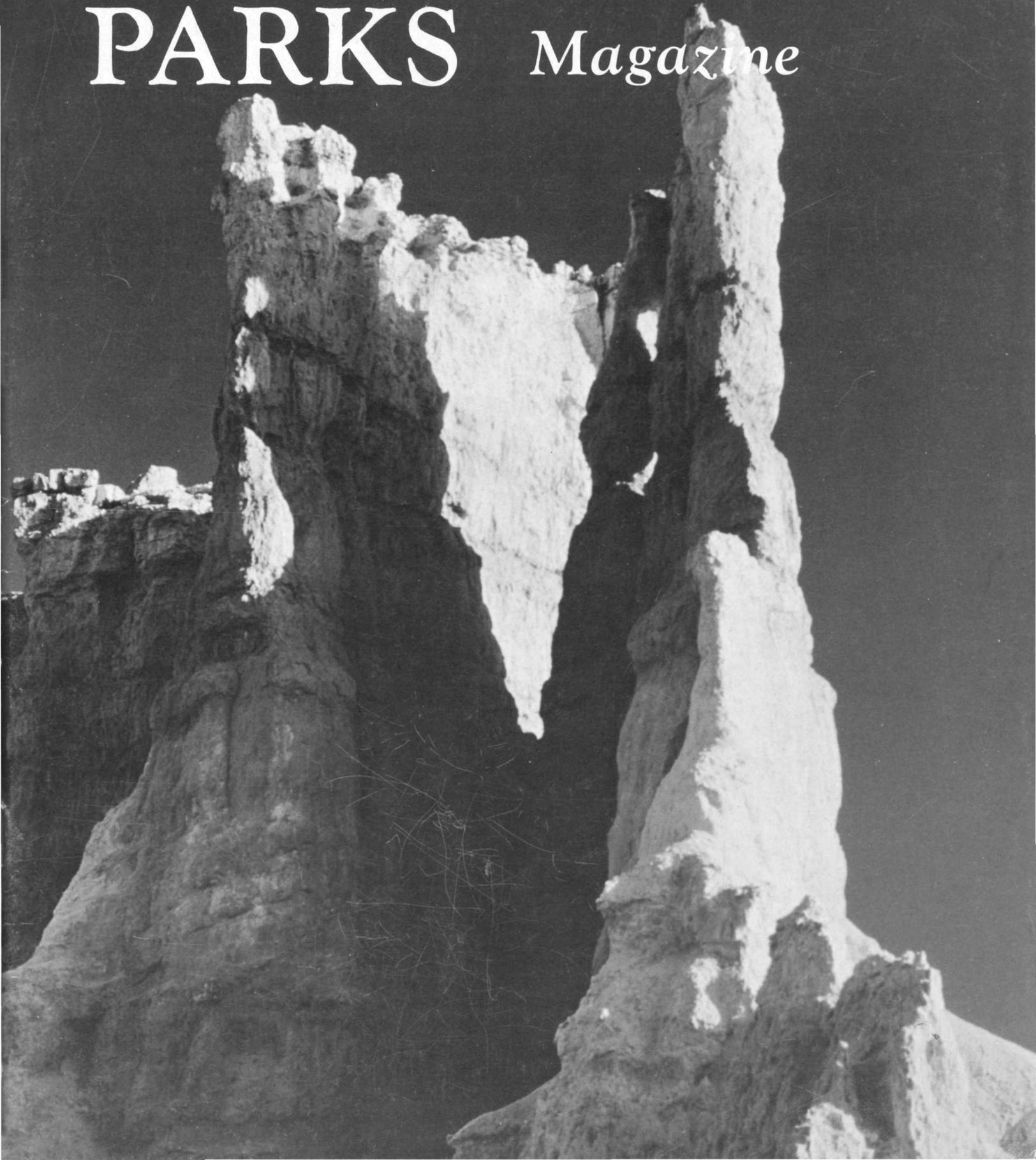


MARCH 1970

NATIONAL PARKS *Magazine*



Butterflies, Yes!

SOME NATURALISTS say that the butterflies have been largely exterminated all over Europe.

We had trouble getting the facts. Entomologists seem to be more interested in the "eradication" of pests than in the fate of the harmless or beneficial insects. But apparently the butterflies are for the most part gone in areas of high human population or intensive agriculture. And how many natural areas exist anymore in Europe—or in most of America?

The causes of this catastrophe are clear: food plants and habitat destroyed by urbanization and agriculture, and the indiscriminate use of herbicides and insecticides.

THIS TREND TOWARD DEATH violates the ecological imperative: that men may not wantonly destroy the life around them, under penalty of death for themselves.

All over the world, people are beginning to realize that when they turn these lethal agents against the other forms of life, the poison returns upon themselves. We are banning the hard pesticides in America; the export trade will have to follow, and tomorrow the soft pesticides and most of the herbicides. We shall turn to other measures: resistant crops, biological controls over insect population explosions.

THE TREND TOWARD DEATH also violates a moral imperative grounded not only in religious tradition but in depth psychology: that human beings must choose in the long run to move toward integration or disintegration, toward life or death.

Any decision to inflict death upon another creature needlessly or wantonly is a decision to move toward death oneself. Modern society deals far too recklessly in death in all its forms: in weapons of extermination, in a restless immersion in traffic, in the compulsive acquisition of wealth, in a blind flight into uninhabitable cities, in the conquest of nature.

An aura of deadly destiny hangs over the process: a tragic fate decreed by character. Freud called it the death wish; Fromm calls it necrophilia. The lifeward impulses of the race must throw it off.

AND FOR SOME PERSONS there is a relational imperative as well. These are the people who know directly and without question that all other creatures truly exist—exist as beings, aware, conscious, perhaps self-conscious. Such a perspective, such a sense of existences and relationships, precludes throughout one's mature life the infliction of pain or death if it can be avoided, even upon the humblest of creatures.

Assuredly, one should add the esthetic imperative, and

certainly where butterflies are concerned. Beauty is the poignant promise of life, perhaps everlasting. That is one meaning of the story of the Flood and the Rainbow. Men may not destroy beauty with impunity.

Of urbanization, and what it has come to be, men can say only that some of them thought, perhaps even a century ago, that it was growth, urbanity; now it reveals itself as but another road to death. Life must be planted and cared for again in the cities, the metropolis diluted and dispersed into green. When the robins and butterflies return to the cities, the prophecy will be lifeward again for men.

THESE AIRY CREATURES, these butterflies, are guided mainly by sight. Their world, their lives, must be a dazzlement of color, a fragrance, a sweetness of nectar, a life of wind under wings.

Their own patterns and colors, and those of the night-flying moths, are marvelous indeed to behold. All the artistry of the universe glows in these delicate designs. The mystery of transmutation from worm to wings fascinates human parent and child.

It is the intrinsic value of life to itself that is important; it is irrelevant whether the other forms of life serve man. The other creatures exist not merely to cooperate with man, to serve and be served by him, but for themselves.

The universe lives in the butterflies quite as fully as in man, perhaps more fully. Man has no license to destroy them; nor when he is truly man, any wish to do so, but rather to preserve and restore them; for man as man is protector, not destroyer.

THE CRUDER SPECIES of real estate developer, progress peddler, profit-grabber, technocrat, has been happy to call all conservationists "bird-watchers" and "butterfly chasers." We recommend bird-watching as pure delight. And the butterflies, when men come alive again, and the world is full of insects, and birds, and furry animals once more, will alight on the back of your hand.

We need programs for the restoration of the butterflies, such as letting the wildflowers grow, or planting nectar crops. All over the world, the poisoning must stop. The mania for economic growth, the compulsion toward urbanization, the mindless proliferation of the race, must be taken in hand.

A new respect for life must be created, which is to include a warm love and admiration for the insects, and the spiders, all of them, incredible as they are, because the love of life is indivisible. From such a moral milieu, and creating it, man himself, like the butterfly from the cocoon, may emerge as man.

—A.W.S.



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COVER "Gulliver's Castle" by Donal W. Halloran

Grotesque rock formations, gnarled trees, sculptured logs, alpine wildflowers, spectacular vistas—Bryce Canyon National Park offers many photogenic subjects for the photographer, so a park naturalist capitalizes on this fact in developing an interpretative program for visitors (page 10).

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oil pollution

ira n. gabrielson

**“we can’t sail anywhere
in the Atlantic
without finding oil”**

The environment always has been trampled under in the rush for mineral resources as valuable as oil. In the past, damage from oil exploration, though often extensive, has tended to be confined to the locality of the industry. Modern oil industry practices, however, are changing the picture drastically. Oil is produced more and more from the ocean floor, it is carried by giant tankers, and its refined products fuel nearly all the ships afloat—a combination that now is polluting the seas.

For many years during residence on the Pacific Coast, another ornithologist and I took advantage of every opportunity to walk the beaches of Oregon, mostly in Lincoln and Tillamook Counties and less frequently in the more southern counties. We were studying birds and bird movements and made notes on all the birds we saw, including the dead ones found along the beaches.

There were few occasions over the 17 years that we lived there when we did not find oil-soaked and dead or dying birds. This amounted to only a few birds in some instances and to many thousands in others. Obviously even in those days oil was taking a steady toll of bird life. From what we know now, it also was killing or harming other animal and plant life of the ocean environment. We had no information as to where and how this oil originated, but we assumed from information given us by Navy friends that it came from the bilges of ships plying the Oregon coast.

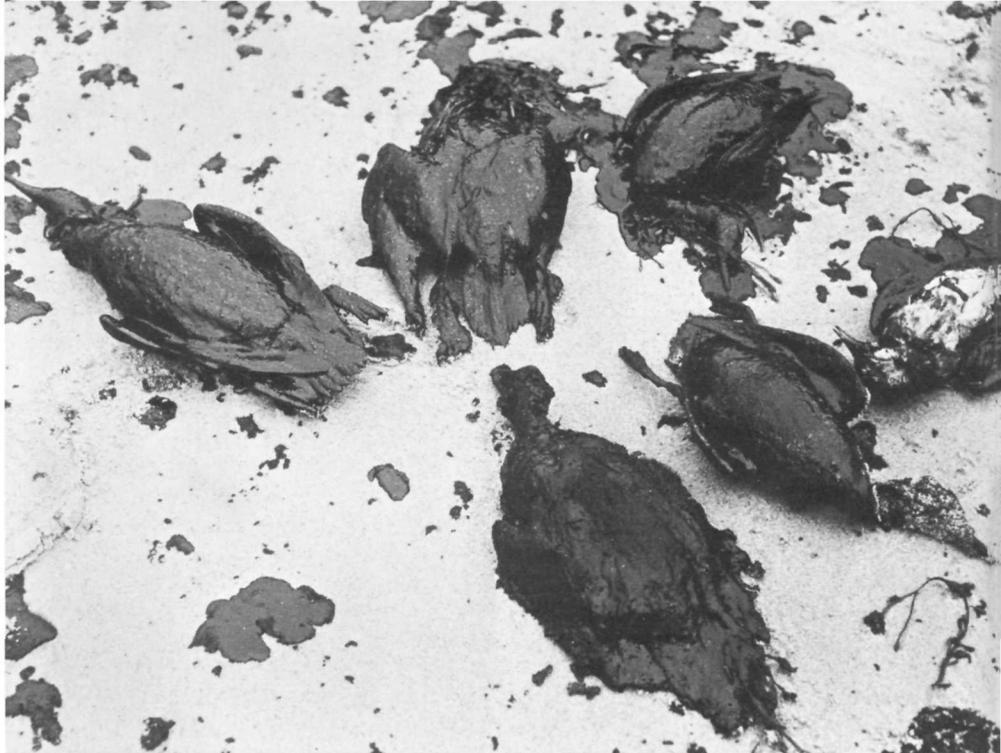
It is obvious from this experience and those of many other ornithologists of my acquaintance that spilled oil, no matter its source, is taking a constant toll of bird life, particularly among the oceanic birds. We saw more of it along the Pacific Coast because we spent more time on the beaches there. During our studies we also found dead fur seals and fish. Some were covered with oil, but we had no way of proving what killed them.

There is no doubt in my mind that the problem is more acute today—all the legislation, safeguards, and agreements notwithstanding—simply because there are more ships plying the oceans; more underwater oil exploration and recovery; more refineries and terminals; and more of everything that accidentally or deliberately introduces oil into the aquatic environment.

Not long ago, a senior biologist at the Woods Hole Oceanographic Institution reported that “Just in the past few years we are finding we can’t sail anywhere in the Atlantic—even a thousand miles from land—without finding oil.”



PAUL CIGUERE, CALIFORNIA DEPARTMENT OF FISH AND GAME



Oil affects birds in several ways. It clots their feathers and weighs them down, interfering with their ability to fly. It destroys the natural buoyancy of the body feathers of swimming birds so they cannot swim and feed; likewise it destroys the feathers' insulating value. Therefore, oiled birds may die from exposure and starvation. Birds may swallow oil during the process of preening, and this ingested oil may lead to poisoning, though little is known of this aspect. Finally, even if birds do not come in direct contact with oil, it may destroy or overlie the lower marine life on which they feed.

spilled oil is taking a constant toll of bird life

During the course of our early studies of Oregon bird life, we found specimens of practically every sea bird that is even occasionally found along that beautiful coast. If my memory serves me correctly, for example, the first records of a red-legged kittiwake south of the Aleutian Islands was an oil-soaked bird picked up on the Oregon coast. It now is a specimen at the Patuxent Wildlife Research Center of the U.S. Bureau of Sport Fisheries and Wildlife.

