

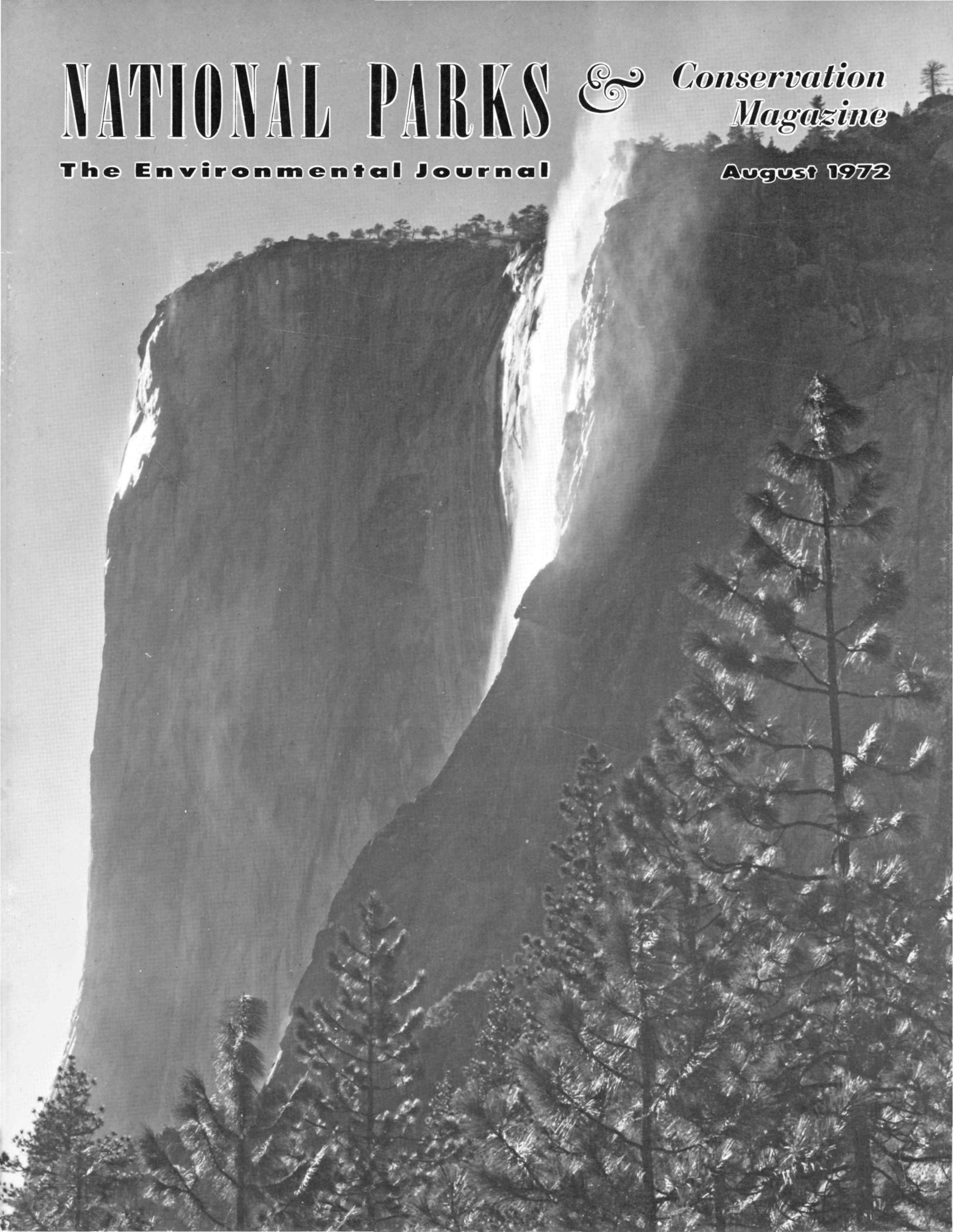
# NATIONAL PARKS



*Conservation  
Magazine*

**The Environmental Journal**

**August 1972**



# REPORT on STOCKHOLM

FLAGS CRACKLED from the towers of Old Stockholm in cold westerly winds during the United Nations Conference on the Human Environment in June: the yellow cross of Sweden, the globe of the United Nations, the ecology symbol of the Conference, all on fields of blue. We still think that they were flags of hope.

Had we expected a miracle, we would have been disappointed. Because we thought we were helping to plant a seedling which might grow into a mighty oak, we came away, not exuberant, but reasonably confident of a good ultimate outcome.

It seems clear that an Environment Secretariat will be established within the United Nations system, perhaps at Geneva; that its work will be managed by an Executive Director with considerable authority and autonomy; that policy direction will be provided by a Governing Council for Environmental Programmes; and that a start will be made toward financing.

INITIATIVES have at long last been taken toward worldwide environmental protection through the United Nations; the outcome, which could be survival or catastrophe, will depend on the will of the nations working together.

The NPCA and the Environmental Coalition for North America, on which the President of NPCA serves as an individual as Chairman, participated, with two accredited observers each. This meant attendance at the daily briefings by the Secretariat with respect to the three working committees and the plenary sessions, and such monitoring of the committees and the plenary as this limited representation could undertake. We submitted a position paper to the plenary, comprising recommendations made previously by the NPCA, published in this Magazine for January, 1972, and made efforts to revise the official recommendations of the preparatory commission to the Conference on wildlife management, stressing the ecological importance of wildlife, as contrasted with the purely economic values associated with hunting and tourists.

THE MEETINGS surely contributed to public understanding of the political processes involved, which

began with a statement by former Secretary General U Thant early in 1968, followed by General Assembly action on December 3, 1968, four sessions of preparatory commissions extending over two years, review of commission recommendations by large committees of the Conference, and action by the plenary session of the Conference.

All along the line the points of view of more than 100 independent nations were worked into the text of the proposals. Up to the last minute, amendments were received and debated at length; often enough on trivial points, but more frequently on basic issues. This was the democratic process at work on a planetary basis, in which representatives of dictatorships and democracies alike participated, we hope with instructive results for all.

THE ISSUE which came to be known as *additionality* was basic. The question was whether the less affluent nations would have to bear the entire cost of ecological precautions in economic development, or whether supplemental assistance to help cover environmental costs could be expected from the more affluent nations.

The position taken by the delegation from the United States on this issue was, in our judgment, indefensible; we stood largely alone against the world in rejecting the concept of additional economic assistance for environmental purposes. It will be impossible for the United States to sustain this position for any great length of time.

To make the situation quite plain, consider again the question of DDT. During the sessions of the Stockholm Conference, the Environmental Protection Agency outlawed the use of DDT in the United States for all practical purposes. India has made it clear that it may have to continue using DDT, and to manufacture it if necessary, with a view among other things to supporting the so-called Green Revolution in the battle against famine and overcrowding, but that it would prefer to change over to better methods if it could get even the necessary technical assistance, but hopefully also economic aid.

The use of DDT in the less affluent countries

*Continued on page 35*

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**NATIONAL PARKS** & *Conservation Magazine*

**The Environmental Journal**

**August 1972**

OFFICIAL PUBLICATION OF THE NATIONAL PARKS & CONSERVATION ASSOCIATION

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**COVER** *El Capitan and El Capitan Fall, by Ansel Adams*

The spectacular beauty of Yosemite Valley in Yosemite National Park has long attracted visitors by the thousands. In fact, admiring visitors were choking the valley with their automobiles, campers, and motorcycles; and exhaust fumes and campfire smoke hung heavy over the valley. Finally the National Park Service has attacked the problem by restricting the use of the private motor vehicle and providing free public transportation. (See page 14.)

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old faithful geyser, yellowstone national park  
franz lipp photograph



*Dogtooth spar, a calcite crystal, lines passages of Jewel Cave.*

JAMES M. TRUMBLY

# **NEW JEWEL IN THE PARK SYSTEM CROWN**

## **Ron Rothschadl**

**A**t Jewel Cave National Monument in the Black Hills of South Dakota the National Park Service has unveiled a brand new centennial present to the American public during the national park system's hundredth year celebration. The gift is a new interpretive complex for the sixty-four-year-old monument: a new visitor center with all new surface facilities, new underground facilities, and a new cave route featuring subterranean formations unlike anything seen before by visitors to Jewel Cave.

Throughout its history Jewel Cave had been a national monument of only limited significance. The original discoverers of Jewel Cave chose that name because of a calcite crystal called dogtooth spar that was found in some passages near the original entrance. In fact, the accessible crystal in Jewel Cave was not only typically unspectacular but far from the best or most abundant. As for wet formations such as stalactites, stalagmites, and flowstone, the known cave passages were nearly devoid of them.

Recognizing, perhaps, that Jewel Cave's tour route was far from spectacular, NPS administrators never installed electric lighting in the cave. In fact no extensive improvements of any kind were added to the interpretive trails. The Park Service chose instead to give the cave tour an air of adventure. Every year visitors to the monument descended a sturdy but steep sixty-foot ladder on shaky legs and maneuvered through a three-foot-high passage on hands and knees. Guided only by the light of gasoline lanterns, visitors discovered what caves were naturally like without manmade conveniences.

For many adventurers of all ages the tour was the high point of a vacation. For others who came seeking a breathtaking spectacle, the cave was a disappointment. For many others of advanced or early age or limited physical abilities, the cave was never to be seen at all.

For cave-explorers (including off-duty park rangers), however, the cave presented a challenge. Fifteen years ago a group of hardy cave spelunkers set out to find new passageways. Accompanying them was a local couple, Herb and Jan Conn. Hoping they would connect the two dead-end tour routes to create a circular trail, the park superintendent arranged with the Conns to explore all the known passages.

The connection was never made. Instead, Herb and Jan Conn went on to explore over forty-two miles of cave passage, a bewildering maze of natural tunnels that made Jewel Cave the fourth longest cave in the world. In the intervening miles many spectacular cave formations were discovered. Several formations unique to Jewel Cave were also found. Today the scenic and geological significance of this monument can no longer be questioned.

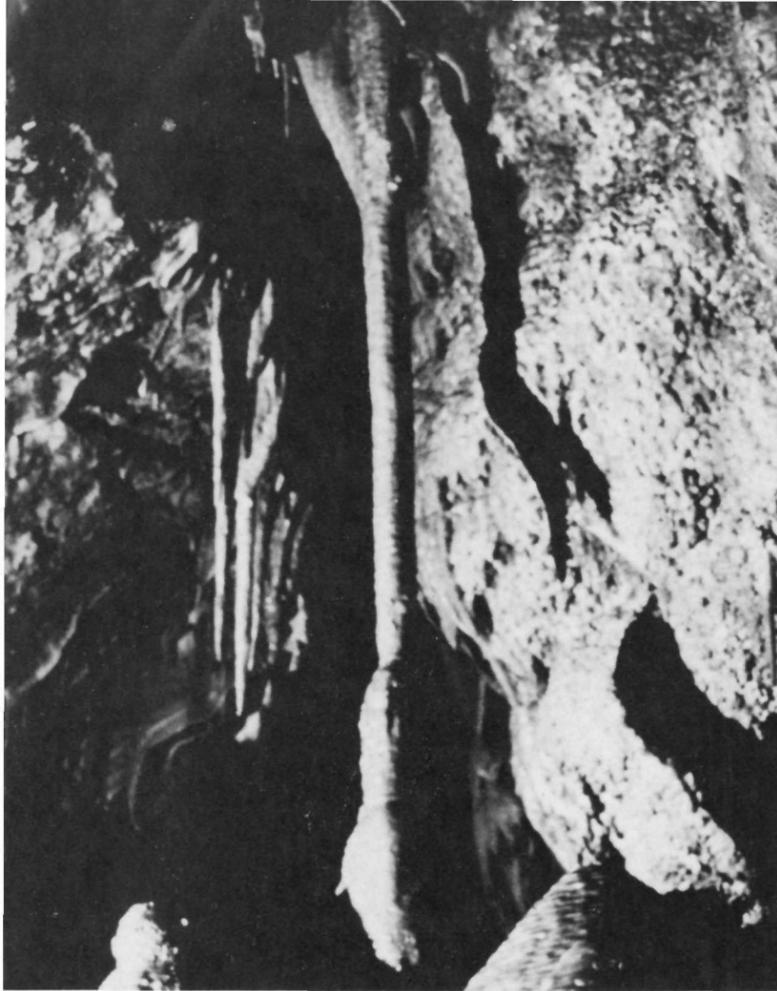
The sightseer who tours Jewel Cave in 1972 will experience a variety of sensations. A bump on the noggin is guaranteed. So is a trickle of water down one's neck. Most impressive is the sense of enormity within the earth's crust. The trail winds a circuitous route past kid-sized passages as well as football-field-sized chambers. Concealed lights illuminate deep, mysterious side passages as stairs and walkways pass over black pits and up the sides of limestone blocks big as houses.