Not only did we find birds such as murre, puffins, auklets, gulls, cormorants, shearwaters, and others that had become victims of oil spills, but we found numerous ducks, mostly of the diving species, although I also recall picking up a few mallards and pintails. I have seen few birds affected by oil spills on land, but I have seen some, particularly in Texas.

None of the kills of birds I experienced along the Oregon coast occurred as a result of any spectacular disasters such as have filled the headlines in recent years. As damaging and as unfortunate as the major accidents are, I believe the industry will agree that oil slicks arising from the bilges and the ballasted fuel tanks of ocean vessels are the most serious offenders today. Oil comes, too, from wrecks and accidents, mechanical failures, and from care-

less handling at manufacturing plants, refineries, and terminals. All in all, a Woods Hole scientist has estimated that oil spills total at least 1,000,000 metric tons a year and perhaps much more.

The Torrey Canyon affair and the Santa Barbara oil spill greatly heightened public concern about the handling of oil. Those two incidents gave massive and visual proof of the direct impact of oil on the environment. I believe the public will remain sensitive to the problem and that the oil industry will be operating in more of a fishbowl than ever before. The industry is aware, I believe, that various aspects of the problem are attracting the attention of more and more well-qualified specialists in the environmental disciplines. We are only at the entering stages of understanding this whole problem.

Right now, there is national concern about the possible adverse effects of the development of oil on Alaska's Arctic coast. The Department of the Interior has issued stringent stipulations regarding the construction of the proposed 800-mile pipeline from Prudhoe Bay to Valdez, but it is not asking Congress for enough money to adequately police and inspect the project to see that the stipulations are obeyed. Apparently, the State of Alaska is even less concerned about what happens on its lands that are involved in the oil activity. Many conservationists have visited the area, and every one of them with whom I have

talked has been very critical of the way in which the tundra is being manhandled.

I know that the oil companies fly newsmen and other writers up there to give them a firsthand look. The hope, of course, is that the industry's side of the story will get into the news. My staff has been contacted by some of these newsmen, and we find that they use a key phrase voiced so much by our friends in the oil industry. "The tundra is a wasteland," they argue, "so why does it matter what happens there?" That one point, I submit, is symptomatic of the larger environmental issue in which the oil industry finds itself involved.

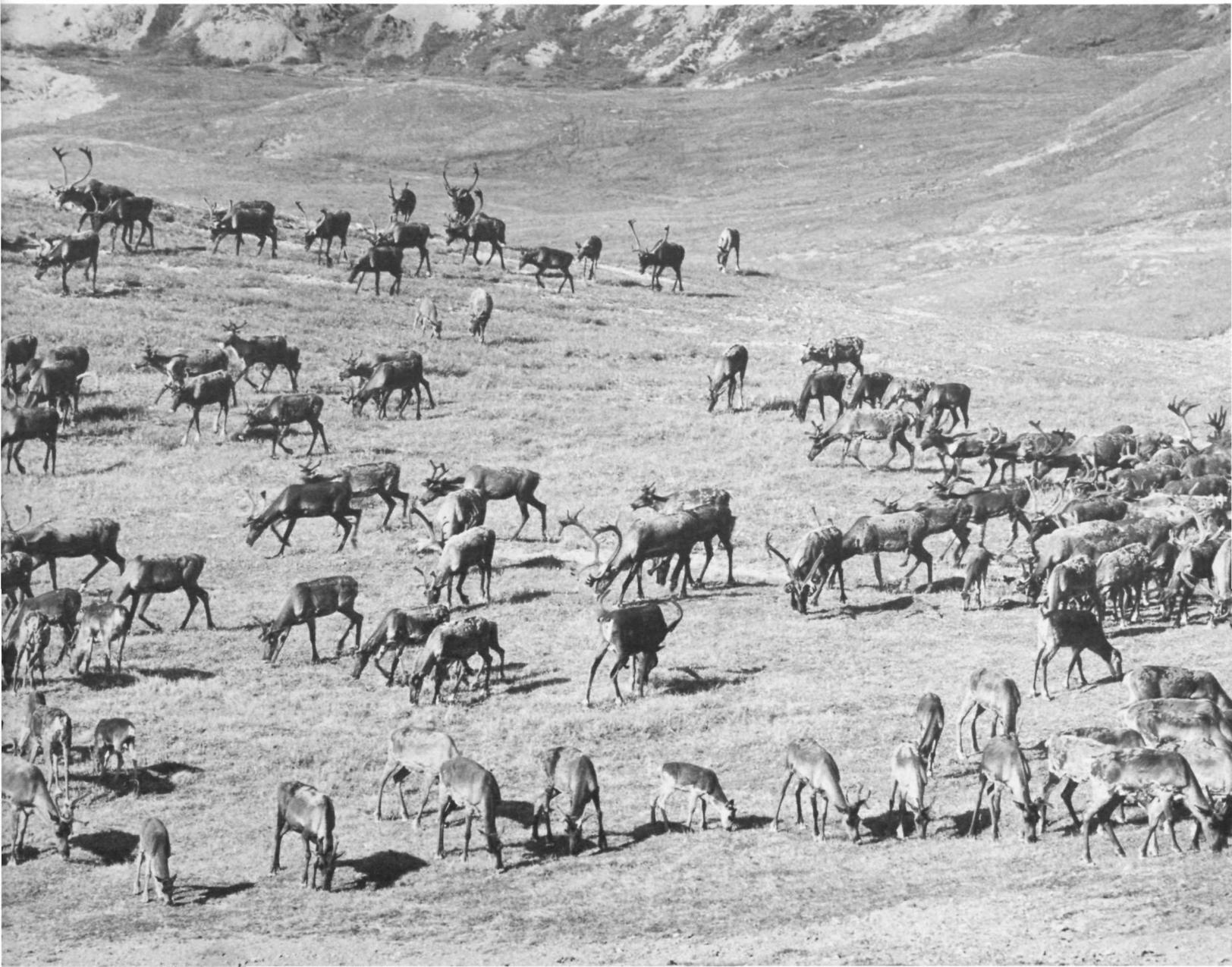
That point is that engineers and bulldozer operators are not qualified to pass judgment on whether an area is a "wasteland" or of little or no moment in the overall scheme of things. They are not the ones to pass final judgment on the relationship of their activities to the environment. They may understand the physical relationships, but they do not know the ecological ones. They can converse knowingly about cubic yards and pumping capacities, but they

engineers are not qualified to pass judgment on whether an area is a wasteland

know little or nothing about hydrocarbon concentration in aquatic organisms, the insulation shield of tundra vegetation, or any other of the complex environmental relationships.

The tundra lichen is one of the staple foods of the caribou, and the various species of berries that grow and ripen on the tundra provide much food for great populations of birds that nest there. This vegetation is slow growing, and many studies have indicated that lichens, for example, take 40 years or more for rehabilitation once destroyed. Destruction of this fragile vegetation is equivalent to destroying a forest area farther south on the continent.

Barren ground caribou grazing on the high tundra, interior Alaska.



Now, the oil industry can do a good job and has done a good job in a number of places that I have been shown. It can develop wells without defacing the countryside and without destroying the vegetation. It undoubtedly costs more to operate this way, but industry will be paying more and more to conduct its operations within the limitations of environment. Business leaders now state publicly that *effective* environmental protection—and I emphasize effective, long-term protection as opposed to public relations demonstrations—will be a paramount factor in deciding public acceptability in the future. It is my experience that the oil industry needs to be more uniformly responsive to this point of view.

In Alaska, I hope that the federal and state governments and the industry will achieve new breakthroughs in positive actions to protect the environment. It no longer is adequate to say only that the state needs the revenues that will be generated or that the country will benefit generally from the discovery and extraction of Arctic oil, if the whole activity is undertaken in such a way as to seriously impair the environment of that largely unspoiled land. Industry still has to prove that it can explore for and remove the oil in such a way as to make the least inroads on the environmental factors involved.

In fact, this is the challenge facing the industry everywhere—not just in Alaska, but everywhere it now operates and where it may be operating in the future. Americans,

as well as the residents of some other of the world's developed nations, are environment-conscious. Today, more than ever before, people are acutely aware of the massive threat to the environment from the expansion of population and all that it entails. They are calling on their governments for the kinds of laws and regulations that will safeguard the environment from further deterioration. There is not the least question in my mind that we are only at the early stages of this awareness in the United States. Environmental matters will be receiving more and more consideration. These new considerations are going to require new investments and the discovery and use of new techniques. The oil industry prides itself on innovation and technological advancement. It knows that something is not necessarily right because of its practice or utility in the past. It is time that the industry embraces these environmental considerations in a more meaningful way.

Because of the extent and nature of its activities, the oil industry will feel this pressure for environmental awareness more sharply than others. More and more, as accessible oil reserves are charted and exploited, the industry is moving into the fragile and sensitive areas of the environment—on the continental shelves and in deep water—where conditions test man's technical knowledge and equipment to the fullest. There is movement, too, into remote areas, like the Arctic, where the forces of nature pose severe tests of men and their equipment. From what

An insufficient layer of gravel in road construction resulted in thawing of the permafrost and severe degradation of the tundra at this well site at Pt. Storkensen operated by Pease-Hamilton.



DIVISION OF WILDLIFE REFUGES, INTERIOR DEPARTMENT

detergents and dispersants are pollutants

we know and have experienced, I believe it is safe to say that the constant threat of accident alone is adequate to keep the industry in a state of ready alert. But the things we do not understand fully or only now are beginning to grasp add greatly to this uncertainty.

In the coastal zone, where tides can move pollutants many miles from their point of introduction, and where the vagaries of nature constantly threaten the permanence of industry's operations, there are many more questions than answers. Operating risks are easily charted, and equipment and procedures are designed to lessen or minimize them. These are the physical sorts of things that are within the realm of the engineers and geologists. But let us consider the biological or environmental problems that are not susceptible to physical approach.

As the Torrey Canyon and the Santa Barbara incidents illustrated—and keep in mind that those two unfortunate incidents are only symbolic of the vastly greater problem of the constant pollution of the sea by oil—man lacks positive methods of dealing with oil once an accident has occurred. The usual approach is to try to contain or isolate the floating oil—an attack that works rarely, if at all—or to remove it from the public eye by sweeping it under the ocean's surface by means of detergents or dispersants. More animal life was killed by chemicals used in the Torrey Canyon accident than by the oil itself. Containment failed as an attack at Santa Barbara, and everyone knows the loss that followed when the oil floated ashore.

But let us give some thought to the total aquatic environment, that vast volume under the surface of the sea, where only patient prodding will reveal what may be going on and where currently we have only the sketchiest outline of what happens when hydrocarbon molecules enter the mainstream of the sensitive aquatic community. In the first place, detergents and dispersants are pollutants in themselves. In the volumes in which they may be used, they add much of an alien chemical nature to the aquatic environment. And as in the case of Torrey Canyon where the detergents were dissolved in low-boiling aromatic hydrocarbons—which are poisonous to man and all other organisms—the results can be immediate and catastrophic.

Crude oil and its finished products consist of various hydrocarbon fractions—low-boiling, high-boiling, olefinic—the implications of the introduction of which into the aquatic environment are not fully understood. In weak concentrations, the low-boiling hydrocarbons have been demonstrated to produce anesthesia and narcosis. At higher concentrations, they produce cell damage and death in many lower forms of marine animals. They also seem to be injurious to the larval and young forms of other marine life. Many of these organisms are at the thresholds of complex marine food chains, whereby larger and more advanced forms feed on and are dependent on the lower forms. Man, of course, is the ultimate beneficiary of marine productivity because he uses sea life for food and other purposes.

The higher boiling hydrocarbons apparently occur naturally in marine life. Although perhaps not directly toxic to exposed animals, they may interfere with nutrition and reception of the chemical clues that are necessary for communication between many marine animals. More research is needed to understand fully these interactions.

Suffice it to say that even if the detergents or dispersants are not toxic in themselves, their use apparently accelerates the exposure of marine life to the toxic hydrocarbons. Some of the hydrocarbon fractions are suspected of having carcinogenic activity. These hydrocarbons are stable and can be retained and concentrated in the marine food cycle as the lesser animals are consumed by those higher up the animal ladder. Some ultimately may end up in man.

These relationships are not known firmly. Only now are they beginning to be suspected. Unknown, too, is the long-term impact of dispersed oil on the marine environment itself. Limited research points to abrupt and substantial changes in animal populations. Virtually nothing is known about the effect of the oil on ocean bottoms, whether it remains in partial suspension, or where it moves.

Sweeping the oil under the ocean's surface is reminiscent of the old proverb, "out of sight, out of mind." It resolves nothing as far as environmental contamination is concerned.

■ The problem is more profound than just removing the stain from the ocean's surface. We need less enthusiastic claims by industry of miracle chemicals that neutralize or disperse oil slicks, supposedly making them harmless and noninjurious to man's interests. We need less of a defensive and apologetic posture on the part of both government and industry. We need recognition of the fact that the direct and allied activities of the oil industry represent a substantial threat to the environment and that precautions are needed at every stage of the exploration, extraction, and handling of oil. We need less reaction and more cooperation in pushing for research to get the answers that are required. The industry must insist on better cooperation from its own people and from allied operators who have and use petroleum products. The industry had better realize that an indifferent tanker captain, a red-necked bulldozer operator, or a glib public relations specialist can be among its greatest liabilities.

Concerned people—conservationists and industry personnel alike—acting in a spirit of cooperation can stimulate the action needed to overcome a serious problem. Let us work together to find a solution! ■

Dr. Ira N. Gabrielson, well-known biologist, is Chairman of the Board of the Wildlife Management Institute. He was formerly Director of the U.S. Fish and Wildlife Service of the Department of the Interior. Dr. Gabrielson has published many articles and books about wildlife conservation and management. This article was adapted from a speech presented at the Joint Conference on Prevention and Control of Oil Spills, New York City, December 15, 1969.



Creating

AN EFFECTIVE INTERPRETIVE PROGRAM

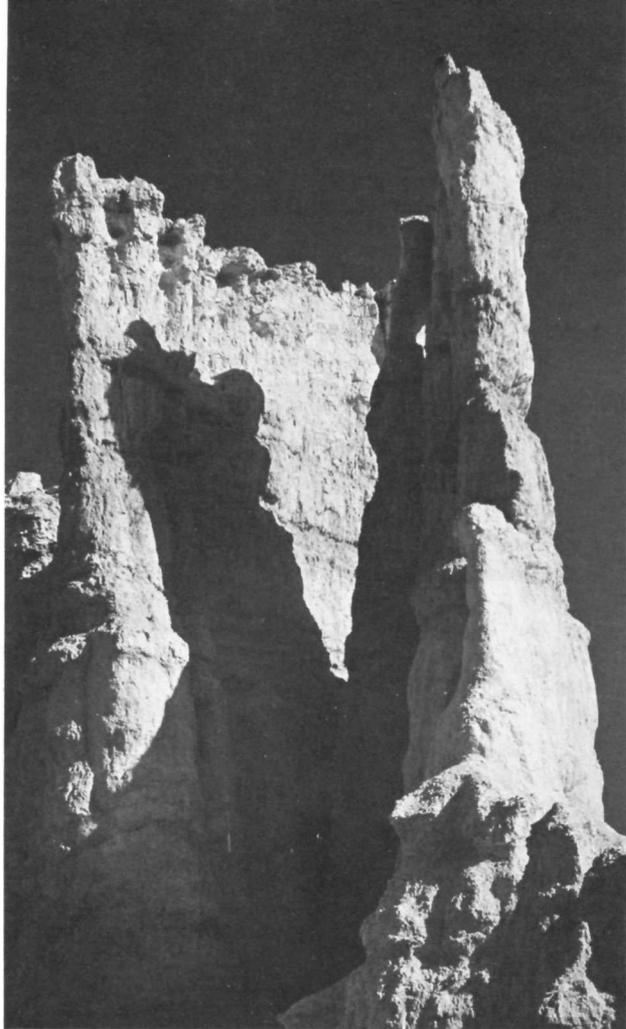
DONAL W. HALLORAN

Reflecting about my experiences as a naturalist at Bryce Canyon National Park in Utah, I see clearly that all the elements for a productive interpretive program were present. The superintendent had stressed the principle of providing education as well as service to the visitors. In addition, the chief naturalist encouraged new approaches to the natural history of the region. By the hiring of three receptionists, naturalists were freed from routine visitor center duties, such as the sale of postcards and books, so that the time could be used for library and field research. By the selection of naturalists with backgrounds in biology, geography, and history, our group was able to handle general as well as specific questions from visitors. Also, we were able to help one another by exchanging ideas from our various disciplines. These conditions probably are not unique to Bryce Canyon. Other parks undoubtedly have found that creative interpretive programs may develop when qualified personnel are interested in communicating their understanding of the natural environment and are given the freedom to cultivate their concepts. The following programs may help to illustrate the importance of these ideas.

PHOTOGRAPHIC HIKE Bryce Canyon consists of thousands of eroded limestone spires, comprising the eastern edge of the Paunsagunt Plateau. The coloration of the rock varies from white to deep reds, browns, and blues. The north-south orientation of the formation, the high elevation of 8,000 to 9,000 feet, and the lack of a major obstruction to the east contribute to spectacular color changes at sunrise. After noting the many visitors who ventured to the canyon rim at sunrise, I began to think about organizing an early morning photographic hike. The administration was receptive, and we made plans for such a hike three mornings each week.

The main purpose of the hike was to encourage people to let the color and form of the area affect their feelings. In the predawn light, I would discuss my objectives with the group by asking questions: What does the canyon mean to you? What qualities are you attempting to capture on film? How do you feel beside this rock spire or looking down hundreds of feet into the gorge? Is it possible to take pictures that will recall these feelings when viewed at a later time? I did not expect answers; the questions were intended to encourage empathy with the surroundings.

PHOTOGRAPHS BY THE AUTHOR



Gulliver's Castle

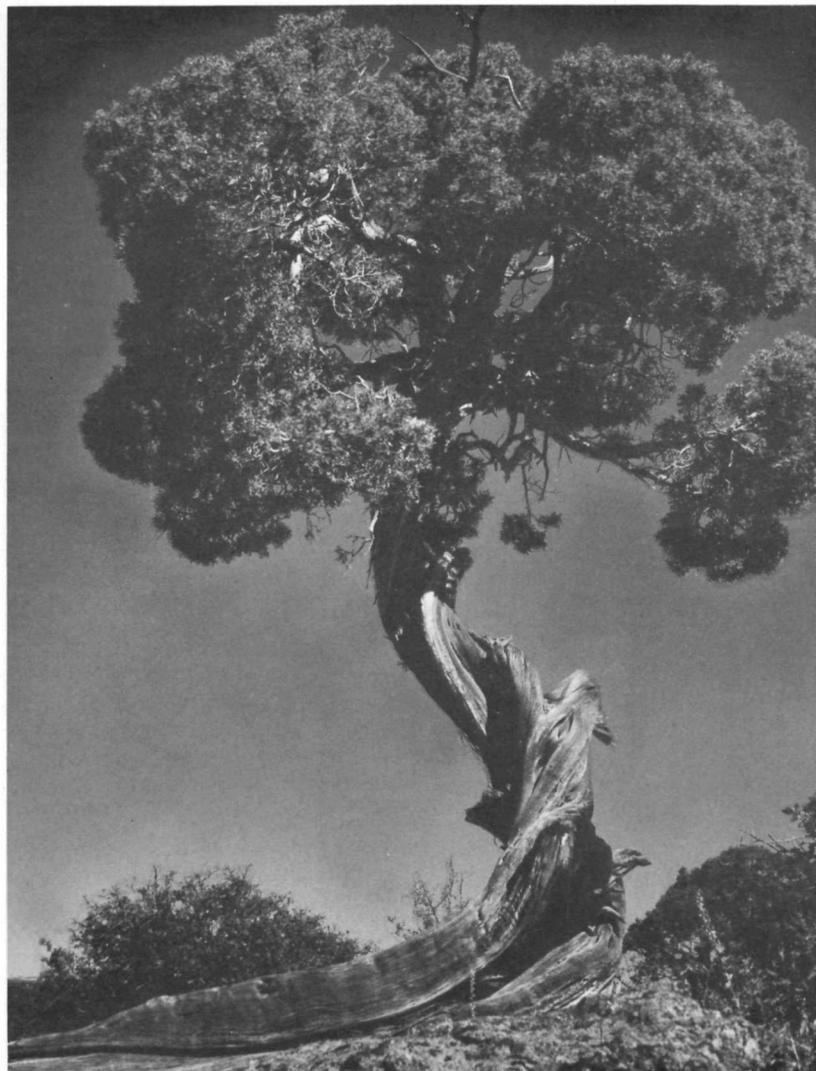
Eroded boulder



In 2 hours we were able to walk at a leisurely pace along the mile-and-a-half trail. Prior training in photography enabled me to answer specific questions concerning cameras and techniques. The only equipment I carried was a spot meter to evaluate the light in difficult locations.

How do you evaluate such an undertaking? Success is revealed by observing the reaction of each group: A person, oblivious to the dust and twigs, sitting on the ground composing a picture of a single flower; the quiet that pervades the group; the involvement each person shows as he finds his own view of the canyon—these signs indicate people beginning to feel unity with nature. Often small groups would gather to share a single view. As they looked and thought, the conversation often moved to topics other than pictures. I recall conversations about man's future, the park system, environmental pollution, and others. These were my personal rewards that made getting up before sunrise worthwhile.

Juniper





BRISTLECONE PINE HIKE The southern end of Bryce Canyon National Park consists of a 9,000-foot promontory with a spectacular view toward the Kaibab Plateau that contains the Grand Canyon. Spruce, fir, bristlecone pines, and a variety of alpine wildflowers cover the plateau. Sculptured logs, bleached silver-gray by the sun, are scattered among the living trees.

This area was under consideration in 1966 for a guided hike; however, the delicate nature of the plateau precluded a wide trail open to large groups of people. The naturalist staff worked closely with maintenance personnel; and the trail that resulted was a narrow, winding path conserving the beauty of the area.

We tried to let the area dictate the mood for the hike. In the dense forest conversations were minimal, allowing the spell of solitude to pass over the group. Irrelevant stories and jokes were replaced by natural history observations. After stopping to examine saprophytic plants, the midden piles left by squirrels, and the differences among trees, we would emerge from the dense forest onto the sparsely treed rim of the plateau. The transition had a startling effect on the hikers, who often would stop to gaze around as if they had suddenly found themselves on the moon. Many did remark that the soil quality, the scattered pines, and the sun-bleached logs reminded them of another planet. Scientific observations of climate, soil, and vegetation seemed superfluous while people were enjoying the elation of the view and the gnarled pines. We can easily destroy the joy of such an experience by imposing information on the visitors. Given time, they begin to ask about the nature of the region.

Below, naturalist John Barnett shares with visitors appreciation of such natural phenomena as bleached stump, at left, on guided hike.



CAMPFIRE PROGRAMS Perhaps the oldest tradition in the Park Service is the evening campfire, complete with singing, announcements, stories, and illustrated lectures. I would be the last to condemn this means of communication; however, I would join with those interested in improving the quality and depth of the presentations.

During my summers at Bryce Canyon, each naturalist had three campfire programs a week at three different locations within the park. Many chose to use a single talk throughout the season. Repeating myself that often during the summer was not appealing, so I developed three separate programs. In organizing the campfire, I wanted to capitalize on the following: my background in biology, conservation, and photography; the visitors' interest; and the visitors' prior travel in the Southwest. The talks were illustrated by using dual slide projectors integrated with a lapse-dissolve unit. As a source of slides, I relied on park files, my own photographs, and copies of maps and magazine pictures. Because campfire singing was optional, I chose to devote most of the campfire to the slide program.

My first talk, "The Web of Life," covered the ecology of the plateau region. This program was based on people's general interest in nature and on my training as a biologist. It was not the usual series of appealing pictures of plants and animals, but a selection of species that would illustrate the biological relationships within this environment. The first slide introduced the viewer to the terms *producer*, *herbivore*, *carnivore*, and *decomposer*. The second slide demonstrated the organization of these terms in the form of an ecological pyramid. Only common plants and animals were selected in the hope that the visitor would recognize them in the park and elsewhere and understand their natural role. Besides general animal slides, I included specific photographs illustrating differences in dentition, foot structure, and habits that aid in adapting the individual to its environment. The program ended by considering man in the "web" and the ways in which he has altered and upset the delicate natural balance.

The program at Bryce Canyon Lodge required special attention. This was a large adult audience, composed mostly of people completing a 4-day tour of Zion, Bryce, and Grand Canyon National Parks. Their familiarity with these parks prompted me to develop an adult program entitled "Story in the Cliffs." This talk covered the evolution of life as revealed by the fossils in the sedimentary rocks of the three parks. These parks are unique in that the entire history of life can be traced from the Precambrian and Paleozoic eras of the Grand Canyon through the Mesozoic era of Zion Canyon to the Cenozoic era at Bryce Canyon.

I would begin the program by posing questions: Of what value are these parks? What can we learn from our parks? Because the terms of the geological time scale might confuse the audience, I substituted a 6-year time scale. The audience was always amazed to learn that in this scale the history of man spans a period of about 15 days. The program ended with a series of examples illustrating problems of pollution and population that plague us today. Judging from the audience response, the program seemed to bring order to the many geological facts they had accumulated during their tour.