This rock structure, geologists say, is the remains of ancient sea life perhaps as much as 325 million years old. The area now making up the Black Hills and the surrounding prairie was submerged repeatedly under a shallow sea

RON ROTHSCHADL



*Calcite spar covers the walls of Jewel Cave, giving the impression of a cloud-filled room.*



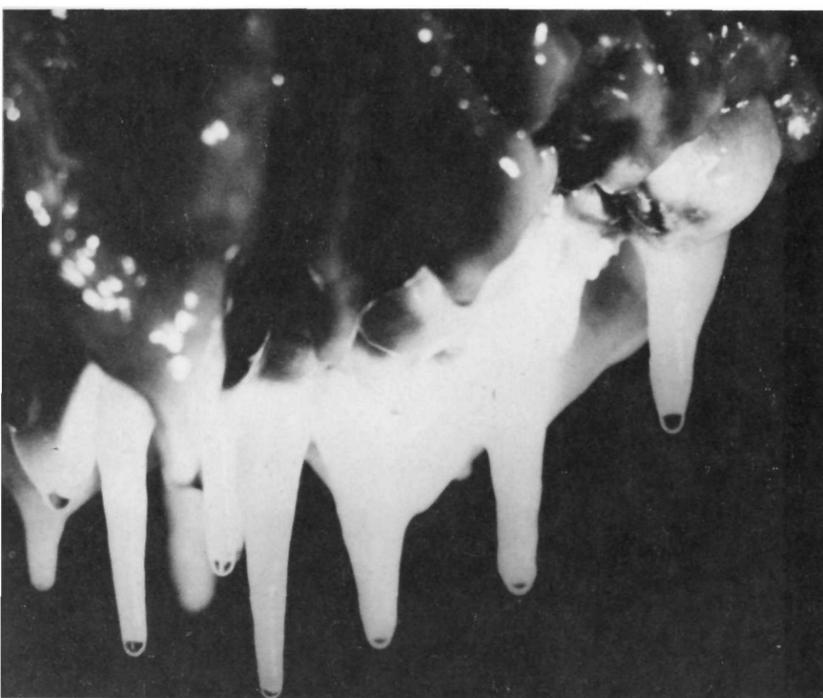
JAMES SHIVES

during this period, called the Mississippian age. Millions of generations of animal dwellers in this sea left skeletons covering the ocean floor, and today the record remains as a layer of fossilized shells, most of them finely ground but some of them intact, that is as thick as 600 feet in some locations.

Jewel Cave's passages developed later from joints that opened in the limestone when molten rock deep within the earth thrust the Black Hills up from the surrounding prairie. Over eons of time groundwater eroded these cracks into a three-dimensional crosshatch of passageways. Later the water released dissolved minerals in the form of a crystal coating that has encrusted much of the exposed limestone surface with clear, faceted jewels of calcite. In places where this calcite crystal is covered with sediment, the billowing surface resembles a bloom of petrified clouds through which the visitor walks as if afloat in a subterranean heaven.

In terms of geological development, Jewel Cave, like all the Black Hills caves, is relatively young. At some time in the cave's future erosion may enlarge passages enough to cause rock collapse and form enormous rooms such as those found in Carlsbad Caverns. At present the explored portion of the cave is a labyrinth of comparatively small passages opening to the surface in only one location. Because the enormous volume of underground passage has only one connection to the surface, a change in atmospheric pressure such as that accompanying a storm front produces a mass movement of air through the cave passages toward or away from this opening. Like nearby Wind Cave, another Park Service facility, Jewel Cave has distinct winds blowing

Above, a tall and gracefully sculptured column forms over thousands of years; in geologic time this is a sudden spurt of growth. Below left, a cluster of translucent soda straw stalactites in Jewel Cave's Formation Room. Below right, in the Formation Room stalactites, stalagmites, and flowstone abound.



RON ROTHSCHADL

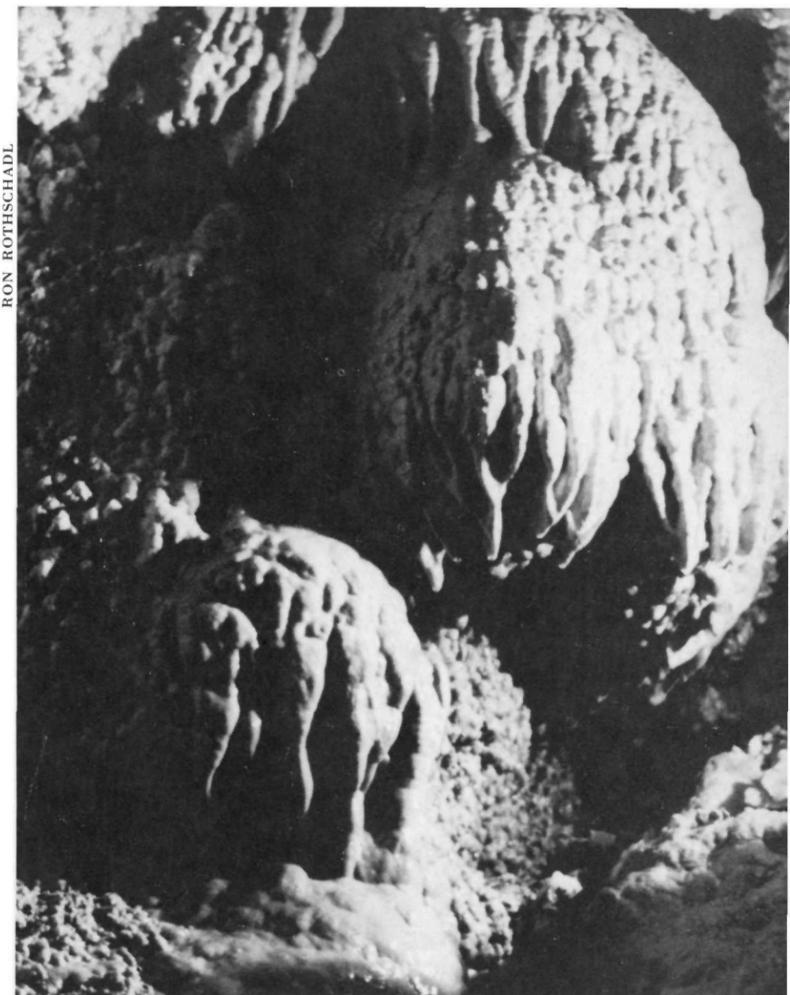


JAMES M. TRUMBLY

Ron Rothschadl is a graduate student in the Department of Recreation Resources at Colorado State University, Fort Collins, Colorado, where he is completing masters-level research that he began at Jewel Cave National Monument. He was a seasonal ranger-naturalist at Jewel Cave for two seasons.

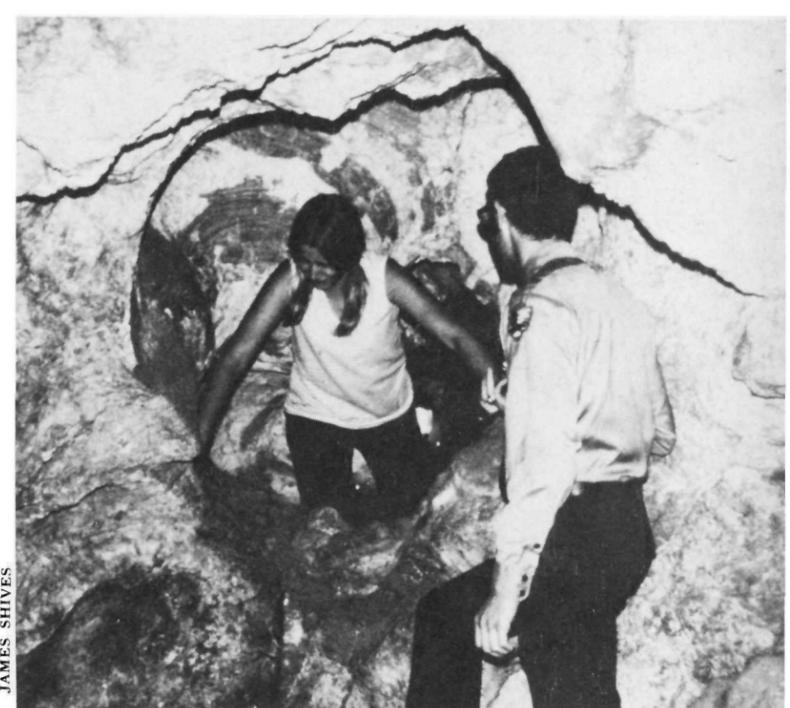


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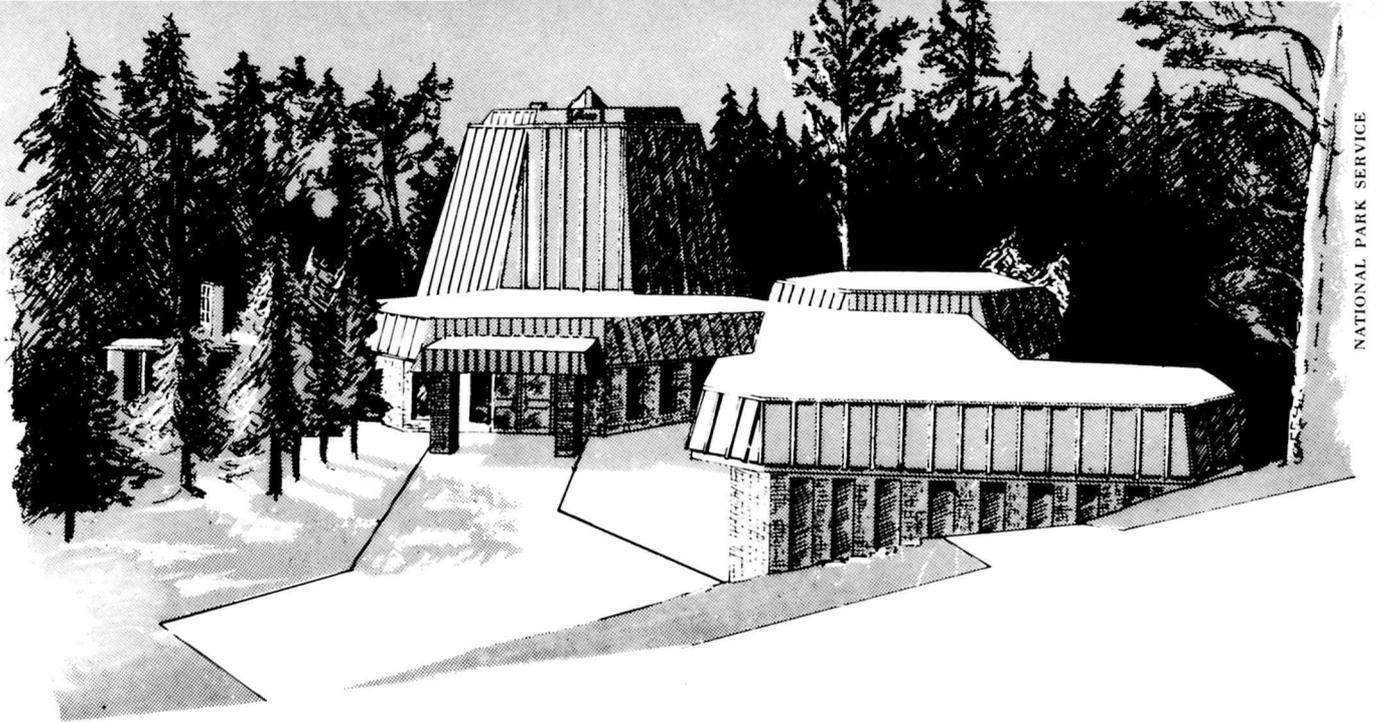


RON ROTHSCHADL

Above left, a silvery balloon of hydromagnesite crystal is one of the formations known to be only in Jewel Cave. (Size about 1 1/2 inch.) Above right, where flowstone is deposited on calcite spar crystal, formations have the appearance of melting ice cream. Below right, a visitor to Jewel Cave's "historic" cave tour leaves the Crawlway on hands and knees.



JAMES SHIVES



*Artist's rendition of visitor center at Jewel Cave National Monument, South Dakota, dedicated Sunday May 28, 1972.*

through its natural entrance at speeds up to fifteen miles per hour.