My final plan for a program came to me when I was

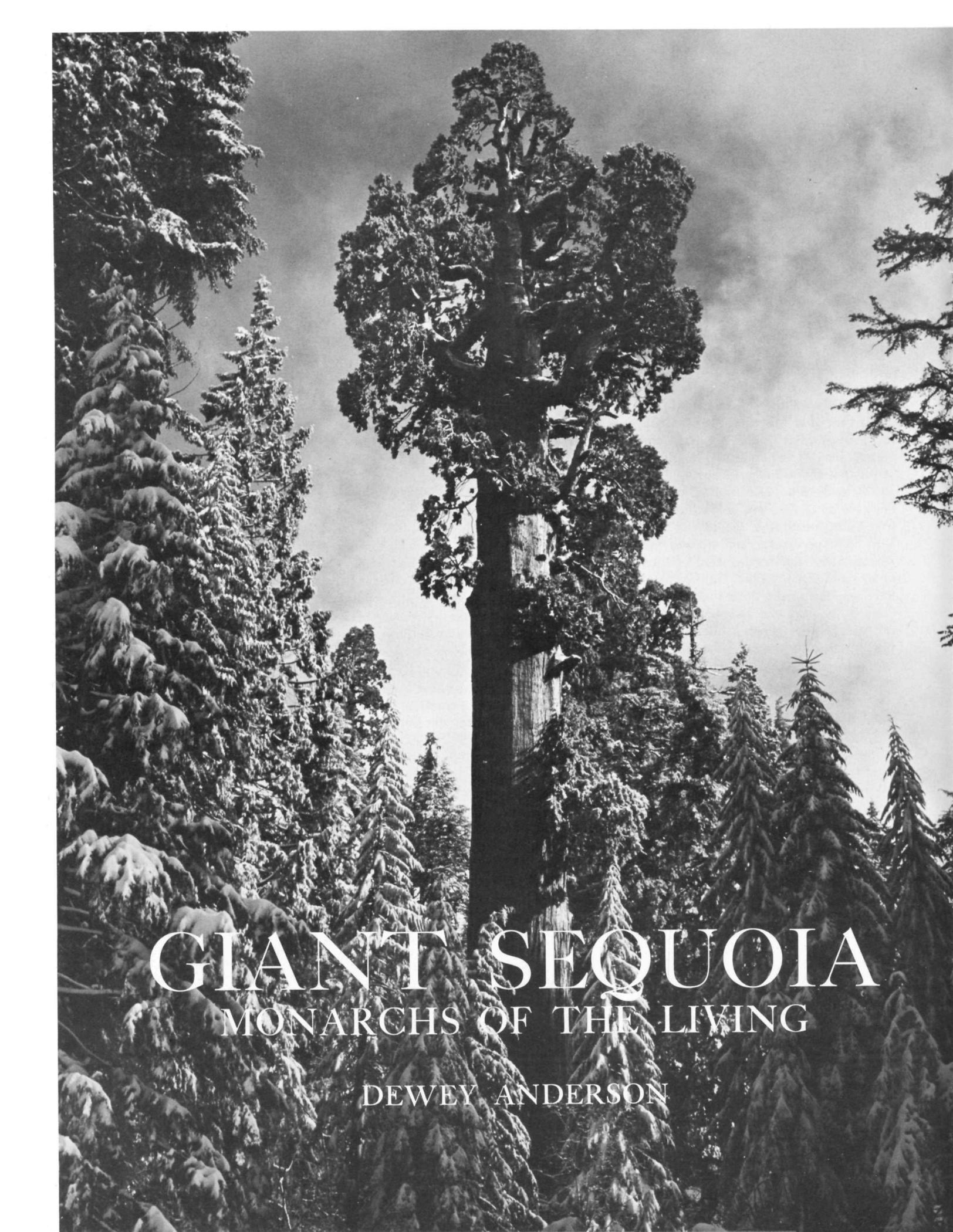
taking photographs from the rim of the canyon. A couple had been looking into the distance for some time when the man remarked, "As far as I can see, it's just a desert wasteland." This remark disturbed me, for I had only pleasant experiences from my travels in that "wasteland." I remembered my excitement in following the dirt road to Hole-in-the-Rock on the Colorado River. Here, in 1880, the Mormon Pioneers lowered 83 wagons and floated them across the river in their trek to colonize southeastern Utah. Another trip had taken me into the remote Henry Mountains of Garfield County to photograph bison and other wildlife. And more recently my wife and I enjoyed a canoe trip on the Colorado River within Canyonlands National Park. Because many visitors did not share my enthusiasm for the desert, I decided to share my experiences with them in a talk entitled "A Traveler in the Arid Lands."

I planned this program as a visual experience designed to dispel the idea that the region was a hostile wilderness. With the dissolve unit mentioned earlier, the screen is never blank, thus eliminating the annoying flash with each slide change. This unit enabled me to include 160 slides during the 45-minute program. Sequences of sunrises and sunsets and the opening of flowers became almost "movie-like" when projected rapidly. The dialogue was minimal, and I relied on the imagery of the pictures to convey the moods of the desert. Besides humor, enjoyment, and understanding, I wanted to convey my concern for the future of the desert. Therefore, part of the presentation dealt with the conflict of interests over water resources, land speculation, and the clearcutting of the pinyon-juniper forest. I received no opposition from the Park Service about including these controversial topics. If areas of controversy are handled objectively in such lectures, naturalists need have little fear of censure.

In judging the effectiveness of all three programs, I relied heavily on audience response during and after the presentation. In terms of the number of people remaining after the lectures, their reflective mood, and the quality of their questions, I felt that many were beginning to understand the nature of our environment.

Although I believe that receptive administration, adequate facilities, and qualified personnel are important elements of any interpretive program, they alone will not ensure effective communication. The task of bringing the conservation message to the public in the national parks rests ultimately with the naturalist. His effectiveness will be measured by his ability to demonstrate enthusiasm and conviction for his programs and to exhibit an understanding of the visitor's needs. ■

Donal W. Halloran teaches zoology at the University of Wisconsin. He studied photography at the University of Utah and with Ansel Adams in Yosemite National Park, which stood him in good stead when he worked as a naturalist at Bryce Canyon National Park during the summers of 1966 and 1967. His talk, "The Web of Life," was selected by the Conservation Foundation to be used in the training of naturalists for the Park Service.



GIANT SEQUOIA
MONARCHS OF THE LIVING

DEWEY ANDERSON

Standing in a grove of the Sierra's giant sequoias, one has a peculiar sense of antiquity. The trees' massiveness, their strength, their great straight shafts towering beyond eyesight into the blue sky above evoke, in some primitive corner of the mind, an arcane memory of our remote past. A singular beauty pervades those deep groves when shafts of sunlight filter through branches as large as most trees 200 feet above. A softness in the air and serenity envelops all about, so that even the most blasé of people feel a kinship with nature that they seldom experience anymore. These venerable cinnamon-red sentinels spread their benign presence about them in a forest canopy so peaceful and quiet that people walk about in hushed, reverential silence. Even children sense the majesty of the grove, and their play becomes less boisterous. Awe is the pervasive feeling in these cathedral groves, whether the visitor is merely passing through on a hurried auto tour or staying a while.

The visitor who lingers has the day-round experience of seeing the redwoods in their several moods. Nothing is quite like rising early and watching the sleeping giants awaken as the sun tips their peaks in morning's first light and makes its way in slanting rays from branch to branch until it comes to rest on the green carpeted floor below, where deer, golden mantels, and chattering Douglas squirrels are about their daily foraging expeditions.

At noon the red-barked sequoias, now bathed in warmth, cast a soft shade through the forest, as picnickers spread cloths at their feet. Unlike their first cousins, the coast redwoods (*Sequoia sempervirens*), *Sequoia gigantea* live throughout the summer on dry slopes where the undergrowth of flowering dogwood, ceanothus, and leafy ground bramble share their sunny days.

At night the moon and stars seem unusually close. Through the richly darkened green foliage of the great branches, their light spreads from the fluted bark to envelop the forest in an eerie red glow. The night things begin their chorus.

So John Muir saw these groves a century ago. And so we fortunate mortals still see them today, because foresight created national parks and forests that stopped destructive logging just in time.

Words are a poor substitute for experiencing firsthand the charm of a sequoia forest. So compelling is the desire for such experiences that already people in numbers reaching the million mark come from everywhere each season to visit the Calaveras Big Trees State Park; Yosemite, Sequoia, and Kings Canyon national parks; and the Stanislaus, Sequoia, and Sierra national forests where dwell the 70 to 90 groves of *Sequoia gigantea* in a stretch of 250 miles along the west side of the Sierra Nevadas. People coming in such numbers—and increasing yearly—threaten the life of these noble trees, because the topsoil beneath them, only a few inches thick, is extremely fragile.

The harm of impacting the soil around the widespread, shallow root structure of the giants is disputed among authorities who are intensively studying the *Sequoia gigantea*. Some claim that damage is irreparable. Others maintain that the impacting process tends to tighten the thin cover layer and actually protects the trees from uprooting when severe winds blow. A considerable body of authority

attests that the soft humus lets moisture penetrate readily and tends to hold what little moisture there is during the long months of the dry season to which the sequoias are subjected.

Not only the tread of so many thousands of feet at the base of these trees concerns conservationists. That many people make many different demands on the forest floor, which cannot absorb the impact nor make a full recovery in the off season. Highways, roads, trails, summer resorts, hotels, summer homes, camps, park structures, and water and sewage systems multiply to serve the needs of ever more people. With this development comes the loss of reforestation seedlings upon which the sequoias and their associates—white fir, sugar pine, incense cedar, and ponderosa pine—depend as old trees mature and die or are victims of winds, heavy snows, and seasonal flooding rains and their runoffs.

One knowledgeable authority with whom I discussed this matter of survival said that the excessive "protection" being given *Sequoia gigantea* within national park and forest boundaries has upset the balance nature maintained between old growth and the maturing of new trees, so today more great old trees fall than new trees reach maturity. Only recently the most photographed sequoia of them all, the Wawona "drive through" tree in the Mariposa Grove at the southern entrance to the Yosemite National Park, fell after withstanding the storms and trials of its more than thousand years. While I was approaching Kings Canyon National Park in summer 1969, a veritable giant in the picnic area at the park center fell unexpectedly and caught two lady picnickers, crushing one and injuring the other. While I was there, two more adjacent trees fell, but the area had been roped off and no one was injured. Experts assembled immediately to study the fallen giants, seeking to determine the causes, for none had been observed as slanting dangerously, and they were considered among the healthy, safe trees in the park.

If the dire prediction of the expert proves true, then one day our successors may see few age-old giants standing, while they gaze on the dead fallen bodies of what today are magnificent living trees. But this prediction does not have to come true.

Too little manpower and slim budgets combine to prevent the kind of forest management that *Sequoia gigantea* needs for maximum growth and survival. These forest areas generally suffer from widespread lack of modern forest practices, which require thinnings, removal of less desirable species, reforestation, and care of the species desired. In the present nonintensive forest management program *Sequoia gigantea* is the big loser. Its seeds, falling on duff (humus, debris, and vegetable mold) and unable to reach the mineralized soil below on which their rooting and survival depend, too frequently fail to germinate. When they do survive, most cannot compete for nutrients and sunlight with faster growing white fir seedlings and are crowded out within a few short seasons. Moreover, seedlings are fragile and are subject to attack by birds and insects; and lack of moisture limits their survival. Therefore, sequoias are not reforesting as they would if nature were allowed her way.

One of nature's ways to establish new sequoia growth



NATIONAL PARK SERVICE

House Group of giant sequoias in the Giant Forest of Sequoia National Park. Seeds that fall on thick duff have no chance to sprout.

is by fire. Once fire from natural origin that swept through forested lands every few years removed the duff, exposed the soil to accept seeds, killed the understory competition, limbed the larger trees so the sun could penetrate, and even removed competitive trees of other species that could not withstand the fire's heat. As many scars testify today, mature *Sequoia gigantea*, with their deep, fire-resistant bark and their crown high above the fire in the understory, withstood even the severest fires. The following October, when seeds are cast, the sequoia seeds found a suitable seedbed prepared by the fire. This is not the fantasizing of an amateur silvaculturist; it is a summation of scientific work under way now by R. J. Hartesveldt, ably supported by his associate, H. T. Harvey. (See also Harold Biswell, *National Parks Magazine*, July 1969.)

John McLaughlin, long-experienced park leader and presently the Superintendent of Kings Canyon National Park, took me down unspoiled sequoia-clad Redwood Canyon, where as many as 57 lofty giants can be seen from one spot, to meet the scientists and observe their work at first hand. Under control conditions, with experimental fired plots adjacent to unfired plots, the survival of sequoia seedlings in the fired area exceeded those in the unfired area fully 200 to one. Dr. Hartesveldt's studies will not be completed until 1976, but already it is apparent that fire is a valuable management tool for reforestation of the species.

The work of these scientists does not end with fire experiments. Diseases attack the sequoias through openings in their trunk caused by past fires and storms. What diseases,

A dense young mixed conifer forest provides a continuous supply of fuel for wildfire. This young forest also competes with sequoias for water and nutrients. The sequoia root system is very shallow, extending down only a few feet but radiating out from the trunk 100 to 200 feet.



PHOTOGRAPH BY THE AUTHOR

how they do their harmful work, and how to prevent their damage has been conjecture until recently. A member of the group studying this aspect of the problem, Ron Stecker of San Jose State College, was over 200 feet up at the top of a hollow redwood when I arrived below to talk with him. He got there perched in a safety cage via a cable worked from a power gear below, his wife operating the rig to raise and lower him. How he got the cable attached to the treetop is a story in itself and best told in connection with the way Yosemite Indian climber and park forestry foreman Charlie Castro put out the blaze in the top of the 279-foot California Tree in Giant Forest in 1967.

Lightning struck the hollow crown of this beautiful tree on August 24 during a terrific storm. It kept burning for several days, a crown fire that could be seen for miles. Embers and falling branches threatened the other trees of the grove, including the celebrated General Grant Tree, affectionately known to thousands as the nation's dedicated Christmas tree, a fitting title for this monarch with its 267-foot height, its great bowl, and its hoary 4,000 years of life. All the experience of trained fire fighters was employed to put out the blaze, but to no avail. Helicopters hovered over the tree's crown, dropping tons of water on it in 13 deliveries, and still the flames blazed. Excitement was high, and the tree was feared doomed, when the park superintendent called Charlie Castro.

He studied the tree with his practiced eye and concluded that no one could hold onto its heavily fluted bark and climb from the ground level of its vast bowl. Some distance away stood a tall fir, which he ascended with spurs and rope to a height of 170 feet. There he attached his long rope, the other end about his waist belt, descended some 20 feet, and swung free like a clock pendulum toward a limb of the California Tree some 70 feet away. While the observers below watched breathlessly, Castro caught a limb of the giant sequoia on his first free swing and then began his perilous ascent from limb to limb to within 15 feet of the flaming top. Around his waist was encircled a small, stout cord that he then lowered to his willing helpers below. They attached a fire hose to it; and, hand-over-hand, Castro hauled it up to where he could manage the nozzle. Then began the fire fighting in earnest as he guided the high-pressure water over the crown onto the flame and in six different places where flames were spouting along the trunk of the tree dangerously close to the high-perched fire fighter. After exhausting hours the flames began to subside, only to be followed by choking smoke, which in turn subsided—and Castro knew he had won. The tree was saved, and the forest grove no longer was in danger. But he still had to make the hazardous descent, now wearied by his efforts and none too sure in his rope hold on the great tree's trunk.

Descending from his dizzying height of some 250 feet above ground was slow work, and again the ground crew waited breathlessly as he inched his way toward them. Then the moment of complete triumph came when they welcomed him back to earth in the hearty way outdoorsmen have with a courageous comrade whose work they admire. The acknowledgement of the Park Service was expressed in practical terms by a substantial cash award and a merit citation.



NATIONAL PARK SERVICE

Dr. Richard J. Hartesveldt, left, and Dr. H. Thomas Harvey, ecologists of San Jose State College, record sequoia seedlings in test plots in Kings Canyon National Park.

Thus Charlie Castro saved the California Tree, so it was only natural that he climbed up and put the cable at the top of the tree where Ron Stecker was sitting in his cage studying bugs when I visited him last summer in Redwood Canyon.

Appropriately, although officially no more giant sequoias are given proper names, Stecker has his "Castro Tree" in which to work. What he does there bears directly on the seeding, growth, and survival of these majestic trees. Certain insects get into the hollow top, eat the succulent live cells, kill layers of living matter, may undermine the living layer, and thus weaken and even kill the tree itself. Tiny pea aphids by the millions were discovered for the first time in any conifer, feeding on the green foliage of the tree. Parasitic wasps live and feed on the treetop. One of the ecological roles played by the longhorn wood boring beetle

Assistant Professor of Entomology Ronald Stecker, San Jose State College, and Forestry Foreman Charles E. Castro, Sequoia and Kings Canyon National Parks, prepare for a trip to the top of a sequoia tree. Mr. Castro rigged the special lift in the tree under Prof. Stecker's guidance.



NATIONAL PARK SERVICE

(*Phymatodes nitidus*) was discovered. Stecker finds him boring into the axial stem and scales of the sequoia's tight little seed cones. The boring kills the cones; they shrink when dry, the scales open; and tiny seeds, some 91,000 of them to the pound, are scattered by the wind to fall aground where new trees can sprout—that is, if the ground conditions are receptive. Here we come back to the controlled fire tool that Hartesveldt and his associates are studying in Redwood Canyon.

A fortuitous set of circumstances helped save the great sequoia giants for us to enjoy today. Once logging was the great threat these trees faced. However, that threat has passed, because the commercial gain from cutting them has become too uncertain. In contrast to *Sequoia sempervirens*, the coast redwoods, these trees make poor timber; their fibre is too brittle, its tensile strength too weak to make good saw logs for building materials, and substitutes have proved superior for grape stakes and fence pickets. But logging took its toll of the giants, which fortunately took place during a more primitive era in lumbering before bulldozers and power saws. So the cut was never overwhelming.

It is one thing to learn scientific truths about the *Sequoia gigantea* and quite another to apply this knowledge on a practical scale—and in time. It will take a shift of emphasis in park and forest management practices to allow controlled burning, for example, on any scale large enough to reforest groves of the giants. Yet competent and practical park officials and forest managers throughout the 250-mile stretch of the Sierras where the big sequoias grow or have grown in the past agree that such sharp departures from usual management practices are overdue if reforestation is to replace custodial care.

Even if this shift occurs in time, the many thousands of people pressing on the fragile soil that covers the parks and forests still endanger *Sequoia gigantea*. Some moves are overdue to control human usage, not only of the centers in parks and forests, but even of the primitive back country John Muir knew so well. In Yosemite National Park, for example, some valiant moves are being made. Camping with tents so close together that their guy ropes intertwined is gone, banished to places outside the center. Roads have been surfaced and traffic rerouted to stop the cut-across pattern that came near to spelling chaos for the park's center. Picnic areas are being dispersed. But offenders are still there, noticed chiefly in the sprawl of Yosemite Lodge and its tremendous turnover of valise-carrying crowds of tourists and the high-paying guests of the Ahwahnee Hotel, which seems a misplaced Miami hospitality amidst the natural wonders of Yosemite.

It will require courage on the part of park leaders,

Dewey Anderson, retired Executive Director of the Public Affairs Institute, is the author of a number of studies in the area of natural resources that have caused national comment.

backed by strong support of conservationists to take the steps needed to reduce the human pressure in Yosemite to a tolerable level. Modern motels and other accommodations should be encouraged outside park boundaries. Visitors could be bussed into the center in sightseeing vehicles with qualified persons pointing out the park's features. They should be encouraged to walk on marked pathways when they view this magnificent sweep of country with its waterfalls, domes, and jagged peaks. The "Coney Island" bathing places along the Merced River on the floor of the valley would be restored to their former natural state, as bathers and sunners sought their pleasure elsewhere along the river. Such moves could materially help relieve the center of the park from the tremendous pressure of people during the height of the summer season. What I propose for Yosemite applies equally to the other Sierra parks and forests where large numbers of people assemble and use the facilities in *Sequoia gigantea* groves.

Even the high country back of Kings Canyon National Park and elsewhere along the John Muir Trail must receive special attention. Since we used to do our pack pulls up and down the major passes of the High Sierra only a short while ago, with nary a ranger met and few other people, too, the day has come when a Park Ranger headquarters has been established. He is assisted by some eight others during the summer, all engaged in keeping the thousands of visitors—hikers, backpackers, and stock packers—somewhat "lined out" as to routes and camping spots and conforming to regulations.

As an example and a harbinger of things to come, consider the road from Eastside Highway 395 up Onion Valley, passable for vehicles to within 2,000 feet of spectacular Kearsarge Pass. The Los Angeles spillover from among its seven million inhabitants sees hordes of organized hiker groups in the high country all summer long, putting heavy pressure on the fragile lands in the meadows and lakeside camping sites, beating the trails into half-foot-thick dust, and forcing the park people to consider installing modified city sewage and water systems to cope with the situation.

If we are to have natural conditions in primitive areas and to reforest the *Sequoia gigantea* groves along the slopes of the Sierra, a special program of use and care is needed—and now. The habitat of the giant trees should be treated in a unified way, with the three national forests, the one state park at Calaveras, and the two national parks, Yosemite and Kings Canyon, working in unison. It might be called appropriately the Sequoia Gigantea Preservation and Growth Project.

Among conservationists there is need for an organization and effort not unlike that which stimulated the preservation of the coast redwoods when the Save-the-Redwood League came into being. Judging by the numerous visitors and their tremendous admiration for the red giants, there is a latent but easily aroused general support of such an effort. Instead of continuing to cry wolf as more and more mature trees fall and fewer *Sequoia gigantea* mature to take their places, conservationists should combine their efforts to reforest the groves and bring new groves into being. That way lies success both for now and for the future. ■

The national park idea, now nearly a hundred years old, has played many vital roles in wildlife protection and preservation; but none is more dramatic, perhaps, than that concerned with the effort to save from extinction the white rhinoceros of Africa. Except for a few survivors in the southern Sudan and a small but carefully guarded herd of the southern subspecies in South Africa, those remaining in Uganda are the last of these immense mammals.

Most conservationists and many other people know how the white rhino has been poached to near-extinction for an utterly useless horn. Some people have heard about the last-ditch rescue operation in which a breeding nucleus was transferred from its home in Uganda's West Nile District to the comparative safety of the country's widely known Murchison National Park. Few, though, know how the transplanting scheme has progressed—or will have heard of Obongi, the park's hand-reared white rhino, whose career was a barometer for the as yet unproved operation.

Oriental people believe that ground rhinoceros horns have magic and aphrodisiac properties, so these unfortunate animals have been hunted intensively. Over the years Uganda's white rhino have suffered their full share of poaching; but until the late 1950's when organized poachers moved in, poaching was essentially casual and not a matter for the greatest concern. However, by 1960, having proved far too powerful for the wholehearted but thin resources of the opposition, poachers had reduced the white rhino population from more than 300 to something under 50. The shadow of extermination was there for even the

D. S. HENDERSON

WHITE RHINO



THE ROAD BACK

blindest to see. Talking, placatory noises, and the constant promises to "review next year" so common to governments everywhere would no longer do, or Uganda's representatives of the world's rarest mammals would be gone.

This was the background for the event in which, during March 1961, Obongi (then a calf of around 2½ years), her mother, and eight other white rhinos found themselves captured and, after many bumpy miles in trucks and a trip over the Nile, released into Murchison Park.

But there were casualties. Nobody had caught white rhino before, and Obongi's mother died shortly after re-

PHOTOGRAPHS BY THE AUTHOR



lease. As a result, the young calf found herself pursued and captured for the second time in a matter of days—this time to remain under “care and protection” until she was entirely capable of looking after herself. Left to her own devices, predators soon would have had her. Thus Obongi—the name comes from the West Nile area where she was first caught—came under the care of Roger Wheeler, the park warden. Over the years, in a relationship neither one-sided nor fleeting, Wheeler kept a close eye on Obongi’s well-being.

The young of wild animals, if taken early enough and kept at least for the period of adolescence, will become tame and friendly. But Obongi had known 2½ years of freedom, so it was reasonable to expect an initial display of resentment and suspicion. Yet almost immediately she became friendly and trusting, a temperament she retained until she was released. The only thing that stopped her from being just another refugee from the wilds was her size. As park officials found, it was one thing to feed and play with a young antelope or cat, but quite another to do the same with a ton or so of extremely powerful, if well-intentioned, white rhino.

In fact, Obongi’s friendliness presented a problem when the time came for her release. The task was not to teach Obongi to fend for herself, but to persuade her that the company of her own kind was more rewarding than that of humans. Basically, she needed a fresh start, sufficiently far off to preclude a hike back to the lodge but sufficiently near an understanding human community to buffer the final transition. In effect, this meant a ranger post.

Ranger Wheeler returned from leave in July 1964 to find that things had misfired. Released during his absence, Obongi had promptly discovered the park’s airfield and had attached herself with great devotion to one of its porters—a local tribesman who, after the first shock, seemed undismayed. Indeed, he soon realized that his new “duties” frequently saved him from the more arduous work of airfield maintenance for which he was officially paid. The fact remained, however, that Obongi not only presented some hazard to air traffic but, more importantly, was unlikely to find a mate. It was clear that she would have to move.

Two problems confronted Roger Wheeler: where to send the animal and how to persuade her to leave. A white rhino could scarcely be driven, not even Obongi. There was, too

D. S. Henderson, an unusual combination of big game hunter and wholehearted conservationist, spent 11 years in Uganda as a police officer. On leaving the police, he devoted much time to antipoaching work. For a while he led police investigations into the West Nile white rhino poaching.

—and no one was more aware of this than Wheeler—something increasingly touching about this huge but gentle creature with its unshakeable faith in man. Whatever the answer, it could not include anything even remotely unkind.