Jewel Cave is a so-called dead cave. Factors of climate and geology allow only slight amounts of water seepage. As a result only microscopic life permanently inhabits the cave. The only other animal visitors—bats, wood rats, crickets, and man—depend on surface mobility to survive. A second result of low ground moisture is the inhibited stalactite growth in the cave. Jewel Cave wet formations, unlike those of southern caves, are typically small and localized. The visitor can expect to see masses of delicate soda-straw-sized stalactites and only a relatively few large formations. Also in contrast to southern cave features are the vivid mineral stains covering the walls. The blending of manganese dioxide, nickel, and iron oxides results in rich shades of red, yellow, and blue. Calcite crystal stained by these minerals is banded white and blue or red. Other wet formations are stained so that translucent brown and white “cave bacon” is seen. On some walls flowstone may take on a yellow, gold, or scarlet hue, whereas a short distance away other walls will be streaked with blue or green.

Many of Jewel Cave's most beautiful formations may never be seen by the general public. Deep in the distant recesses of the cave, explorers discovered a wall covered with what seemed to be dozens of silvery bubblegum balloons. These objects, some over an inch in diameter, have a reflective mother-of-pearl appearance. They consist of moist, hollow aggregates of hydromagnesite crystals that collapse with the touch of a finger. They remain a puzzle to experts who are unable to explain their occurrence.

In other locations cementations of quartz and calcite crystals cover walls or floors with a blood red encrustation of faceted jewels. The literally millions of faces reflect the explorer's light with a dizzying sparkle. This material, descriptively called scintillite, is also unique to Jewel Cave.

At still other sites hoary gypsum beards can be found swaying in the cave breeze. These objects have the appear-

ance of pure white hair and grow hairlike from the limestone walls. Gypsum beards have been observed growing to a length of well over a foot in Jewel Cave.

Typical of the delicate beauty of the cave, these fragile formations are, except for the gypsum deposits, unique to this national monument and so will be permanently preserved from destruction.

**P**ark Service architects have designed the visitor center to rest strategically on the brow of a sloping canyon wall. From the parking lot the complex looks like an unobtrusive series of octagons and an office wing, beyond which the plains can be seen stretching to the south in the distance. From the surrounding hills the buildings seem to rest among the pines, blending into the brown limestone outcroppings. A three-story building whose form is dominated by an elevator shaft and hoist fits closely to the hilly landscape and complements the surrounding topography.

The new interpretive complex has been designed as a frame within which the visitor views the beauty of the national monument. Its purpose is to open many of the cave's best attractions to the greatest possible portion of the American public. Because of the new facilities in addition to the original ones, Jewel Cave National Monument now, after sixty-four years, offers a worthwhile recreational opportunity to practically all people.

And for those among the touring public who are most inclined toward adventure, Jewel Cave's historic cave tour remains. Park Service officials expect that the old lantern-lit, hands-and-knees tour will continue to be available to groups of limited size as long as it remains in demand. If this type of tour fits your family, Jewel Cave is for you, too. But don't be surprised if you bump into two cave explorers in hard hats. Herb and Jan Conn are still exploring Jewel Cave, and they're hoping that many fantastic sights will yet be found. ■

STEPHEN P. JOHNSON

# PALAU

## AND A SEVENTY ISLANDS TROPICAL PARK

*In this final article of a three-part series on the Limestone Islands of the Pacific Trust Territory, author Stephen P. Johnson outlines the social and political obstacles to the establishment of a major island park or reserve and recommends ways to reduce these obstructions. The first article discussed problems accompanying the process of "modernization" in Palau, the Trust Territory district in which the Limestone Islands are located. The unique and endangered plants and animals of the region and the existing Seventy Islands nature reserve were described in the second article.*

**I**n November 1968 the International Biological Program held a technical meeting on the state of conservation in the Pacific Islands. Meeting in Koror, Palau, a group of distinguished scientists associated with IBP drew up an extensive list of recommendations and resolutions concerning both Palau and the whole of Micronesia. Among these resolutions were motions to "ensure that resource management legislation be enacted" by governments responsible for the welfare of the Pacific Islands. More specific were resolutions that dealt with the necessity of listing unique

SETH PIERREPONT

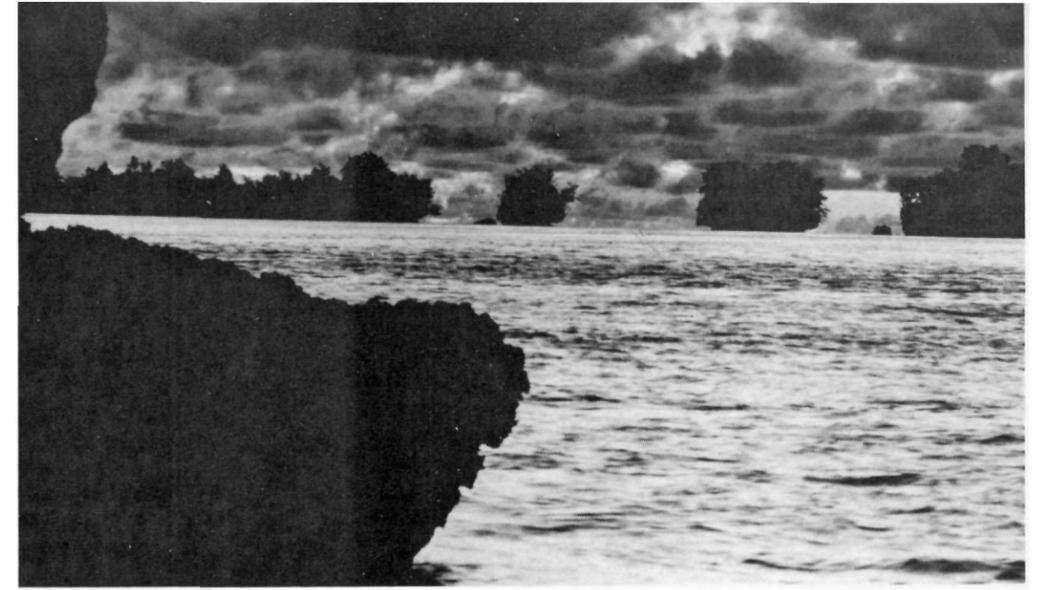




Left, view of an inland salt water lake from a limestone cliff. Right, the Limestone Islands at sunset.



STEPHEN P. JOHNSON



SETH PIERREPONT

natural and historical resources, recording indigenous conservation practices, preventing fishing with dynamite and poisons, and limiting spear fishing and coral dredging. Resolutions also were drawn up that advocated protection of various endangered species, including the dugong, the saltwater crocodile, the coconut crab, and the fruit bat.

The majority of resolutions were general in scope and were designed to protect the Pacific islands as a unit. Specific to Palau, however, was a resolution recommending a serious study of the possibility of establishing a park in the Limestone Islands. Seth Pierrepont and I researched the matter for the National Parks & Conservation Association and the International Union for the Conservation of Nature and concluded that despite problems associated with such an undertaking a park or preserve could, and should, be established in the Limestone Islands.

The conclusions drawn by IBP were determined by the biological needs of the area and the various species that inhabit it. Environmental considerations are, however, only one factor among the many that would justify the establishment of a park or preserve in Palau. Because of its recreational potential, historic value, and natural beauty the Limestone Islands could provide the attraction necessary to support the tourist industry on which the Palauan economy may soon be dependent. But as the pace of "progress" quickens in Palau the chances for intact survival of the natural assets of the region are steadily diminishing. Palau is a young country and its people are only now becoming aware of the pitfalls associated with "civilized" society. The average Palauan cannot yet understand why urban man makes such apparently desperate efforts to preserve natural areas. Safe within their island sanctuary, many Palauans are oblivious to the possibility of a day in which they too will have to establish wildlife sanctuaries and wilderness areas. Protection for Palau will come only with the growth among the citizens of the island of a conservation consciousness—an awareness of the growing dangers to the natural environment.

Already at least partially cognizant of the value of their natural surroundings, the Palauan legislature and the Trust

Territory administration have approved measures designed to protect several endangered species of wildlife. Through the efforts of various individuals and the High Commissioner of the Trust Territory, the Ngerukewid Islands Preserve (the "Seventy Islands") was set aside in 1956. Unfortunately these efforts alone cannot save the area from irreparable environmental damage, although they represent a good beginning.

The Palauan environment faces a variety of threats. The land has been abused by colonialists and indigenes alike; it still bears the scars of phosphate mining and a vicious war. Grassfires further hamper the normally difficult task of farming. Palau's lagoon is at the mercy of modernization. Vacuum dredges weaken the reefs, Koror's wastes foul inner lagoon waters, and poachers reduce endangered animal species to alarmingly low numbers.

The history of conservation in Palau predates the arrival of colonial powers by centuries. Tribal chiefs established conservation practices long before the coming of the Spaniards in the late nineteenth century. In the past decade a number of concerned Palauans and Americans have renewed such earlier efforts to resolve environmental problems. Even so, progress in the field of conservation has been limited at best. The United States has all but ignored conservation problems in the Trust Territory, while only occasionally managing to meet its commitments to improve educational opportunities and economic self-sufficiency. Despite this lack of support, individuals within the Trust Territory administration and various conservation-oriented groups have begun the battle against the deterioration of the quality of the land and water. The Palauan Recreation and Parks Board, the Department of Fisheries, and the Office of the Chief Entomologist have all directly confronted the conservation problem. The Recreation and Parks Board has addressed itself to developing Palau's recreational facilities. Fisheries, under the direction of Peter Wilson, supervises the marine environment and is responsible for developing Palau's marine resources.

The Office of the Chief Entomologist, under the direction of Robert Owen, has been particularly instrumental in

organizing Palau's conservation "movement." It was largely through Owen's efforts that the coconut rhinoceros beetle (which at one time threatened much of the palm forest in the Trust Territory) was eliminated as a major pest. His office has been responsible for the study and comprehensive listing of the plant, animal, and insect species found in Palau and the rest of the Trust Territory. His assistant, John Kochi, the jovial man who was our guide for the

summer, serves as a trained conservation officer. As a result of his conscientious efforts, both dugong and megapode poaching have been significantly reduced.

Kochi, a native Palauan, saw the harmful potential of uncontrolled development during first-hand exposure to western society. After attending high school on the island of Guam, Kochi undertook a six-year stint in the United States Army, spending time in Honolulu, Georgia, Germany, and Korea. He returned briefly to Palau as a youth corps advisor before journeying to the larger island of Ponape to study in a farm institute. From Ponape he returned to Palau to work in forestry within the Department of Agriculture, which at the time was under Owen's supervision. As a result of his association with Owen, Kochi decided to pursue a career in conservation. Largely self-taught in that field, Kochi hopes to be able to study in the United States. He is regarded as a likely successor to Owen as chief conservationist. Kochi is an especially good example, but many other less widely traveled Palauans are becoming aware of Palau's environmental problems.

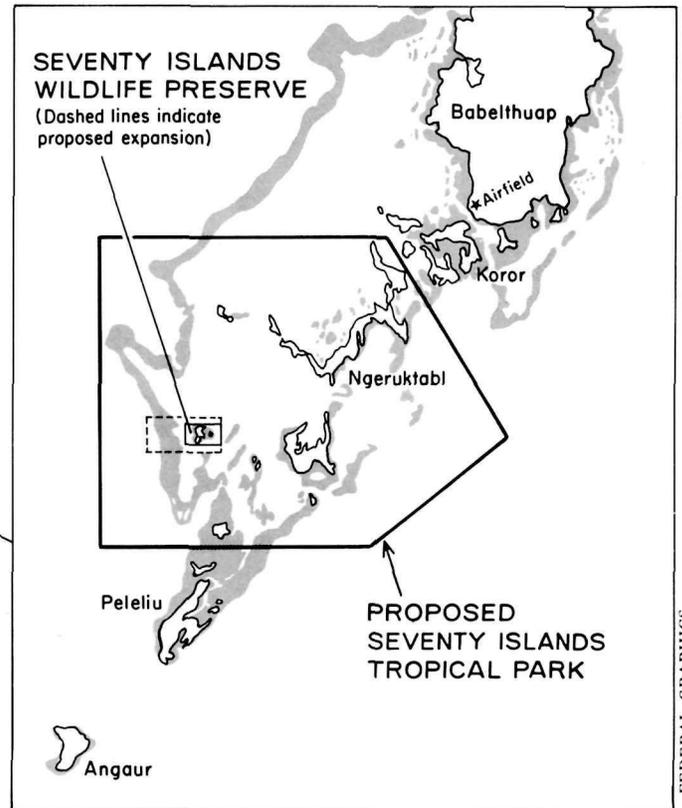
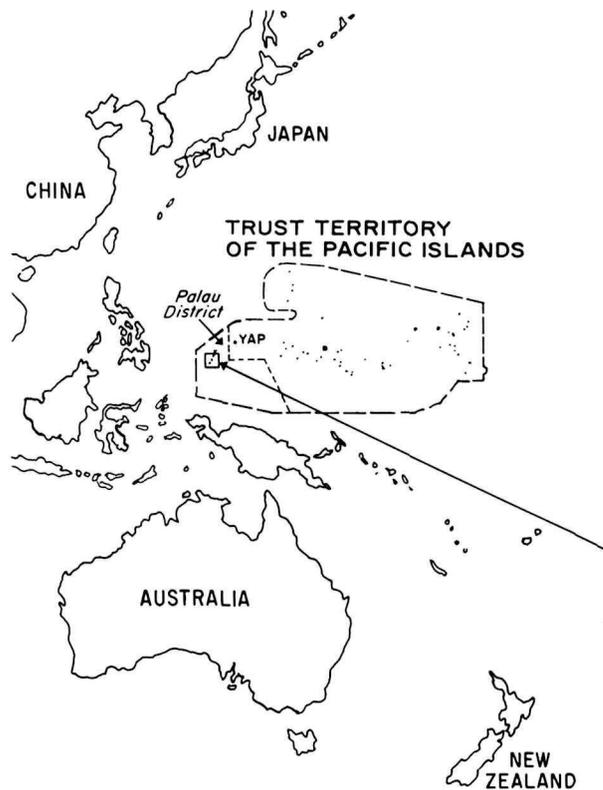
To park planners and seasoned conservationists the need for a conservation consciousness among any people is all too evident. In efforts to encourage such an attitude in Palau, Owen and his staff have produced several radio programs. Simple but effective, the programs explain the distinctions between renewable and nonrenewable resources, and they emphasize Palau's dependence on subsistence sea farming and the consequent necessity of preserving marine habitats. Conservation programs also have been instituted in elementary and secondary schools. Awareness is growing; there is perhaps no better teacher than necessity.