Wheeler’s solution was masterly. He called Obongi’s adopted porter, told him to summon his charge, and, having found her, to start walking toward the Pakuba Ranger Post. So Murchison Park provided a strange and touching sight—a grown man leading a white rhino through the bush, with the enormous mammal making unmistakable efforts to convince the world that it was really *she* who was doing the leading! Reaching the ranger post around nightfall, the porter slipped away into the darkness to leave the unfortunate Obongi to a solitary night in the bush.

The next day Obongi, puzzled and perhaps sad and disillusioned, attached herself to the ranger post, where she remained until she was finally wooed away nearly a year later by a persistent bull. Finally, in August 1967, shortly 6 years after her capture, she produced her calf, a perky youngster whose appearance brought quiet satisfaction to all concerned and who, with another calf born about a week previously, was a vital step in the effort to ensure that Murchison Park’s white rhino are at long last established.

The story of Obongi is happy, tying in as it does with the last-ditch experiment of transferring white rhino to Murchison National Park. Yet the story came within measurable distance of not being written. A moment’s madness, a moment’s official carelessness, disease, a bush fire—any of these misfortunes could wipe out the Murchison herd overnight. And outside South Africa the remaining white rhino hang on grimly in the West Nile and southern Sudan, with only the slenderest of long-term prospects. Certainly—and again outside South Africa—whatever future the white rhino may have seems inextricably tied to the Uganda government’s continuing interest and vigilance. Its officials have a great responsibility in the matter, and they need all possible encouragement.

Epilogue. In July 1968 Obongi was speared in the left shoulder by a poacher. The wound healed, and more patrols were sent to the area. Later, park rangers discovered Obongi’s 19-month-old calf alone in the bush. Vultures were sighted circling an object in the Albert Nile. It was Obongi. Poachers had crossed the river by boat from the West Nile and killed her and anchored her body with stones and ropes some 100 yards offshore. The horns had not yet been removed. Rangers were posted in ambush overnight. The next morning the poachers returned, pulled the carcass ashore, and cut off one horn. As they started to cut off the second, the rangers leaped from ambush and arrested them. They were safely in custody, but Obongi was gone. ■





Bob Hines

The Last Winter

A FABLE BY CARL C. LAMB

Two snowshoe hares hopped along in their tundra habitat. They were searching for food, an activity preoccupying all wild creatures. Dry tundra grasses blown clear of snow and protective willow thickets provided natural stopping and eating places for the pair.

An old scraggly wolf, a loner, had been traveling for miles in search of a meal. His wet nose had been unable to relay any exciting messages to his brain. Now, suddenly, he stopped. The rabbit scent was fresh. Blood surged in his veins, and he became vital and alert. He could not see the rabbits, but his nose pulled him like a magnet along their fresh trail. He trotted, stopped, sniffed, looked, and trotted again, rapidly closing the margin of distance between himself and his prey. Saliva dripped from his mouth as his starved body anticipated a meal.

Within a few minutes the climax of the stalk neared. The rabbits broke and ran with little chance of escape. The wolf closed in. But nearby was a great lake. Only in extremely cold winters had it frozen entirely across. The rabbits bounded frantically onto the rough ice surface, dodging air pockets and uplifted slabs of ice from an earlier warm spell. The pursuing wolf, upon reaching the

lake edge, was forced to stop. He tested the ice and sniffed the air pockets, but some deep-seated ancestral experience caused him to hold back. In his terrible hunger he sat passively watching his meal, and his means of survival, bounding off into the fading light.

The rabbits eventually reached the rocks, logs, and broken ice slabs that were the shoreline of an island unoccupied by animals and unknown to man. The spring breakup would leave them isolated from the world outside. The wolves, foxes, and lynx would no longer harass them—or control their numbers.

On this island paradise the rabbits found abundant shelter in a small forest and plenty of food in openings and thickets. Spring came and they fattened on juicy plants and shoots. A litter was born, and that litter matured quickly to raise a dozen litters. In barely the twitch of a nose, there were hundreds of rabbits. Like some humans, the rabbits worried only about today. Without enemies, they satisfied themselves with eating and resting, and everything else came naturally. But an island bursting with bunnies could not remain utopia forever. Disease and neurotic problems began to arise along with a shortage

of food. Plants and shoots vanished. Roots were scratched out of the ground, and the soil blew away. When the long, cold winter came again, the rabbits died from starvation and exposure until none was left.

It was to this desolate, devastated island that Nyak, my lead dog, took me one bleak day. I had been traveling across the great Alaskan tundra with nine dogs and a freight sled when a driving blizzard and approaching darkness made us lose our way and forced us to seek shelter in a spruce forest and to camp there until morning. Only in the grey light of the next morning as I moved numbly in the cold to break camp did I realize that we were on an island; in the blizzard and fading light of the previous evening we had traveled for several miles on the snow-covered ice of a great lake. As the light increased, I found evidence of the tragedy—bits of rabbit fur, hides, and bones at every windblown spot; once abundant willow stands gnawed to stubble; grass missing where dry winter grasses should have been; bark ripped from small trees and shrubs; soil eroded or totally removed by wind and past rains.

We left the mysterious island, crossed the lake, and continued our lonely journey toward the cabin. At times I ran behind the sled to keep warm. Rich clumps of grasses left exposed by the winds were stark and contrasting reminders of the devastation behind us. As the hours passed, I evolved my theory about what had happened on the island. And I considered the implications.

Scientific man, so wise and knowing, could easily have forecast the demise of the rabbits as they unwittingly destroyed their means of sustenance. But curiously, man cannot view his own planet-island in the same detached manner. He dumbly nibbles and scratches away at his limited earthly resources, destroys great forests, pollutes his water and air, washes millions of tons of topsoil into the oceans, and consumes precious minerals as if tomorrow will never come. However, when natural laws are seriously abused, the consequences are severe and often final—as the rabbits discovered.

Islands of death are not reserved for rabbits. History records many human civilizations that have grown great, had their day, and perished—leaving a blighted wasteland and a few cultural artifacts as their legacy to subsequent generations.

We know that rabbits will multiply incredibly in a few generations when natural limitations of enemies, food, and disease are removed. What happened in Australia where colonists turned the British rabbit loose in an environment

free of natural enemies is a classic example. Similarly, some human populations now are multiplying incredibly in the few generations that have elapsed since the great epidemic killers were checked.

At the time of Augustus Caesar the Roman empire had a population of about 54 million people out of an estimated world population of 250 million. It took 16 centuries for this number to double. By 1950 there were 2½ billions of people in the world, and presently the world population has zoomed to 3½ billions! If the trend continues, there will be 7 billions in the rapidly approaching year of 2000. Malnutrition and outright starvation are not distant horrors to be postponed by inventive scientists; those conditions have become a reality in today's civilized world. Daily, 190,000 additional people join this island-world of humanity, where two-thirds of the existing population are in some degree hungry.

An inadequate food supply is but one of many crises threatening mankind today. Our total environment—land, water, air, and the many life forms dependent on it—is being despoiled. Less measurable, but perhaps more ominous, are the social and economic impacts on man. Social disorder, widespread crime, civil disobedience, and weakening moral standards are eroding the quality of life. As populations explode, problems of housing, slums, welfare, health, and education multiply disproportionately. Some of these conditions already seem beyond solution, and the outlook is not improving.

We tend to forget that all wealth is derived from the natural resources available on this island-planet, just as the rabbits were completely dependent on the resources of their island. Many of our resources are not renewable. As we consume and reduce our means of survival and wealth, and accelerate the demands on this foundation by adding more and more people, a head-on collision with natural laws is absolutely and clearly forthcoming. Not one, but many controls will plague mankind if he persists in destroying his means of survival. These controls will include starvation, civil strife, warfare, disease, and a general degenerative collapse of civilization as we know it.

It would be naïve to imply that our national and world problem will end if and when the population curve begins to move downward. But it is utterly stupid to believe that we will find permanent solutions to problems that plague us unless the population curve does turn down sharply.

A scientist has compared humans to bacteria in a saucer, multiplying endlessly until they die in their own filth. I have hypothesized an island of rabbits fatally trapped by uncontrolled fertility. There are many documented instances of animal and insect communities doing much the same thing. And the history of man does not exclude some similar examples of uncontrolled populations destroying themselves and their resources. As a thinking creature, man has the capacity to regulate his society, and he has an obligation to keep it ordered.

We are nearing the ultimate deadline within which it still may be possible to take swift action to limit our numbers. The necessary action will come when each of us decides to become a participant in demanding programs of population control. The alternative, of course, is to continue as nonparticipants and follow the blind, rabbitlike mentality of the past—and wait for the last winter. ■

Carl C. Lamb was District Park Ranger at Mt. McKinley National Park, Alaska, for two years, 1963–1965. During that time he traveled by dog sled and snowshoe on some long and lonely journeys, observing the remarkable relationships among wildlife, plants, weather, and terrain. In fact, most of his time in that great outdoor wilderness was a practical lesson in plant and animal ecology.

White birch. Dark area at base is due to bark peeling.



new hampshire's 11 birches

helen ross russell

in New Hampshire there is a birch for every ecological niche of the state from boglands to abandoned farms, woods, lakesides, mountain slopes, and the very top of Mt. Washington. The number of individual birch trees probably is greater than the number of any other tree group in the state. Finally, the number of species of birches in New Hampshire is greater than in any other state in the United States or any other comparable area in the world.

Twelve species of birches grow east of the Mississippi. Eleven of them grow in New England, and every one of these species grows in New Hampshire. No other state holds this record.

Usually when people think of birches and New England, they think of the white-barked varieties. The best known



Above, white or "paper" birch.
 Right, white and gray birches.
 The gray birch is distinguished by
 large gray triangles under every branch.

and most common of these is the native white birch, or "paper birch." This tree grows in rich, moist woodlands and along streams and lakes. It starts life as an inconspicuous brown sapling that gradually takes on a lighter orange tone and finally becomes creamy white. The bark has horizontal black dashes called lenticels that provide for respiration. As the tree increases in diameter, the outer bark begins to peel, exposing the lower layers of golden tan bark with deep brown lenticels. These layers peel in turn, producing sheets of paperlike material. From this characteristic the tree receives its scientific name, *Betula papyrifera*, "the paper-bearing birch," and the common name, "paper birch." Some trees start peeling when they are as small as 2 inches in diameter; others do not peel until they are 8 to 12 inches in diameter.

A mature tree may be from 50 to 100 feet tall and 2 to 3 feet in diameter. With age the bark near the base becomes dark gray, rough, and fissured. White birches live to be as old as 80 years.

The other common white-barked birch tree is the gray birch. It is frequently confused with its handsome relative, although it is really quite different. Gray birch is a relatively small, short-lived tree. It is often called "old field

birch" because it is one of the first trees to appear on abandoned farm land. It also grows on burned-over areas, deforested land, and neglected land.

The bark lacks the chalky white quality of the white birch and never peels. The tree is characterized by gray triangles under every branch, which continue to increase in size even after the branch has been removed. If a gray birch is cut down, young trees sprout from the stump. As many as 100 sprouts have been observed on one stump. This is one reason that gray birches frequently grow in clumps.

This species of tree grows from 20 to 30 feet high with a maximum of 35 feet. The trunk never exceeds 6 to 10 inches in diameter and is generally curved or crooked.

In the summertime the leaves may also help to distinguish between the white and gray species. White birch leaves are ovate, but gray birch are almost triangular with a long slender point. In addition, the stalk of the gray birch leaf is long compared with the blade, and the leaf moves in the slightest breeze. Because it resembles poplar in this respect, it has been given the scientific name of *Betula populifolia*.

Another common New Hampshire birch reverses the



Yellow birch. Left, a satiny young tree. Center, a mature tree. Right, an old tree.

pattern of the white birches. Black birch (*Betula lenta*) has dark bark—reddish brown to black—with light-colored lenticels. It looks very much like wild black cherry and is frequently called “cherry birch.” A taste test will quickly reveal the difference between cherry birch and cherry, however. Cherry twigs are bitter. Black birch is sweet—flavored with wintergreen. In some areas it is called “sweet birch.”

Black birch is a large tree. It is commonly 45 to 50 feet high and may reach 80 feet. It may be 5 feet in diameter. The bark does not peel; but as the tree ages, the trunk loses its shiny quality and breaks into thick, irregular plates.

This tree has a wider distribution than the other birches. It is found all over the New England States except in northern Maine and in the coastal regions. It is well known outside New England in southern Canada, the Middle Atlantic States, the Central States, and in the mountains of the South.

Yellow birch (*Betula lutea*) has a similar range except that it extends higher into Canada. In many ways it is as interesting as the white birch in appearance. As a young tree the bark is satiny. In color it ranges through tones of yellow-gray to a soft silver. This stage gives it the common name of “silver birch.”

As it grows older, the bark begins to peel in extremely thin sheets. Even the bark on branches hangs in ragged shreds. The color deepens, and the trunk is streaked with silver, gunmetal, yellow, and orange with black lenticels. When it reaches old age, the bark becomes dull brown, deeply furrowed, and broken into irregular plates.

Yellow birch is another large tree with mature specimens from 50 to 95 feet tall and 2 to 4 feet in diameter. Gnarled, wind-beaten specimens of yellow birch are frequently encountered high on mountains growing among the conifers or occasionally standing in solitary grandeur on a mountaintop.

These four birches—white or “paper,” gray or “old field,” black or “cherry,” and yellow or “silver”—are found in large numbers in every New England state. The other seven birches are less well known and generally have more limited ranges. They are European white birch, blue birch, red birch, swamp birch, dwarf white birch, tundra dwarf birch, and northern birch.

The European white birch (*Betula alba*) is both a wild and a horticultural tree in New England. Our native white birch will not grow along city streets. Occasionally it can be grown successfully in parks and on large lawns and campuses, but it is always a marginal plant when removed from its habitat. For this reason the European white birch has been widely introduced. Seeds from these introduced trees have taken root and grown in both United States and Canada. The tree is now naturalized in Quebec, Manitoba, Saskatchewan, Alaska, Maine, Vermont, New Hampshire, and Illinois.

It is difficult to tell the basic form of the European white birch from our native white birch. The European variety has a tendency to branch lower and does not peel so early

or so much. The branches tend to droop. The contrast between the white bark and the gray to black marks under the branches is greater, with both black and white more intense. It is a smaller tree, attaining a maximum height of 40 to 50 feet and a diameter of 10 to 18 inches.

Because it has been a horticultural plant for a long time, many varieties have been developed. Some botanists consider them distant species; others consider them subspecies. The scientific names give some idea of the variations:

- Betula alba pendula*—weeping birch
- Betula alba pubescens*—pubescent birch
- Betula alba atropurpurea*—purple-leaved birch
- Betula alba laciniata*—cut-leaved birch
- Betula alba pedula laciniata*
- Betula alba pendula atropurpurea*

Most of these varieties would be found only in landscaped areas, although weeping birch is occasionally found growing wild in the woods.

Blue birch (*Betula caerulea-grandis*) is similar to the European white birch in size and color and is practically indistinguishable from it in the winter. In summer its 2- to 4-inch-long blue-green leaves make it easily recognizable. It grows in the Gaspé Peninsula, Quebec, Nova Scotia, northern Vermont and New Hampshire, and northeastern New York.

Red birch has an even more limited New England range. Normally this handsome tree grows along streams and lakes of the Middle Atlantic and the southern states. This characteristic explains its synonym, "river birch." In this respect it occupies the same ecological niche as the white birch of New England. A few isolated stands, however, have invaded the white birch area. They are found along the Nashua River in Fitchburg, Massachusetts, along the Merrimac River in Lowell and Lawrence, and along two tributaries of the Merrimac—Beaver Brook at Pelham, New Hampshire, and Shawsheen River at Shawsheen, Massachusetts.

Red birch derives its name from the color of its trunk, which is red-brown or cinnamon red to almost maroon. A richness about the color of this tree makes it outstanding. The tree grows from 30 to 80 feet tall with a diameter of 3 or 4 feet. The bark peels easily. Even in old age the bark of the small branches continues to peel in long ribbonlike strips, giving the upper part of the tree a shaggy appearance long after the lower trunk has checked and cracked into coarse furrows and platelike scales.

A common New England birch that goes practically unnoticed is the swamp or low birch (*Betula pumila*). This tree is one of the first to appear in bog succession and can be found in many of the wetlands of the area. It sometimes grows as a shrub with a prostrate trunk sending up branches at intervals. At other times the trunk grows vertically, and it is a small tree. The maximum height for this species is 9 feet. It has dark brown bark that peels very little. Its leaves are rounded, egg-shaped, or wedge-shaped with the widest part toward the tip.

The last three New England birches are all small trees or shrubs growing on alpine slopes.

Dwarf white birch (*Betula minor*) has white bark that does not peel. It grows in acidic rocky barrens of the north

and on alpine summits. In New England it grows on Mt. Washington and Mt. Mansfield.

The ground birch or tundra dwarf birch (*Betula glandulosa*) is a shrub of mountain summits. Its branches are brown and smooth with conspicuous glands that appear as resinous dots. It may reach a height of 3 feet, but mature alpine specimens frequently are less than a foot tall. These are trees of high mountains—Mt. Katahdin, Mt. Washington, and Mt. Mansfield.

The last of the tundra species is northern birch (*Betula borealis*). This shrub or small tree resembles the tundra dwarf birch in size and growth pattern. Its branches are hairy, however, as opposed to the smooth, gland-spotted bark of the tundra dwarf birch. Its young leaves are also hairy.

Occasionally a birch is discovered that does not look exactly like any of these species. It may have foliage like one birch with bark or fruits, or both, like another. These trees are hybrids—crosses between two different species—and they carry some characteristics of each of their parents. There are more natural hybrids in the birch family than in any other group of trees.

All the large birches are used for lumber. Much of the wood goes into boxes, crates, woodenware, toys, dowels, shuttles, toothpicks, and similar products. They also are converted into pulp from which wood alcohol, charcoal, and acetate of lime are produced.

Black and yellow birch take and hold stain extremely well. These trees are used in making furniture that is stained mahogany, maple, walnut, or cherry. The natural birch color also is used in furniture. In addition, some of these trees have curly or wavy patterns that are converted into veneers similar to curly and bird's-eye maple.

Oil of wintergreen is still extracted from the bark and twigs of black and yellow birch for use in some soft drinks, medicines, and confections.

Small amounts of white birch bark are used in the production of baskets and novelties. Thousands of thin sheets of the bark are harvested by vacationers.

The question is repeatedly asked, "Does it hurt the tree to take the bark?" And the answer is, "That depends . . ." The thick layers of bark that were used by the Indians in canoe and wigwam construction and are still used for basket making were a crop. They were taken from a tree harvested for this purpose.

A camp that has mature trees to spare and wants to experiment with Indian crafts could cut down a tree and use it. Cutting thick sections of bark out of a living tree defaces the tree and opens it up to disease and insects. The bark will never be replaced. If the cut is too extensive or if the tree is girdled, the tree will die. Paper-thin pieces of bark that already have come loose can be collected without damaging the tree. A good rule to remember is that the use of a knife or hatchet in collecting bark seriously damages the tree, either killing it or spoiling its beauty. This is unfortunate, for useful as the birches are in holding soil and water and valuable as they are as lumber and crop trees, their greatest contribution may well be the beauty that they contribute to the New England landscape. ■

news & commentary

PRESIDENTIAL SPECIFICS ON THE ENVIRONMENT

President Nixon, in his February 10 message to Congress on the environment, went a long way toward answering those who have criticized his lack of specific proposals for coming to the rescue of the moribund biosphere. This time the President was specific; he proposed a 37-point program of action in five categories:

- **Water Pollution Control.** A Clean Waters Act would provide \$4 billion over the next 4 years for constructing municipal waste treatment plants. Localities would match this with \$6 billion worth of bonds sold to a federal Environmental Financing Authority. Municipalities getting aid would be required to charge industries reasonable users' fees; the Secretary of the Interior would get strong new legal weapons for enforcing federal standards, which would be extended to many intrastate waters; fines for non-compliance would range up to \$10,000 a day.

- **Air Pollution Control.** The President said that he has ordered the start of a research program aimed at producing "unconventionally powered" (steam, electricity, or gas-turbine) vehicles within 5 years and has ordered the government to purchase samples of any such vehicles privately developed. He proposed combating smokestack pollution with nationwide air quality standards; fines again

would range up to \$10,000 a day.

- **Solid Waste Management.** The President said he has ordered a redirection of research to emphasize development of degradable packaging materials and recycling techniques for nondegradable materials. He said the new Council on Environmental Quality will recommend some system to promote the prompt scrapping of junk cars.

- **Parks and Public Recreation.** Mr. Nixon urged better use of federal land. He announced an executive order to all federal agencies to consider whether the uses of lands under their control are in the best public interest and especially whether they could appropriately be converted to parks. Also, he proposed full funding in fiscal 1971 of the \$327 million available in the Land and Water Conservation Fund to purchase new park lands, with emphasis on parks near cities.

- **Organizing for Action.** Mr. Nixon said he will recommend needed reforms in the organization of federal environmental agencies and hinted at "major reassignments of responsibilities among departments."

Along with the President's recent order to federal installations to end their own pollution, this message indicates environmental realism in the Administration. Mr. Nixon put no price tags on most of the points of his program; it seems that he is looking for effective action now that

will not greatly burden the federal treasury. In view of the urgency of the situation, these forward-looking proposals come none too soon.

NELSON PROPOSES ENVIRONMENTAL AGENDA

Wisconsin's Senator Gaylord Nelson was not short of specifics in a recent speech before the Senate on our environmental mess. He opened with a blast at the "disposable society" in which "the mindless pursuit of *quantity* is destroying the opportunity to achieve *quality* in our lives," and in which there is not merely irritation with pollution but "a growing fear that man is on the way to defining the terms of his own extinction."

Nelson estimates a need for expenditures of \$20 billion to \$25 billion *annually* for halting degradation of our surroundings and restoring the environment to a semblance of its former quality.

Nelson proposed an "Environmental Agenda" for the decade calling for:

- An amendment to the U.S. Constitution to read: "Every person has the inalienable right to a decent environment. The United States and every state shall guarantee this right."

- "Immediate . . . firm federal action" to rid America of pollution from five sources: the internal combustion engine, hard pesticides, detergents, jet aircraft, and nonreturnable containers.

- Funds and coordination to be made available for research into population problems and for providing family planning services.

- The establishment of a "citizen environmental advocate agency" and an en-

letters

CHALKED PETROGLYPHS

We were greatly concerned and disturbed by the two captions on page 17 [October 1969] concerning the chalking in of petroglyphs to give them photographic clarity. Mr. Jackson states, it "will soon weather off." Rest assured, in most cases it will not. We have priceless Indian art (Barrier Canyon, Courthouse Wash, etc.) in our areas that were chalked for the same purpose in 1928. There is no sign that it is any less noticeable today than when it was applied. And we have no reasonable method of removing it—none without risk to the art itself. We consider these acts of vandalism or thoughtlessness or both and suggest that both Mr. Jackson and your readers be

reminded of same—at least while visiting our national parks.

J. F. CARITHERS
Acting Superintendent
Canyonlands National Park
Arches and Natural Bridges
National Monuments

BIG SUR

In reference to Dewey Anderson's article, "Big Sur: Where the Forest Meets the Sea," in the October issue, there does exist a group similar to the lay body or Big Sur Scenic-Recreational Commission that he suggested should be set up. The "Save the Big Sur Coast League" was formed to mobilize public opinion and support for the preservation of the scenic and natural beauty of the Big Sur Coast. Our Executive Committee meets at intervals and would be pleased to have any interested members of the Forest Service

Administration join us in a discussion of the entire Big Sur coastal area.

Regarding the establishment of a Crest Highway, it is our opinion that one roadway slashing through this beautiful coastline is enough. A second one high up on the ridge would only encroach upon and devastate the pristine wilderness that exists there now. Whether Highway 1 should be widened to increase the flow of traffic, or whether traffic should be limited to maintain the present uniqueness of the highway is a knotty problem that seems to be judiciously ignored by planners and highway commissioners alike. It is time this particular problem was brought out into the open.

BROOKS CLEMENT
Chairman
Save the Big Sur Coast
League
Carmel, California

(Continued on page 31)

vironmental overview committee in Congress. The independent advocate agency would represent the public interest in matters before federal agencies and in the courts.

- A moratorium on new leases or permits for oil production and other activities on the outer continental shelf until "criteria are established for its protection." In addition, municipalities and industries must be required to stop dumping wastes at sea.

- Establishment of an education program that would make the environment and man's relationship to it a major study at every level of public education.

- The development of mass transit and other alternatives to the private car and its concrete and asphalt ribbons, using the annual \$3 billion to \$4 billion from the Highway Trust Fund that now is going toward completion of the Interstate Highway system. In 1975 the system is due to be complete, and these funds will become available.

- Delineation of a national land use policy to halt urban and industrial sprawl, control strip mining, halt the draining and filling of wetlands, and generally ensure wise planning instead of chaos and rape in the use of the land.

- Formulation of similar policies for minerals and other natural resources, and for water and air quality. Under the latter policy federal support of municipal waste treatment would be enlarged and research would be supported that aimed at improving treatment and solid waste recycling techniques. As they developed, these techniques would be made mandatory.

- Establishment of a national, non-partisan environmental political action organization, with state and local organizations providing the foundation.

DON'T RELAX YET ON EVERGLADES

It is official. The Everglades jetport will go elsewhere, and the training strip will be removed as soon as another training facility can be built.

"We concur in the President's excellent statement that the agreement on airport construction in [the Everglades] 'is an outstanding victory for conservation,'" said a statement released by the Everglades Coalition, which has led the fight against this ruinous proposal. "It is a great victory for all the people of Florida and America. We congratulate the President and the many dedicated public officials involved."

Now all that remains to be accomplished is the supremely difficult task of convincing the Army Corps of Engineers that the American people cherish their

Everglades National Park and that consequently their rights in the matter of water for the park at least equal and probably exceed those of municipal and commercial interests in Dade County. Further, commercial exploitation of the Big Cypress Swamp should be blocked. Through the Leopold Report and the intensive investigation of the park ecosystem that grew out of the jetport controversy, it has become apparent that the swamp in its natural state is vital not only to the park's water supply, but also to the water supply of all the region.