Unfortunately, the development of a conservation ethic in Palau is hindered by several social and political obstacles. One formidable deterrent is the lure of consumer goods introduced by Americans. Canned food, cars, refrigerators, stereo equipment, and scuba gear have all become

Left, a Palauan fisherman empties a thrownet of sardines—a primitive scene even for Palau.



STEPHEN P. JOHNSON



desirable commodities. As people strive to buy such products, they tend to neglect traditional values and priorities that once served to minimize the impact of humans on their natural surroundings.

For centuries the Palauans lived a relatively simple life, their style of living changing little from decade to decade. With the coming of industrial man, Palauans were catapulted into a new existence dominated by technological advances and development. The simple life style they had known could hardly withstand the pressures of colonial powers, eager to extract the islands' raw materials and to set up strategic military bases. The islanders were rarely consulted as their lands were remade. In response the Palauan today typically gives a fatalistic shrug, which in the island vernacular signifies resignation to one's fate. In this case fate amounts to tossing tradition aside to accommodate technology's irrepressible demands. The developer and the industrialist tell the Palauan that there is no standing in the way of "progress." Environmental destruction is passed off as a necessary consequence of a lifestyle considered by most Palauans, like most Americans, to be more desirable than the simpler but usually less comfortable sort it has replaced.

The primitive society is forever gone in Palau, and its successor places certain inevitable demands on the land. The issue is one of planning the physical development of Palau so the people will benefit. Unlimited development of the Limestone Islands would be disastrous, both ecologically and in the long run to the Palauans themselves. Although in the immediate future the construction of resort facilities, for example, might promote the tourist industry

and bring in money, a never-ending program of building eventually would destroy the natural beauty of the island and bring about the demise of tourism—consequently eliminating the financial benefits that had been hoped for.

To know how much development can be tolerated remains a theoretical dilemma in the midst of many real problems facing the establishment of a park. What is to become of fishing rights in the lagoon areas that would be encompassed within park boundaries? Would traditional food-gathering be restricted in order to protect various species, or would that activity be prohibited within the confines of the area?

A problem of immediate importance is the question of which governmental channels can be used in establishing a park. Many Americans concerned with the preservation of natural areas and in particular the judicious development of the Limestone Islands believe that the most practical way to ensure the continued security of the land is to establish a park. But the United States has no jurisdiction in matters related to designating parklands, even in its role as Trust Territory administrator, because the land is not U.S. property. Foreign governments and organizations may offer advice, but the decision of what to do with the Limestone Islands rightfully belongs to the Palauans.

As previous articles have shown, the Limestone Islands are significant for a number of reasons. The beauty of their characteristic geological formations and vegetation is alone reason for creation of a park. As a biological reserve the islands are invaluable. The rare and endangered species of plants and animals that they support need substantial protection to survive pressures of a developing economy.

To most Palauans many of these assets are still taken for granted. But Palauans may prefer to view the propositions in economic terms. If tourism is to flourish and continue to provide revenue for Palau, the entire district—including the Limestone Islands—will have to be subjected to careful planning so that development can be geared to best suit the needs of visitors as well as Palauans. If the islands are exploited, tourism will suffer.

The following recommendations are structured around the recognition of Palau's financial, social, and environmental needs. Many of our recommendations reflect the general concerns of the International Biological Program Technical Meeting (Koror, 1968) that were expressed in their forementioned resolutions.

Much could be done to further conservation awareness through education in Palau. We suggest the U.S. government expand existing Trust Territory educational programs to more fully integrate conservation into elementary and high school curriculums. National Environment Education Development (NEED) offers various teaching materials and programs that could be of assistance to the Palauans. The National Park Service, which developed these methods, could be consulted. Pamphlets, radio broadcasts, and perhaps films could be used to advantage.

Education takes time. The governments of Palau and Micronesia may want to take interim steps to protect the area. The measures selected will be contingent on further studies of the region and the recommendations of specialists.

Because it is usually expedient to utilize already existing institutions in the establishment of planning offices, we suggest the amalgamation of the Palauan Recreation and Parks Board and the offices of Fisheries and Entomology into a department of conservation. Through such a centralization a greater degree of efficiency could be expected in dealing with problems of the environment, in that the qualified personnel from each department could work collectively on a common issue. Each department within this composite group could retain enough identity to continue its own programs while at the same time working within the general context of conservation.

We suggest that the existing Land-Use Committee be consulted in determining the best combinations of areas to be incorporated into a park. This group could call upon landscape planners, resource economists, biologists, historic and recreation planners, and other professionals to advise the decisionmakers in Palau and in the Micronesian government of the specific needs and potential assets of each park configuration being considered.

The groups mentioned above would be jointly responsible for the direction of conservation throughout Palau, though their initial focus would be in the Limestone Islands.

Concerning the Limestone Islands specifically, we urge all concerned Palauans to consider seriously the establishment of a park or island preserve in order to insure the best possible use of this area. The boundaries of such a park should be established so as to include the majority of the Limestone Islands that lie south of Koror and north of Peleliu. (Both Koror and Peleliu have important historical sites but are too heavily populated to qualify for park

status. Formal protection of the sites of historic interest in these areas would be adequate.) As Robert Owen has noted, bait fishing rights within the area should be ceded to local fishermen.

A park should exist to meet a variety of needs. The Limestone Islands easily could be zoned into smaller areas that could be managed to accommodate different uses. Such a park could serve the interests of recreationists and biologists alike.

We recommend that the Seventy Island Preserve be included within the borders of the park and that it retain its current status as a "strict nature reserve." We support Owen's proposal that the Seventy Islands be expanded to encompass the several small island group located to the west of the existing preserve and to include a section of the outer reef. Through these extensions the preserve could more adequately provide a total ecosystem to support the endangered species that inhabit it.

In wilderness man confronts the primeval, and the experience is as invaluable for the Palauan as it is for the rest of mankind. Parks provide insurance that some wilderness will continue to exist despite the ravages of modernization. The establishment of a park in Palau would benefit both the economy of the region and at the same time preserve a wilderness environment.

Dr. Harold J. Coolidge of the International Union for the Conservation of Nature and Natural Resources has pointed out that public parks serve to promote national pride within a people. For the Palauan, currently wrestling with the question of his future political status, a tropical park could be very helpful in serving just such a purpose. Most Palauans have not yet recognized the need for practicing conservation. Through the encouragement and support of concerned individuals and organizations, that recognition can be hurried and the continued beauty and natural history of the Limestone Islands insured and enjoyed. ■



Observations made during a summer 1971 research tour of Palau and the Limestone Islands enabled Stephen P. Johnson, photographed above in jungle gear, and his associate Seth Pierrepont to formulate recommendations regarding the establishment of a large park or reserve in those islands.

# CLEARING THE ROADS —AND THE AIR— IN YOSEMITE VALLEY

George B. Hartzog, Jr.

**A**LADY who had vacationed in Yosemite Valley, Yosemite National Park, California, last year, wrote the park superintendent, "It was a great freedom not to have to go near our car from the time we arrived until we left."

Many other 1971 visitors expressed similar thoughts, but this woman summed up most aptly, perhaps, the Yosemite visitor's new feeling of emancipation from the automobile.

Cars in Yosemite Valley are now used primarily for arrival and departure. The narrow gorge, where 50,000 people gathered as late as 1970 in bumper-to-bumper holiday formation, is now relatively free of cars. Today visitors hike, bicycle, or ride horseback over the moderately clear roads. Or they enjoy the incomparable scenery on sightseeing shuttles without paying a nickel. The National Park Service pays the fare, and the principal park concessioner, Yosemite Park and Curry Co., supplies the buses and drivers.

In 1971 Valley shuttles carried 1,600,000 passengers. To carry that many people would have required 400,000 car trips. The shuttles helped to clear the Valley air as well as the roads. The exhaust fumes of cars—added to campfire smoke—had long caused a Valley air pollution problem. The shuttles also freed park rangers, previously burdened with traffic control and accident reports, for more significant duties such as acquainting visitors with the park's multiple attractions.

In 1972 the National Park Service has reduced the role of the automobile further by banning all cars from the Yosemite Village parking plaza. This spacious area in front of park headquarters, the visitor center, stores, and eating places is now a visitor mall, reserved for concerts, ranger-naturalist programs, bicycling, and a visitor promenade.

Each arrival is given a map that says: "We hope you will not use your car while you are here. Where there were acres of automobiles there is now open space to walk." Parking space has been increased and rearranged in five areas convenient to the bus route and near overnight lodging.

Perhaps the most difficult task has been to convince our automobile-dominated society, and the many enterprises dependent on that society, that the automobile must be drastically restricted if Yosemite Valley—only seven miles long and two miles wide—is to survive as a great natural and recreational resource. To limit the range of the family car is like trying to limit a family rite. Once people realized, however, how much more they could enjoy the park without the clamor and fumes of traffic jams, the more willingly they temporarily parted with the family buggy.

The newest shuttle equipment includes trackless, three-car "minitrains" that can carry eighty-seven seated passengers and sixty-two standees. Two nonpowered trailer units are drawn by a third unit, whose engine is converted to use propane instead of gasoline and thus meets California's 1974 air pollution standards. This single engine emits about 1 percent of the exhaust gases that would be spewed into the Yosemite atmosphere if fifty cars were to transport the 150 minitrain passengers as in the preshuttle days.

Especially designed for Yosemite Valley, these shuttles provide ample space for backpacks and camping gear. For sightseeing the designers installed windows nine feet long and four feet high, probably the largest ever installed in a motor vehicle. Even the rear windows are seven feet wide and three feet high.

Also of particular concern to me personally are the safety features incorporated in the shuttles and in all public vehicles in the National Park System. The attractive minitrains, in the dark blue, avocado, light blue, and grass green of the International Ecology Symbol color scheme, have one-quarter-inch safety glass, self-contained braking systems in each nonpowered unit, and emergency break-away braking capability. The door interlock systems prevent movement of the vehicle unless doors are securely closed. Though limited to twenty-five miles per hour, these vehicles can easily negotiate any grade on the routes. The powered vehicles have large heating systems for year-round use. The nonpowered units are designed for summer use.

**S**HUTTLES are not new in Yosemite National Park. The concessioner had introduced service in 1967; but, with automobile traffic still clogging the roads, buses offered little relief from overcrowding. Traffic and campground congestion, overflow camping in valley meadows, and air pollution from cars and campfires were diminishing, if not ruining, the park experience for many visitors. On summer nights the valley roads were almost solid with cars as the occupants gathered largely to watch the "firefall." This nightly attraction was produced by pushing a bonfire over the edge of Glacier Point, a rocky pinnacle 3,200 feet above Yosemite Valley. Though spectacular, the firefall had long been criticized as not in keeping with national park standards. But perhaps its most serious effect was on the motorized public. The firefall tied traffic in knots.

Holiday attendance was another knotty problem. The Valley had overnight accommodations for about 9,500 people; yet on the Fourth of July the Valley would record



*A doubledecker shuttlebus affords passengers a relaxed view of Yosemite Valley.*

NATIONAL PARK SERVICE

some 54,000 visits. Public campground campers in the Valley alone averaged nearly a million a year, and the congestion and conflicts in lifestyles were causing some disappointing camping experiences.

After consulting with our regional and park staffs, traffic engineers, and the chief concessioner, I informed the company on January 24, 1968, that (1) the firefall would be discontinued immediately; (2) the central Valley road would be converted to one-way traffic to permit leisurely sightseeing; (3) shuttlebus service would be continued; (4) a small footbridge would be built over the Merced River for hikers, bicyclists, and horseback riders; (5) the park would place new emphasis on a quality park experience rather than on accommodating large numbers of people; and (6) a sightseeing trackless tram would operate on an experimental basis.

The new one-way traffic plan had dramatic results. In June, July, and August 1968 the number of accidents on this 5½-mile stretch dropped 86 percent from the 1967 level. Yet the numbers of Valley campers, park concessions

visitors, and park overnight stays were virtually the same, down less than 1 percent each from 1967; and the park visitations and number of cars entering the park were up 2 percent.

The one-way road achieved threefold results by increasing visitor safety; improving the atmosphere, health conditions, and esthetics of the Valley; and releasing ranger man-hours for nontraffic functions—visitor guidance, nature-walk leadership, and historical interpretation. “Nothing except a major offense takes as much of a park ranger’s time as checking and reporting a traffic accident,” said David J. McClain, the park’s chief law enforcement officer.

Expanded shuttle service in the Valley helped persuade visitors to leave their cars in parking lots or in communities just outside the park.

We attacked the camp congestion problem by reducing the number of public campsites from 2,600 to 1,139, eliminating overflow camping, and requiring registration of all campers. We expected protests over this pruning job, but they were fewer than anticipated. Many visitors ex-

pressed relief at the abandonment of sardine-can camping. The registration requirement virtually eliminated unauthorized camping and allowed the orderly redirection of overflow campers to the High Sierra campgrounds. The one-week limit imposed on camping allowed more people to use the coveted Valley sites.

We selected the Mariposa Grove of giant sequoias near the western park entrance for the sightseeing tram pilot project. For decades the narrow road winding through the grove had been jammed with cars on holidays and other peak visiting periods. Exhaust fumes, stalled cars, and noisy motors had marred one of the world's unique forests. Camper rigs often obscured the view. Cars frequently were parked just off the road, impacting the soil and preventing the growth of young sequoias and other plants.

Sweeping changes were needed here. Early in 1969 I called for (1) a 175-car parking area in the lower Grove; (2) conversion of the former Grove ranger station into an

information and concessioner ticket sales facility; (3) sightseeing tram service by the Yosemite Park and Curry Co.; (4) five fifty-passenger specially designed trams; and (5) improved interpretation techniques on sequoia ecology.

We set a target date of June 1969; but the tram manufacturer encountered design and fabricating problems, and it was necessary to delay the start until September 13, 1969. Even at that late date, opening day brought 544 passengers. After parking, the riders paid a dollar apiece for adults and fifty cents for each child occupying a seat. The trams were to run every fifteen minutes in peak periods and every half-hour the rest of the time. Riders could debark at any of four stops and reboard later cars. Six brief audio messages on the trams provided background information. Naturalist talks were given at the Grizzly Giant tree and the Grove Museum.

The new service won quick public acceptance. About two out of three visitors rode the trams. From September 13 through October 24, 1969, the trams carried 10,384 passengers. Removal of the tram roof improved passenger visibility. Visitors also could walk the route if they wished. The park laid out new nature trails, including a self-guided trail.

It was clear that our car reform movement was both practical and a hit with the public. But traffic was steadily increasing. We could meet traffic demands by either restricting car use further or extending and widening Valley roads, which were expected to reach their capacity of 10,000 vehicles a day by 1977.

To widen and extend the Valley roads was unthinkable.

Our master plan studies had indicated that automobile use had to be limited drastically and replaced with mass transportation. Our proposed park master plan, then being drafted, called for eventual elimination of all autos from Yosemite Valley. One of the eleven National Park Service policy guidelines issued by the Secretary of the Interior on June 22, 1969, had stated that "the private automobile is impairing the quality of the park experience" in Yosemite National Park and urged that "we begin to deal with this condition now" through mass transportation facilities.

We had carried out that objective in the same year with the tram system at Mariposa Grove. Early in the summer of 1970 I was preparing to announce further programs to restrict automobile use in the Valley, when the regrettable confrontations of Stoneman's Meadow occurred. Several hundred young people occupied this grassy tract against regulations, and a series of encounters with rangers and reinforcing police ensued on July 3-4. Mistakes were made on both sides. The National Park Service learned much from those mistakes. We have retrained our rangers to acquaint them with the problems and cultures of minority groups and young people. Most important, we have stressed that park visitors, of whatever appearance, are not to be manhandled. We have added more young people to our summer staffs at Yosemite and other big parks who can communicate easily and comfortably with their peer groups. We had no serious incidents at Yosemite the following year.

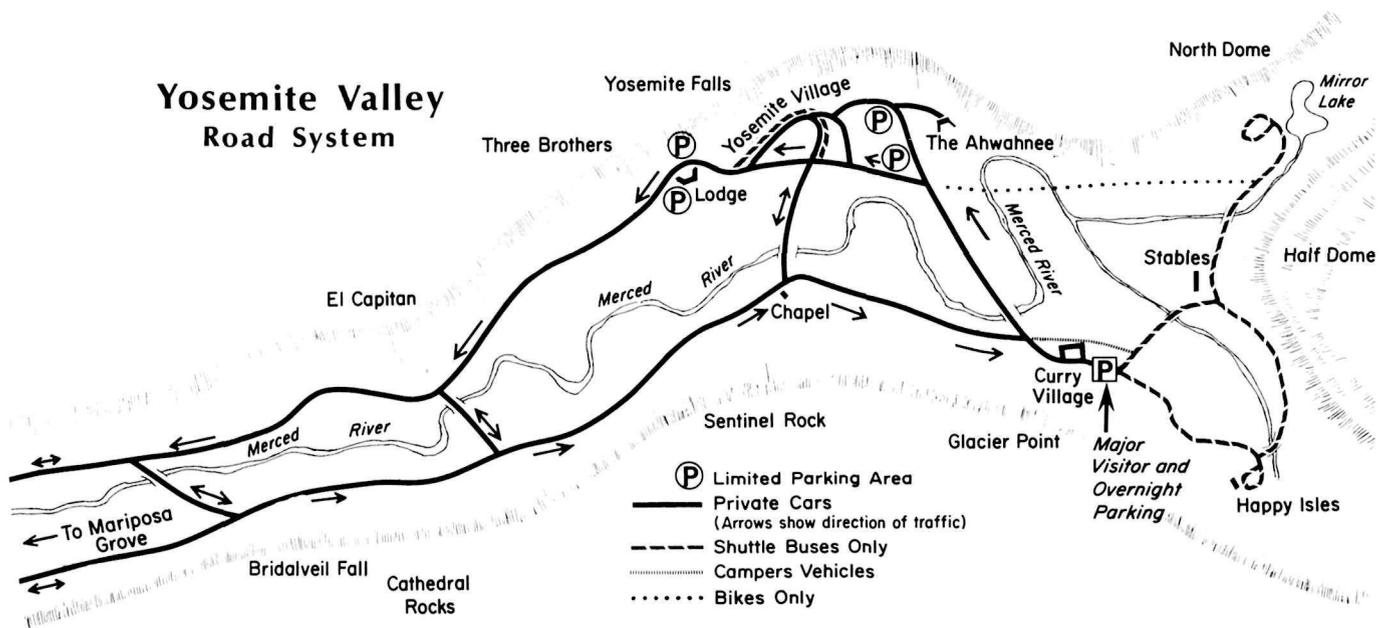
This matter is mentioned here because the incident threatened to eclipse our plans to relieve the overcrowded conditions, especially financially. Yosemite law enforcement costs for the summer increased by \$271,000. Congress later approved \$550,000 to provide a mobile

*Below, a Yosemite "minitrain"—a power unit hauls one or more nonpowered trailer units. Bottom, tram service through the Mariposa Grove of giant sequoias is popular with visitors.*



PHOTOGRAPHS BY NATIONAL PARK SERVICE

## Yosemite Valley Road System



squad of forty law enforcement specialists able to move from park to park as needed.

The unhappy affair of Stoneman's Meadow also emphasized more than ever the need for a more relaxed atmosphere in Yosemite Valley. Reduction of the tensions of heavy traffic would do much to reach that objective. On July 9, 1970, I went ahead with our plans to launch the most drastic program yet to restrict automobile use throughout the Valley: (1) The 1968 one-way traffic plan for the 5½-mile central Valley road net would be extended throughout the Valley's 14-mile central and western primary circulatory road system. This scenic route would afford leisurely views of waterfalls, valley walls, meadows, and wildlife; (2) all private motor vehicles would be prohibited in the eastern portion of the Valley; (3) a free shuttlebus service would operate in that area; (4) visitors would be urged to park their cars and take a bus, walk, or ride a bicycle or a saddle horse; and (5) a one-mile road from near Mirror Lake in the extreme eastern Valley to the lower Ahwahnee Hotel grounds would be barred to buses as well as to cars, thus encouraging bicycle, horseback, and hiking use.

The shuttles, like the Mariposa Grove trams, pleased the public. From July 9 to September 7, 1970, they covered 1,800 miles a day, carrying 488,000 people. The free 24-hour service was reduced after Labor Day. From mid-October on, two buses operated with additional buses available on holidays and weekends. An estimated 261,000 passengers were carried from September 9, 1970, to March 1, 1971.

In 1971 the Mariposa Grove trams also began offering free service. Four minitrain power units, each pulling one or more of the six trailer units, served the eastern Valley. New 100-passenger doubledecker buses were introduced in Yosemite Valley, with three doubledeckers operating mainly in the central and western Valley. Their capacity was 2,250 passengers an hour. The doubledeckers ran even during the winter months of early 1972, and by summer eight were in operation.

By August 1971, Ansel Adams, Yosemite's camera artist, was saying, "I have never seen Yosemite looking so well and people happier in it." He credited the free shuttles and the new doubledecker experience with enabling more people to see more of the Valley. Adams perceived what was really taking place. He called it "a newly evolving appropriate human participation and enjoyment of this park."

Early in 1972 we requested funds for advance planning of a total visitor transportation system for Yosemite. Through such planning we hope to keep cars from the heart of the park, moving visitors from a parking center into the Valley by the relatively pollution-free, quick-service shuttles.

**F**OR THE NATIONAL PARK SERVICE, Yosemite's transportation program is the first of many similar actions that will be taken in other parks to diminish traffic congestion, pollutant effects, and noise caused by increasing numbers of motor vehicles—factors that frustrate visitor enjoyment.

Last spring Horace Albright, second director of the National Park Service, attended the John Muir observance at Yosemite. Later, in a note to Shirley Sargent, who arranged the event, that extraordinary man said, "I found Yosemite Valley as beautiful as I ever saw it. . . . I hope no new policy will discourage visitors who really want to see this exquisite part of our native landscape."

In my view, Horace Albright—who was present at the signing of the National Park Service Act in 1916—expresses the sentiments of most Americans. Yosemite Valley is the people's valley. Every management effort should be devoted to keeping it open for the people's enjoyment and—as the Act of 1916 says—"unimpaired for the enjoyment of future generations." ■

**George B. Hartzog, Jr., is director of the National Park Service.**

The right of the wolf to its place in the natural world finally is beginning to be recognized. Within the past twenty years people in Canada and the United States have begun to make a determined effort to resist the seemingly inexorable forces that were sweeping the wolf to extinction.