The Everglades Coalition will continue to work toward "a firm agreement, binding on the Army Engineers, the Central and Southern Florida Flood Control District, and the counties in the region" to make the needed water available to the park; it will urge strongly that existing private enclaves within the park be acquired by the government; it will attempt to block drainage and real estate development in the Big Cypress; and it will urge public acquisition of the swamp.

PRIME MINISTER GANDHI OPENS IUCN ASSEMBLY

India has many serious and complex problems, but she has vocal conservationists as well. Moreover, her people are guided by religious teachings of reverence for nature. Thus New Delhi was especially appropriate for the 10th General Assembly of the International Union for the Conservation of Nature and Natural Resources; there were both pressing problems and the need for imagination to avoid facile solutions. Prime Minister Indira Gandhi's opening words at the meeting had special poignancy:

"As an only child whose childhood was invaded by the turbulence of a vast national upheaval, I found companionship and an inner peace in communion with

nature. I grew up with love for stones, no less than trees, and for animals of all kinds. . . .

"In the last century, and especially during the last three or four decades, Indira Gandhi's opening words at the wealth. . . . We must teach [our people] from their early school days to become planters and protectors of trees, to care for animals. When forests are cut down, wildlife naturally is threatened; some beautiful and interesting species [already] have become extinct. . . .

"All great religious leaders have preached respect for life. In India, Buddha did say this and later Emperor Ashoka, whose rock edicts and pillars are strewn all over the country urging us to have love and friendship for all creatures. . . . I hope that your presence here will encourage our conservationists, who are fighting an uphill battle."

DDT MAKERS FORCE DELAY IN USDA BAN

Notwithstanding the clear danger to the biosphere of DDT, the patent public desire to be done with this pesticide and its relatives, and the demonstrated fact that DDT rapidly is losing its effectiveness as an insecticide, six major pesticide makers have elected to fight to the bitter end for their right to profit from environmental death. It seems that the six, who have filed an appeal of Agriculture Secretary Clifford Hardin's DDT ban, will continue to take every opportunity to delay the final removal of DDT from the domestic market. Even for the uses already banned, such delay could amount to well over a year; and Secretary Hardin as of our writing has yet to move against the bulk of DDT uses. The six are Allied Chemical, Diamond Shamrock Corp., Lebanon Chemical Corp., Stauffer Chemical Corp., Black Leaf Products Co., and Carolina Chemical Inc. It may be termed naïve to expect the producers not to take advantage of every statutory provision to keep marketing their assassin chemical. If so, it is a sad comment on our industrial ethic that it is considered proper or acceptable to continue such a dangerous business until forced by others to stop.

In a related development, the Interior Department has announced development of a catalyst that promises to be able to break down DDT and some other chlorinated hydrocarbons when applied with the pesticide. The use of the catalyst can be controlled to bring about breakdown in a matter of hours or of weeks, depending on the use in question. This is an attractive development, but it is loaded with hazards. First, the breakdown products still are toxic (10 percent of the toxicity of DDT) with no word on how



Mrs. Gandhi

persistent *they* are; the environment already is overburdened, and any increment is most hazardous. Second, the very existence of the catalyst may appease those who think that technology can do anything. In the belief that the catalyst provides a final answer, the public's pressure to end the use of DDT may fade. Yet use of the catalyst would be extremely hard to enforce. It is mixed just prior to application by a user who would rather get maximum effectiveness out of his pesticide, and so would tend to skimp or leave it out altogether. However, the catalyst will be valuable for those DDT applications "essential" to human health and welfare that we will have to endure anyhow.

SCHEDULED GRAZING FEE HIKE DELAYED

There are serious implications in the announcement by Interior Secretary Walter J. Hickel of a delay in the scheduled increase in fees charged by the government to stockmen grazing cattle on public lands in the West. Mr. Hickel announced that there will be no more increases in the grazing fee until the Public Land Law Review Commission makes its report in June.

The Public Land Law Review Commission was created by act of Congress in 1964 to make a study of the vast complex of laws relating to the public lands. Many conservationists believe that the membership of the Commission is heavily weighted in favor of the exploiter interests and they fear that the recommendations in the report will reflect that bias.

The grazing fee increase schedule was worked up prior to the advent of the present Administration after a comprehensive study by the Bureau of the Budget. The Bureau recommended to the Departments of Interior and Agriculture that grazing fees be increased, over a period of years, to the point where they would be in line with the fair market value of the grazing rights. (Conservationists support the increases, because they make grazing on the public lands less of a giveaway program and thereby reduce exploiter pressure on these lands.) Both departments adopted a schedule in keeping with the Bureau recommendations, over the strong protests of stockmen and their special friends in Congress. Both Hardin and Hickel earlier upheld the decisions of their predecessors on this issue, but now Mr. Hickel has blocked the *second increase on the schedule.*

This delay in the scheduled increase highlights the urgent need for conservationists to note carefully the recommendations of the Commission, and to be prepared to react in the public interest to resulting proposals.

NPA's 1970 WORLD TRAVEL PROGRAM



Charles J. Ott

Winter patrol at Stoney Lake, Mt. McKinley National Park

ALASKA

A: Jun. 15-Jul. 5

B: Jul. 7-Jul. 22

B1: May 24-Jun. 9

Trip A: Cruise the Inside Passage from Vancouver to Skagway and see the Yukon, Point Barrow on the Arctic Ocean, Mount McKinley National Park, Glacier Bay, Katmai, Sitka, Kodiak Island, and the cities of Juneau, Fairbanks, and Anchorage. \$1575, including air return to Seattle. Limit, 20.

Trips B and B1, round trip from Seattle: The same as A but without the Inside Passage cruise and Sitka. Limit, 20 each group. Trip B, \$1375. Trip B1, \$1340.

AFRICA

C: Jun. 18-Jul. 10

D: Jul. 9-Jul. 31

E: Jul. 30-Aug. 21

E1: Sep. 3-Sep. 25

Trips C, D, E, and E1: Observe African mammals and birds in their natural habitat—lion, giraffe, zebra, elephant, hippopotamus, rhinoceros, crocodile, and many others—in Kenya, Tanzania, and Uganda. See tribal life, national parks, and game preserves. \$1585, including round trip air from New York. Limit, 24 each group.

SOUTH AND CENTRAL AMERICA

F: Jul.-Aug.

Trip F: A month-long conservation trip to Venezuela, Colombia, and Guatemala, including wildlife, Indian culture, and archaeological remains, as well as areas of great natural beauty. Limit, 30.

SOVIET UNION

G: Jun.-Jul.

Trip G: A fascinating three-week tour divided between conservation areas in European Russia and Siberia, and great Soviet urban centers such as Moscow and Leningrad.

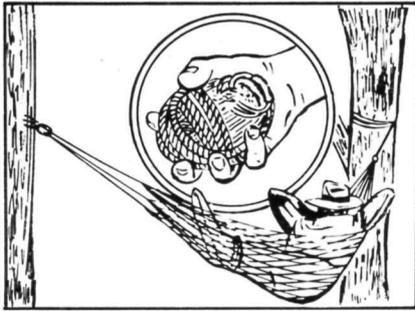
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reviews

THE UNEXPECTED UNIVERSE

By Loren Eiseley

Harcourt, Brace & World, Inc., 1969.
233 pages plus bibliography. \$5.75.

There is almost no way, short of poetry, to share the experience of reading Loren Eiseley.

It is as if one were assaulted by the sounds and smells and mist-woven images of millennia, by the dreams of primeval creatures and the struggles of a single-celled organism for survival, by an intelligence that encompasses all living things from the perspective of a desolate crag, wrenched out of time and the known dimensions.

To call Eiseley a naturalist may be appropriately simple, or it may be a term of resonant profundity. I can think of only one other man in American life and letters—Henry David Thoreau—who owned a similar capacity for coming to terms with the infinite.

It has been said that Eiseley, himself, is a poet at heart. He is actually a poet in fact, widely published and anthologized. Apart from his scholarly anthropological papers and the "naturalistic" works beginning with *The Immense Journey* and continuing through the current volume, he has won two major prizes for literature. I have long believed, with no small unease for my heresy, that he is the finest living writer in the English language. I also believe, with somewhat more secure conviction, that he possesses a breadth and depth of understanding that is unique in our time.

The Unexpected Universe is a difficult, demanding, and disturbing book. We are quickly divested of the banalities that so often pass for thought today; we are invited to enter instead a universe in which all matter, animate and inanimate, exists in precarious balance. Mystery is inherent in all that is or might have been. Accident demands its constant due. Man and all that he has wrought hang suspended by a brittle thread, a reminder of our fragility and of our essential ties to the past.

Through all of it, the observations and the deductions and the precise data of science, a brooding Eiseley shares his innermost world.

"If there is any meaning to this book, it began on the beaches of Costabel with just such a leap across an unknown abyss. It began, if I may borrow the expression

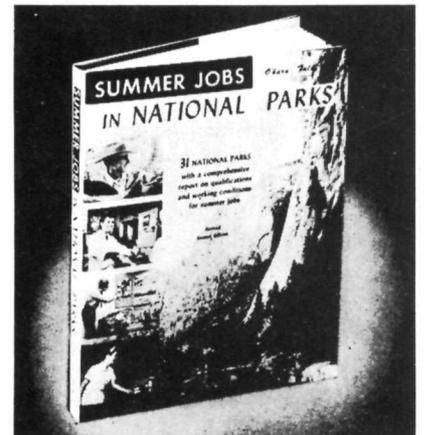
from a Buddhist sage, with the skull and the eye. I was the skull. I was the inhumanly stripped skeleton without voice, without hope, wandering alone upon the shores of the world. I was devoid of pity, because pity implies hope. There was, in this desiccated skull, only an eye like a pharos light, a beacon, a search beam revolving endlessly in sunless noonday or black night. Ideas like swarms of insects rose to the beam, but the light consumed them. Upon that shore meaning had ceased. There were only the dead skull and revolving eye. With such an eye, some have said, science looks upon the world. I do not know. I know only that I was the skull of emptiness and the endlessly revolving light without pity."

As he has in his previous books, Eiseley the scientist-poet challenges the constricted vision of our age. He has sympathy neither for the arrogant scientism of the academies nor the simplistic hedonism, stripped of tradition, that so blithely rages at our institutions.

Loren Eiseley, a man beset by doubts and despair and uncertainty, stands at the center, in the eye of the hurricane, and untiringly pursues the meaning that has eluded all of us.

ALEX RODE

Alex Rode is a teacher and psychotherapist in Washington, D.C.



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THE ENVIRONMENTAL HANDBOOK

Edited by Garrett De Bell

Ballantine Books, Inc., 1970. 384 pages. 95¢, paper.

Prepared as a guidebook for the first national Environmental Teach-In to be held on April 22, this book attempts to answer the question, "What can I do?" Mr. De Bell says "It is clear that only a return to large-scale citizen involvement at all levels can turn us from our destructive path. There are suggestions here for direct action, how to organize a group, what other organizations have done, addresses of major environmental groups, political platforms, and what services are available from the National Teach-In office." *The Environmental Handbook* describes a full range of alternatives for action, including those that are contradictory; but the reader cannot fail to find something he can do—from using soap like Ivory Flakes instead of detergents, using live Christmas trees and planting them later, to militant eco-tactics and political action. If you are ready to assume stewardship of your Earth and want to know how, this book is a rich source of ideas. If it is unavailable at your local bookstore, mail your order with \$1, your address and zip code to: Dept. CS, Ballantine Books, 36 West 20th St., N.Y., N.Y. 10003.

(Continued from page 27)

Mr. Clement's 2-year-old Save The Big Sur Coast League of prominent people is a "group similar to the lay body" I suggested should be set up, but it doesn't go far enough. The Big Sur forest is essentially, or predominantly, a recreational area, and that means more and more people. They need representation officially in the decision-making process.

I foresee increasing pressure to straighten out the curves in Highway 1, to speed up traffic use, and eventually, as demand mounts, to make it into a four-lane highway. I deplore that. If the League can prevent it, its existence will

have been completely justified, even if it does nothing else. But citizens have not been able to prevent such "progress" anywhere else, and I doubt that they will here. My proposed all-forest-controlled driveway along the crest is offered as an alternative "in being" that could halt actions along the main highway for at least a quarter of a century, to give us time to grow up organizationally to prevent such an outcome. There is another possible route: namely, along the east side of the Santa Lucia Range.

DEWEY ANDERSON

In publishing Mr. Anderson's article we intended to present only one alternative

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to widening Scenic Highway 1. National Parks Association does not generally favor the construction of scenic highways in either national parks or national forests, and we do not expect to mount a campaign for a scenic road in Big Sur. In fact, if NPA formulated recommendations on highway planning in the locality, we probably would favor a road east of the mountains toward Salinas Valley with trail access to the Big Sur. We understand that the Army has been the principal barrier to routing a highway there because it would have to pass through the Hunter-Liggett military reservation. Here again, there may be room for an alternative.

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D. S. HENDERSON