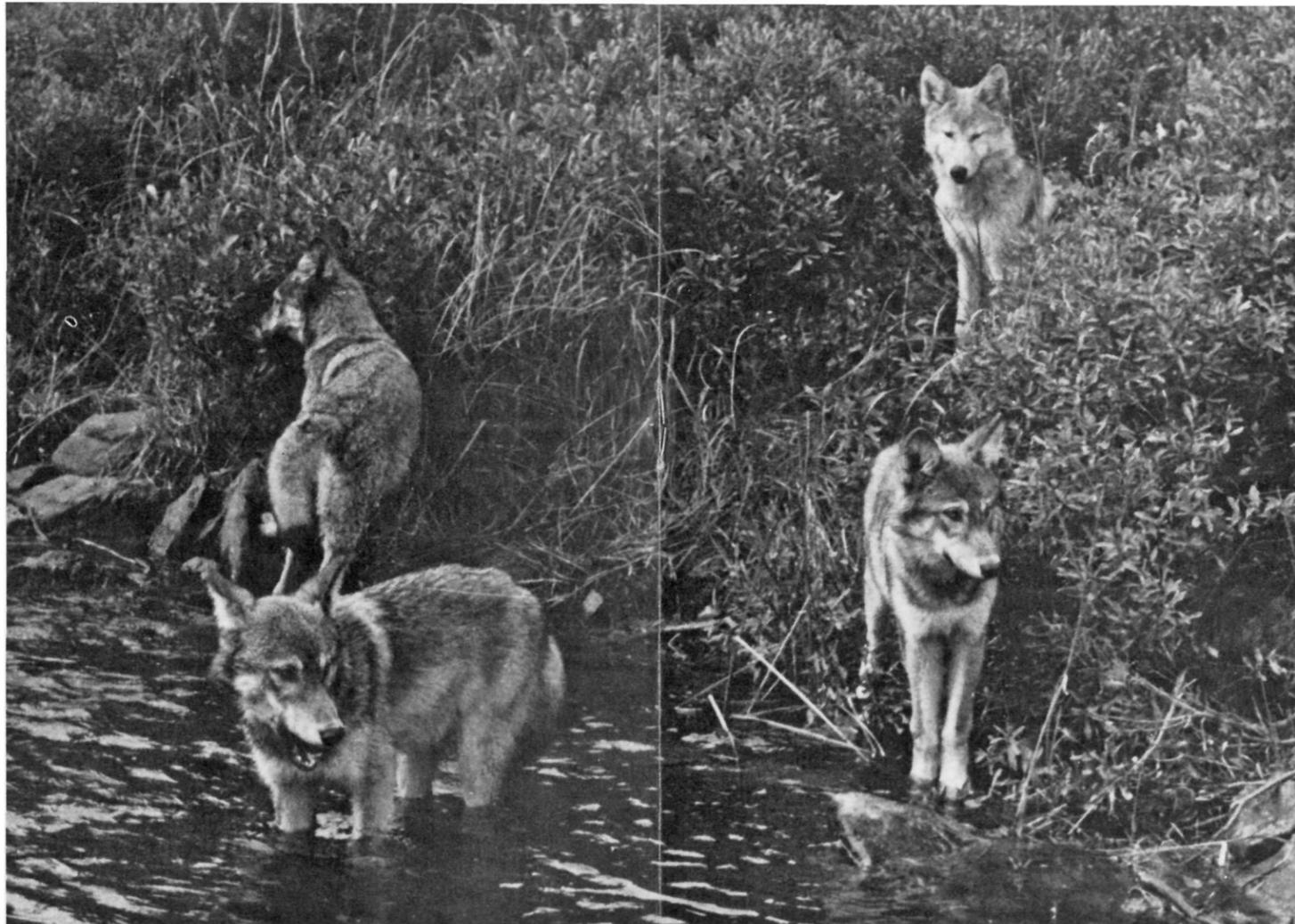
One of the most encouraging aspects is that there is more to the movement than a few people fighting a rear-guard action for the sake of conscience. A growing part of it reflects the understanding that a world that cannot live with wolves will be a poor place for any man who is not an automaton.

The wolf is one of the most adaptable mammals to environmental conditions that the world has known. When Europeans first came to North America, the many forms, or subspecies, of *Canis lupus* ranged from the northernmost parts of Canada's high arctic islands over most of the United States and well south into Mexico. In Europe and Asia the animal showed a similar adaptability; it was found in the British Isles, throughout Europe and the Middle East, and over large areas of China and the Asiatic portion of the USSR.

For centuries wolves have demonstrated a remarkable capability to live close to people in spite of determined efforts to eradicate them. One of the earliest records of extermination comes from the British Isles. There the wolf had yielded to man by the mid-1700s. In Europe wolves also have been exterminated in the most densely populated countries, including Belgium, Holland, Denmark, Switzerland, East and West Germany, and Austria. A very few still may exist in Norway, Sweden, and Finland in the north and in Italy in the south. They are still being reported in France, Spain, Portugal, and eastern Europe. However, little specific information is available on the status of wolves either in western Europe or in Czechoslovakia, Yugoslavia, Bulgaria, Rumania, Greece, and countries in central Asia. The most immediate thing that needs to be done for wolves in Europe is to obtain a reasonably accurate knowledge of their status and distribution.

The status of the wolf in the USSR is not clear to me at the present time. A few years ago I had an article translated from a Russian periodical, *Hunting and Hunting Economy*. Its title was "The Dangerous Predator Will Be Exterminated." The author, D. Plotnikov, stated that as many as 8,000 men in 740 teams had been organized to exterminate wolves. He reported that the annual kill of wolves had declined from 42,600 in 1946 to 8,800 in 1963. However, recently a scientist from the USSR advised me that 28,000 wolves were killed in 1961 and 17,000 in 1970. He stated that the wolf is endangered only in the European part of the USSR, and that in the north and in the Asian section of the country a bounty is in force because the wolves are harmful to agriculture. They are decreasing in numbers in these areas. Wolves are protected in Kafka Zapovednik, a state nature reserve in the Caucasus.

In the United States it took about two hundred years to exterminate the wolf east of the Mississippi River. By 1850 the animal had disappeared from all but a few areas, and by 1900 it had been exterminated throughout the east. Some wolves persisted in northern Wisconsin and the Upper Peninsula of Michigan for another fifty years. They now have been exterminated in Wisconsin and reduced to a



PHOTOS BY DOUGLAS H. PIMLOTT EXCEPT AS NOTED

## WOLVES AROUND THE WORLD



DOUGLAS H. PIMLOTT

few scattered individuals in the Upper Peninsula of Michigan.

West of the Mississippi, wolves persisted in considerable numbers until the 1930s. Their persistence in the Great Plains after the buffalo were gone seems attributable to the fact that domestic cattle were substituted for food after the principal prey had been killed out. Wolves could have persisted in the western mountain ranges, where big game animals were abundant, much longer if stock grazing had not become such big business on national forest and other public lands. The grazing interests would not tolerate any level of wolf predation, and they lobbied effectively to obtain government action to exterminate wolves. The result was that in 1915 the U.S. Congress began funding control of animals injurious to agriculture. It was the death knell for the wolf in the western states.

The story of the campaign to exterminate the wolf is told by Stanley Young in *The Wolf in North American*

*History, The Wolves of North America, and The Last of the Loners*. His writings attest to the fact that the trappers of the Predator and Rodent Control Division (later the Division of Wildlife Services) of the U.S. Fish and Wildlife Service were devoted to the cause of ridding the United States of wolves. In 1944 Young, who once was chief of the predator control division, predicted that wolves would always occur in wilderness areas of the United States. But within twenty years viable populations occurred only in Alaska, the northeastern portion of Minnesota, and on Isle Royale National Park in Lake Superior. Events moved so rapidly in the final stages that the area now occupied by wolves in the lower forty-eight states represents less than 1 percent of original range.

Although wolves are not completely protected in Minnesota, the situation there has improved considerably during the past few years. The bounty system was discontinued in 1965 and has not been reinstated. In 1966, the Depart-

ment of the Interior classified the timber wolf in Minnesota as an endangered species, and wolves have been protected on national forest lands in the state since 1968. Nevertheless, a strong anti-wolf sentiment persists, as evidenced by the following facts: (1) Many legislators continue to work for a restoration of the bounty; (2) the wolf is excluded from Minnesota's endangered species law; (3) there is considerable pressure in the state to get the timber wolf removed from the federal list of endangered species; and (4) directed predator control legislation was passed in 1969 to provide the basis for wolf control in the state. At present the wolf control program, conducted by the state under the legislation, results in wolves being killed primarily in the contact area between agricultural and forested areas. Ultimately wolves also will be controlled in areas where they are considered to be competing directly with deer hunters. It is apparent that the future of timber wolves is still not secure in Minnesota. Inasmuch as the species has been reduced to occupying a minute fraction of its original range in the forty-eight conterminous states, its original classification as an endangered species is certainly justified.

The mixed emotions that exist in human society about wolves are evidenced in Alaska by programs for both killing and protecting wolves. The territorial bounty system was continued after statehood but was modified in 1968 so that only a resident of a particular game management unit could bounty a wolf within the unit. At the same time the Department of Fish and Game was given power to designate the units where bounties would be paid. In 1963, the Department passed a regulation elevating the wolf to the status of a game animal. On the other hand, the Department has been strongly criticized for allowing aerial hunting of wolves to continue over much of the state. However, aerial hunting requires a permit from the Commissioner of Fish



and Game and could be restricted or eliminated where wolf populations are considered to be in danger. For example, no permits were issued on the North Slope, where there is much human activity and where wolves are extremely vulnerable to aerial hunting. What will happen in the future with respect to the aerial hunting of wolves in Alaska is not clear. Public Law 92-159, recently passed, prohibits shooting of animals from aircraft. The intent of the law was to stop such sport hunting. However, the National Parks and Conservation Association has learned that there is a move afoot in Alaska to circumvent the intent of the law by issuing permits that would allow airborne sport hunters to act for the state.

The ambivalence in attitudes that exists was particularly evident in 1970 when a bill was introduced in the Senate to remove all bounties and a bill was produced by the House to double the wolf bounty. However, perhaps the most important factor is that fish and game authorities state unequivocally that there are at least 5,000 wolves in the state, that they are widely distributed, and that they are in no danger of being exterminated. In fact, they point out that in some areas, such as the Nelchina Basin, wolves now exist in good numbers where twenty years ago they were almost nonexistent.

I have left the wolf of the southern states until the last because it is considered a separate species. Nevertheless, the red wolf, *Canis rufus*, seems to be quite similar to *C. lupus*, at least in an ecological sense. This wolf originally occurred over all or part of fifteen states. It now occurs principally in a small area of coastal marshes of southwestern Louisiana and Texas and has been officially classified as an endangered species.

In 1970, Ronald Nowak, a graduate student at the University of Kansas who has had a long-time interest in red wolves, estimated that there might be two hundred left in the coastal areas and possibly one hundred scattered in other parts of their original range. Many forces are working against the red wolf. They include encroachment of industry, agriculture, livestock grazing, and hybridization with the coyote, *Canis latrans*.

In *Report on the Red Wolf*, Nowak stated that there is evidence that hybridization with the coyote began before the turn of the century in central Texas, gradually spreading eastward. I believe that hybridization of coyotes with red wolves has probably resulted from changes in the environment, particularly changes in the balance between forest and range land. As human activities have increased, there was more and more intermixing of range and agricultural land with the forest. Coyotes are primarily animals of open country or of the forest edge. They were favored by these changes and colonized more and more of the east as the forests, which formed the central core of red wolf habitat, were cut or used for the grazing of livestock.

All things considered, the future of the red wolf is very much in doubt. I fear that the species is unlikely to survive in the wild. Conceivably it could become extinct in this decade.

I believe Canada is the most important stronghold of wolves in the world. They still exist in normal numbers over 90 percent of the country, an area in excess of three million square miles. They have been extirpated in the most southerly parts of the country, including the Maritime

Provinces, the island of Newfoundland, and the most densely populated areas of the other provinces. But generally one does not have to go far to find them. It is possible that Canada is the only country in the world where the wolf does not warrant being classified as an endangered species.

Ambivalent reactions and mixed emotions over what should be done about the wolf are widespread in Canada. There are organizations that lobby for their protection and others that exert pressure for control programs that will "reduce them to rarity." The name of Jack Miner is widely known to Canada and for years was synonymous with conservation. In 1947, three years after his death, the Parliament of Canada established National Wildlife Week to be celebrated on the week of his birth. However, his reverence for wild things did not extend to the predators. "Kill the wolves, save the deer" was a persistent theme of his talks and writings. In 1971, the Jack Miner Foundation published a booklet, *Deer and Wolves in Ontario Between 1890 and 1970*. The theme is unchanged. The anti-wolf crusade continues. Its message will be acclaimed by many people across the country. But in spite of this type of anti-wolf crusade, there has been increasing political pressure for the protection of wolves. It is resulting in the amelioration of control programs throughout the country.

The programs for the control, or extermination, of wolves that were instituted in Canada were basically similar to those in the United States. The first bounty system began in Upper Canada (now Ontario) in 1793. All provinces with wolf populations, as well as the Yukon and Northwest Territories, eventually followed suit. All provinces except Ontario and Newfoundland (Labrador) added control programs in the postwar period. There were, however, two important differences between the effect in Canada and in the United States. In Canada the federal government does not have jurisdiction over wildlife or land in the provinces. This meant there was no major program extending across provincial boundaries. The second reason was that large areas of the country have no form of agriculture and little settlement and are inaccessible. The result was that there was no intensive political pressure to mount the type of coordinated campaign against the wolf such as that introduced in the western United States at the instigation of livestock producers.

It does not seem that concern for the preservation of the wolf has developed to any appreciable extent in Europe and Asia. In the case of the USSR, I have the impression that efforts are principally aimed at reducing wolf numbers over large areas of the country. There is some evidence of changing attitudes in Scandinavian countries, but public opinion may not develop soon enough to prevent the extirpation of wolves in Finland, Norway, and Sweden.

As far as Europe and Asia are concerned, an interesting and potentially valuable initiative on wolves has been taken by the Survival Services Commission of the International Union for the Conservation of Nature and Natural Resources (IUCN). The SSC has established a Wolf Specialist Group. The objective of the project is "to preserve wolves as a viable species in holarctic environments of the world

in perpetuity for scientific, educational, and economic purposes . . . so that people gain enjoyment and satisfaction as a result of their presence in wild communities.”

The SSC was formed in 1949 to prevent extermination of threatened species of animals and plants throughout the world. It has formed a number of groups through which specialists from various parts of the world work together to develop research, conservation, and management programs. These groups have provided the central focus of the SSC programs. Ecologists from sixteen countries, including the USSR, have agreed to become members of the Wolf Group. The group will hold its first meeting in 1972 at Banff National Park in Alberta. Canada was selected as the site of the meeting so that the participants, many of whom have not had an opportunity to conduct field studies of wolves, will have the opportunity to gain first-hand impressions of wolf ecology. The proposal for the meeting states:

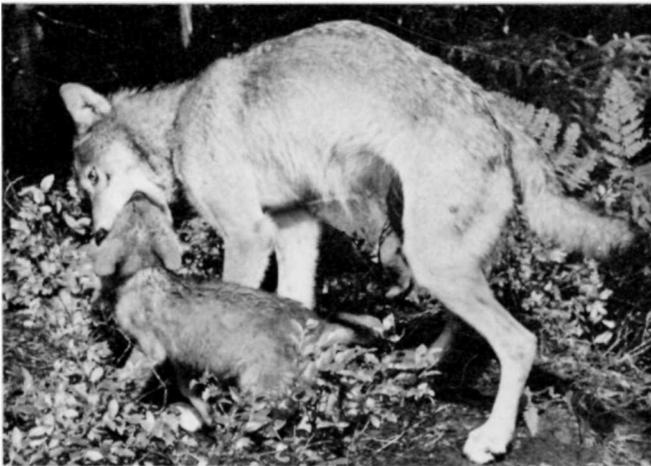
“Each participating country will present a brief working paper on the status and exact distribution of wolves and the nature of research, conservation and/or control programmes in their respective countries. Each paper will include an appendix listing the museum specimens with their place of collection, which have been collected during

the past twenty years in an attempt to determine whether specific wolf populations are pure or consist of crosses with feral dogs. This will give a more accurate picture of true distributions, of interactions with humans and domestic animals and it will give an indication of potential reserve areas. Experience has shown that observations and unverified collections are unreliable.

“An overview of these papers will give an indication of gaps in our knowledge of the distribution of wolves and of future research and management needs. This overview, together with a paper on methodology of management programmes and of field studies used to locate and study wild wolves, will enable the Wolf Group to draw up a programme of action for implementation at state, provincial or private levels.”

I hope that the papers prepared for the meeting, and subsequent research, will clear up much of the uncertainty that exists about the status of wolves in Europe and Asia.

Research on wolves in Europe and Asia seems to have been meager. I believe, in fact, that it has been limited to what a few interested people have been able to do as a peripheral activity. Work of this nature has been conducted in Finland, Norway, and Sweden and has resulted in some published information on wolves.



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*Clockwise from top left: A wolf pup solicits food; among other differences, the gravely endangered red wolf is longer legged and slighter than its husky relative, the timber wolf at right; a beautiful wolf reclines gracefully; an eager pup seems full of curiosity about the world; and two females demonstrate characteristic dominant and subordinate behavior.*



I believe that the change in attitude toward the wolf in North America can be directly related to the dramatic increase in knowledge of wolf ecology and behavior during the past thirty years. The first important wolf study was made by Dr. Adolph Murie and resulted in a monograph, *The Wolves of Mt. McKinley*, published by the U.S. National Park Service in 1944. It was followed in 1947 by *The Timber Wolf in the Rocky Mountain National Parks of Canada* by Dr. I. McTaggart-Cowan.

Perhaps the most important study of wolves has been conducted since 1958 on Isle Royale National Park in Lake Superior. The leader of the project, Dr. Durward Allen of Purdue University, had directed and assisted with a succession of studies on the interrelationships of wolves and moose and on the population dynamics and behavior of the island's wolves. The Isle Royale studies have clearly demonstrated that wolves have evolved the capability of regulating their own numbers even when they have access to an abundant food supply and are completely protected.

Other field research programs have been or are being conducted in Wisconsin, Minnesota, and Alaska; on Baffin Island in the Canadian Arctic; in the Northwest Territories of Canada; and in Jasper National Park in Alberta and in Algonquin Park in Ontario.

Much of what is known about the behavior of wolves and the social organization of packs has been learned from studies of captive animals. Particularly important work has been conducted in the Basel Zoological Park in Switzerland by Dr. R. Schenkel, and in the Chicago Zoological Park at Brookfield, Illinois, by Drs. Rabb and Ginsberg and associates.

The classification, or taxonomy, of wolves represents an area that has been receiving increasing attention during the past decade. The attention is certainly warranted, because as far as North America is concerned the subject has not been considered in detail since the publication of *The Wolves of North America* by Stanley Young and Edward A. Goldman. As it now stands, North American timber wolves are classified into twenty-four subspecies, whereas those of Europe and Asia are subdivided into eight. Three subspecies of the red wolf have been recognized. If the present classification scheme is valid—a fact doubted by many scientists—it means that several subspecies of wolves have been exterminated in North America.

Research on wolves has played an important part in the development of understanding about the role of the wolf in natural ecosystems. It has stimulated, and provided the base for, much popular writing and for three movies.

What is known about wolves has been drawn together in two current books. *The Wolf*, by L. D. Mech, published by Doubleday and Co., is an authoritative reference book on ecology and behavior. *The World of the Wolf*, by R.

**Dr. Douglas H. Pimlott, a native of Quebec Province, holds a cross-appointment with the Faculty of Forestry and the Department of Zoology at the University of Toronto. He is widely known for his research and writing on the ecology and management of big game animals and wolves and is deeply involved in the work of conservation organizations. Dr. Pimlott is chairman of the World Wolf Group of the International Union for the Conservation of Nature, president of the Canadian Nature Federation, and chairman of the Canadian Arctic Resources Committee.**

J. Rutter and D. H. Pimlott, published by J. B. Lippincott, is a popular account of the way of life of wolves. It contains many photographs of wolves, wolf habitat, and animals that wolves prey on.

I have roamed rather widely around the world in writing about wolves, so I will try to place the matter in perspective by summing up. In the United States the red wolf is almost extinct and will probably not survive in the wild—perhaps not even beyond this decade. The timber wolf, as far as the forty-eight states are concerned, essentially exists in viable numbers only in Minnesota. It may eventually occur only in the Superior National Forest, where interchange can occur with wolves from Ontario. The prospect for the wolf is good in Alaska at the present time. It has made substantial gains in the state during the past decade. I believe that the force of public opinion will result in its getting more and more protection in the future. In Canada, wolves occur in approximately 90 percent of their primitive range. During the past fifteen years the bounty has been discontinued in six of eight provinces or territories where it was in force. In addition, the intensity of control programs conducted in several provinces has been greatly reduced. Finally, several organizations are working to foster a better understanding of wolves throughout the country, and this seems to be having considerable impact on public opinion.

The picture for Europe and Asia is hazy, but it is encouraging that persistent reports of wolves are coming from countries where the animal was believed extinct. Two such countries are France and Italy. The USSR is by far the most important country for wolves in Europe and Asia. It has conducted intensive control programs, but an awareness seems to be developing that extermination of the animals is not a desirable goal. It is to be hoped that the Wolf Group of the IUCN will be able to clarify the picture on the status and distribution of wolves in these parts of the world.

I wrote my first article on the conservation of wolves eleven years ago, when I wrote about "Wolf Control in Canada." At that time the future of the wolf looked dim. I could not seem to find silver linings to any of the dark clouds that covered the sky. That sky is not clear yet, by any means; but I do think wolves' chances of survival are improving. As I said in opening this article, the right of the wolf to its place in the natural world finally is beginning to be recognized. When people begin to show that they really care about the future of wild things, I feel certain that the people who run our countries will respond. The President of the United States demonstrated one of the ways in which public opinion can work when in early February of this year he signed an Executive Order ending use of poisons on federal lands and in federal programs of mammal and bird damage control, except in emergency cases. Actions like this make me feel that my increased optimism for the future of the wolf is justified.

Wolf extermination programs must become wolf conservation and management programs; and if people are willing to continue working for wolves as they have in the past decade, there is little doubt that the governments of the world will get the message. ■



PHOTOGRAPHS BY BILL HALLMON EXCEPT AS NOTED

# BIG THICKET: what's left?

Edward C. Fritz

FROM THE RICH, DEEP SANDS of antiquity come the waters of thousands of springs, seeping into a 3,000-square-mile topographical basin in southeastern Texas, feeding a network of clear, permanent streams that flow in a leisurely fashion through creek and bayou into the ever-cool Neches River, and by way of the river to the Gulf of Mexico. This basin and its springs and streams constitute the Big Thicket country of the Lone Star State.

Over a period of a million years of Ice Age and more recent time, the level of the world's oceans has ebbed and flowed with the freezing and thawing of immense volumes of glacial ice during four glacial and three interglacial periods. Each time the Gulf of Mexico receded from the lowlands of the east Texas coast, the Neches and the Trinity rivers to the west began a new cycle of activity, cutting into the sands left by invading seas, bringing in new sands from the north, laying down deltas that sloped gently toward the Gulf.

Today, during a time when the waters of the Gulf stand relatively low, river flows and floods once more have scoured and eaten into the soft materials of a former sea-bottom. Fed by sixty inches of rainfall a year, the Neches and its tributaries have cut contortions into soft sands and clays, piling white sandbars along inner bends and leaving mazes of sloughs to mark their wandering courses. Because the many soil types and drainage net-

works that have developed here vary significantly in age and pattern, they sustain a surprisingly large number of plant communities. A change in drainage caused by a foot or two of difference in elevation or the presence or absence of a chemical or two in soil composition often results in a remarkably abrupt botanical break. Thus, over thousands of years of ecological succession, eight major plant associations have developed in the Big Thicket region.

In earlier time the Big Thicket was dominated by prairie grasses. Prairie fires, started by lightning and probably also by Indian inhabitants, held woodland trees in check while bluestem and Indiangrass continued to hold sway. Eventually, however, forest trees took over the sands to the north, and prairie survived only in the poorly drained wetlands of clay formations. Then entered European man and his livestock to disturb these remnants of original grasslands, curtailing the prairie fires that were part of the natural prairieland regime. Loblolly pine, joined later by hardwoods, moved into this last prairie. Northwest of the town of Batson is a stand of nearly 500 acres of aged pine and hardwood, a prime example of such a man-caused ecological succession. South of this forest, Marysee Prairie is the only sizable remnant of the original *tall-grass prairie* of the Big Thicket—about seventy-five acres in extent and still diminishing in size. Only enlightened management can save it.

On the higher sandy surfaces of more recent geological antecedents, longleaf pine was among the first tree species to persist in spite of prairie fires, forming *upland pine savannas*, mostly open prairie, with a scattering of eastern dogwood, rich-nutted chinkapin, and the exquisite purple pleat-leaf iris.

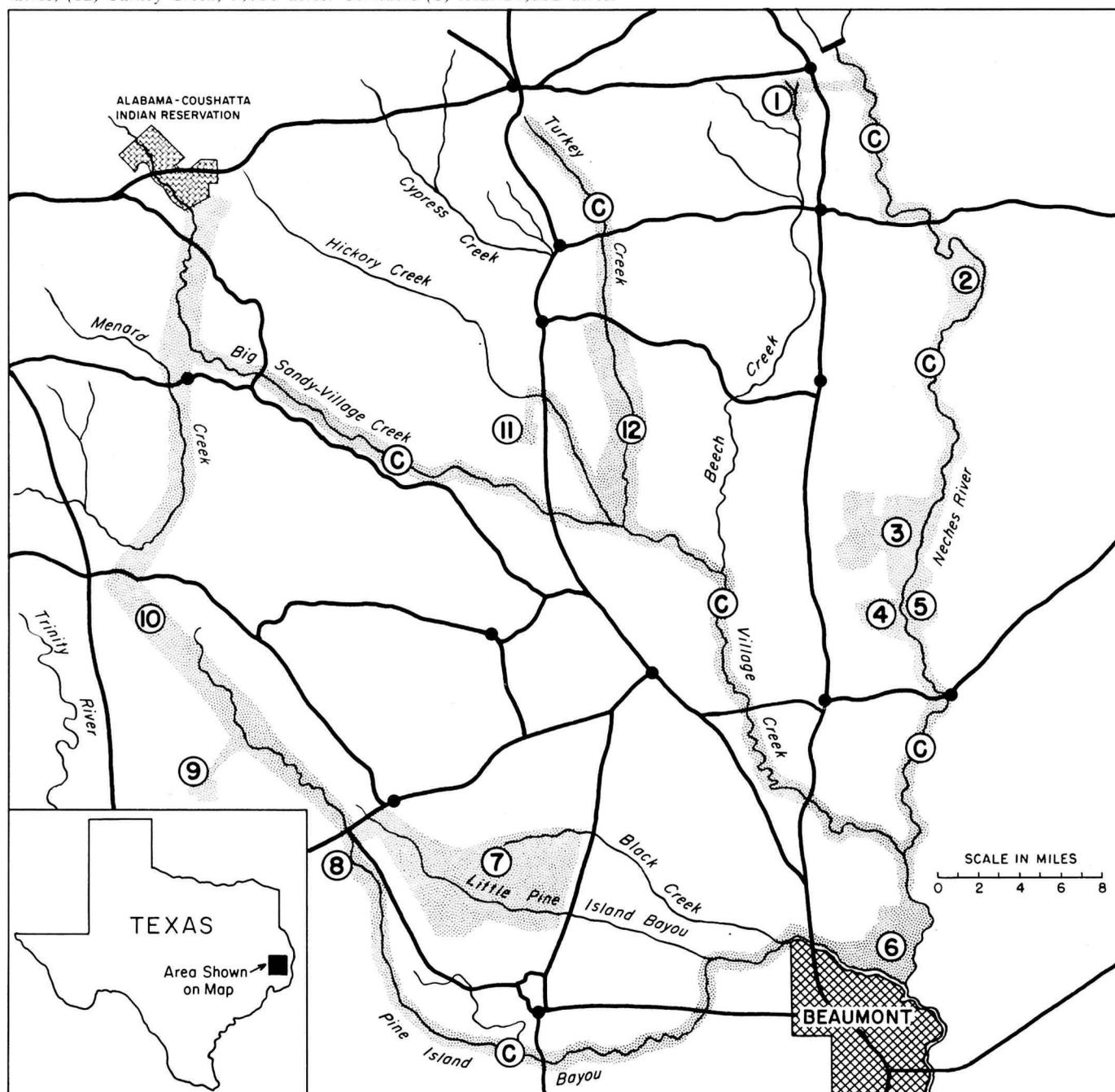
On older sands another ecological succession took place. Loblolly pine took over some of the original prairies, and shade-tolerant trees appeared to create a *loblolly-beech-magnolia* closed canopy forest over pink azaleas, strawberrybush, beechdrops, Indianpipe, and the crane-fly orchid.

In some parts of the Big Thicket thin, horizontal layers of clay underlie the surface sand at no great depth. When rainwater penetrates the sand, it flows along the top of

a clay layer to swales, where it seeps out and stands, creating a highly acid soil. On hummocks in such swales pines have obtained a foothold. Around the hummocks lies a soggy mat, replete through the seasons with plants ranging from primitive club moss, selaginella, sphagnum moss, and seven species of ferns, to highly advanced butterwort, spade-leafed sundew, and yellow pitcher-plants. Closed gentians, marshallia, and four species of orchids also abound in this *wetland pine savanna*.

In the floodplains of the region the biggest trees have gained dominance—the overcup and basket oaks, shagbark hickory, sweet gum, black gum, and loblolly pine. There are lower stands of water oak, water elm, nutmeg hickory, and hop hornbeam. Below these in some spots grow the ladies'-tress orchid, touch-me-not, and a host of rare flow-

Shaded areas indicate units and connecting corridors of the proposed 100,000-acre Big Thicket reserve. In numerical order the units are (1) Beech Creek, 4,860 acres; (2) Joe's Lake, 3,780 acres; (3) Jack Gore Baygall and Blackwater Slough, 8,000 acres; (4) Deserters' Island and Baygall, 2,700 acres; (5) Neches Bottom, 3,320 acres; (6) Beaumont, 5,140 acres; (7) Lance Rosier (Saratoga), 20,000 acres; (8) Palmetto, 760 acres; (9) Loblolly, 1,190 acres; (10) Profile, 15,500 acres; (11) Hickory Creek Savanna, 668 acres; (12) Turkey Creek, 9,750 acres. Corridors (C) total 24,332 acres.





The eight major plant associations in the Big Thicket region: center, bottomland hardwood forest; clockwise from top left, tall grass prairie; upland pine savanna; loblolly-beech-magnolia; acid bog ("baygall"); arid sandylands; palmetto flats; wetland pine savanna.

ers. In the numerous river bottom sloughs stand the tupelo gum and, towering over all, the bald cypress, up to twenty-eight feet in diameter, guarding myriad ferns and violets. All these are part of the *bottomland hardwood forest*.

In many meeting places, or ecotones, between the plant communities water seeps through open *acid bogs* that are patched with sphagnum moss, tiger lily, and whorled pogonia. Or the water trickles along wooded acid bogs, through dank stands of sweetspire, cyrilla, white azalea, white bay, and gallberry holly. Pioneer families of the region call these bogs "baygalls."

In the watershed of Pine Island Bayou, one must walk low ridges to stay out of the swamp water held in *palmetto flats* by an impermeable, clay formation, under a closed canopy of overcup basket, water, and willow oaks.

Although the warm, moist air from the nearby Gulf of Mexico makes most of the Thicket a lush natural arbor, there are some soils, mostly along the ancient stream terraces, where rain filters into the earth so fast, and the summer sun burns so hard, that a typical desert-type

vegetation, including cactus and yucca, thrives on *arid sandylands*.

These, then, are the eight major plant associations of the Big Thicket. They include, all told, such diversity as some forty species of orchids, a dazzling display of various mushrooms, and twenty-seven national champion trees. In these communities lives a profusion of animals, including more than 300 species of birds. Nesting birds run the gamut from hooded and worm-eating warblers to wood ducks and anhingas. Amphibians and reptiles proliferate here, beaver are spreading, a panther occasionally appears, and otter and the endangered ivory-billed woodpecker and alligator still survive.

Today there is no longer any solid block of Big Thicket as large as 10,000 acres. Man has checkerboarded the region with his works—here a pipeline, logging road, or highway, there an oil field; here a pasture, there a town. A mild climate the year around, beautiful woodlands, and miles of stream banks are attracting resort developments. Worst of all, in considering the Big Thicket as a natural

system, are the new tree plantations, burgeoning at a rate of 35,000 acres a year. The plantations are biological deserts, carefully controlled by insecticides, herbicides, and fungicides to eliminate any living thing that might compete with fast-growing loblolly and slash pines.

Before planting rows of pine, the timber companies clear the land with machinery. Until the last two years, the companies generally gave low priority to stream bottoms, when selecting areas for pine plantations, both because heavy grubbing equipment operates less easily in deep, wet soil and because slash and loblolly pines do not grow as fast in standing water. But recently the pattern has changed. In at least two big blocks of the Thicket foresters have bulldozed every fiber of plant life down to, and in to, two waterways—Village and Turkey creeks.

Logging as practiced in the past did not impair Big Thicket ecosystems permanently. In that rich, wet soil, a mixed forest with large trees can grow back in sixty years. In an additional sixty years even a bottomland hardwood forest will regain its virgin characteristics if left undisturbed.

For many years conservationists in Texas and elsewhere have been advocating federal protection for at least a portion of the Big Thicket of Texas. As early as 1927 R. E. Jackson of Silsbee spearheaded the East Texas Big Thicket Association, and by the mid-1930s the protectionist movement had grown considerably. In 1936 the Texas Academy of Science made a biological survey of the area. Out of the published report came a resolution by the Academy that the Big Thicket should be protected. The East Texas Big Thicket Association then proposed a national area of 430,000 acres.

That proposal was generous indeed by the standards of today's thinking. Over the years, various other park plans were formulated only to founder on the rocks of timbering opposition and official disinterest both in Texas and Washington. These later proposals all shared a common denominator, however, which was a general tendency to shrink the amount of Big Thicket to be protected. Various acreages, ranging down to 20,000, were spoken of from time to time; all slipped into obscurity.

Within the past several years it has become apparent that if any significant part of the Texas Big Thicket is to be saved in natural condition, it must be soon. For in a few years—ten, perhaps—there will be little left to save.

Right now, the remaining prime areas of the original Big Thicket are found mostly along streams, forming a weblike pattern of ecological corridors.

For this reason, recent proposals for a national Big Thicket reserve have looked toward a wheel-shaped preserve with streams and overland trail corridors as its rim and spokes, and a large block of terrain near the town of Saratoga, which would encompass—if that word can properly be used to describe such a configuration—some 191,000 acres. The timber companies, however, have taken a dim view of such a generous acreage.

Park planners recently have been considering a scaled-down version of the same general proposal, with part of the large block omitted and reductions in acreages made elsewhere. This latest proposal would, many Big Thicket enthusiasts think, still protect choice areas from construction and pollution, prevent traffic congestion in and between

units of the oddly shaped reserve, provide long trails and canoe routes with a wilderness atmosphere, save passageways for roving animals and spreadways for rare plants, and allow interpretation of the manner in which the Big Thicket was carved out by the forces of running water. This arrangement would, it is thought, save the best of the Big Thicket within the limits of a 100,000-acre figure, which seems to be imposed by the realities of 1972.

Essentially, the reserve would consist of twelve units connected by corridors. The units, in clockwise order beginning at the northeast, would be Beech Creek, Joe's Lake, Jack Gore Baygall, Deserter's Island, Neches Bottom, Beaumont (in the triangle between Pine Island Bayou and the Neches River), Lance Rosier (or Saratoga), Palmetto, Loblolly, Profile, Hickory Creek Savanna, and Turkey Creek. Housing within the boundaries of the reserve would be limited to park personnel, and all concessions would be outside its boundaries.

The National Park Service also has prepared an alternative 100,000-acre plan in which the Saratoga Tract and part of Lower Pine Island Bayou would be omitted.

However, the timber companies oppose these plans also. They contend that if they need to run new pipelines or timber roads across the streams, the corridor type reserve would cramp their operations. Conservationists say that there are already sufficient pipelines crossing the corridors to service all the oil ever produced in the region and that there are already sufficient public highways crossing the streams to service all the timber operations of the Big Thicket, now and forever. Some think that the timber companies really want the streamside corridors as expansion sites for development of streamside lots, a lucrative practice that is spreading through the Big Thicket and the rest of the nation as well.

Inasmuch as pipelines and highways cross the area and because of its proposed configuration, it is unlikely that a federal reserve in the Big Thicket could be called a national park. It conceivably might be designated as a national monument, although perhaps better yet would be a tailor-made descriptive category. Neither conservationists nor congressmen wax enthusiastic over the proliferation of categories in the national park system, although there is ample precedent for such flexibility where necessary to achieve the best use.

In the meantime, however, lumbering and development continue in most of the Big Thicket. When the world loses a part of its variety, man loses part of his place in nature. In the Big Thicket there yet remains a great wealth of variety—plants, animals, scenery, and geological and human history. There is yet a reasonably good chance to preserve part of this heritage by making it a unit of the national park system. ■

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# ECOLOGICAL FORESTRY for the CENTRAL HARDWOOD FOREST

Leon S. Minckler & Peter A. Twight

Summary of a comprehensive report under the same title by Peter A. Twight and Leon S. Minckler, published in April 1972 by the National Parks and Conservation Association. The report covers the first of a series of NPCA forestry studies supported by the Culpeper Foundation of New York. Copies of the printed report are available from the Association for \$1.00.

THE OBJECTIVE of the kind of forest management that we have called "ecological forestry" is timber production that maintains and enhances other social values of the forest and protects the environment for ourselves and future generations. In the central hardwood forests of America this double purpose can be accomplished by intensive forest improvement and by harvest and regeneration cutting of small groups of trees to provide a flexible, sustained yield of all values from a continuous and diversified forest.

This report outlines an alternative to even-aged forest management by clearcutting in our central hardwood forests. It has been prompted by the undue emphasis of public agencies and the industrial forestry establishment on timber values over environmental and other social values. It was given impetus by our concern that the assumption of timber primacy is responsible in large part for the relative failure of official cooperative programs to interest many small (to five hundred acres) woodland owners in sound forestry practices. The current public outcry against clearcutting, and the protests of some professional foresters, have generated arguments in response to those that claim the biological and administrative necessity of clearcutting. We believe that these arguments are valid only if the unstated economic value assumptions are valid and that those assumptions should be matters for public decision.

In its simplest terms the issue has resolved itself into an examination of commodity values versus all social and environmental values; in a broader sense, monetary profit versus total economic values. We use the term "economic" in its original sense of "household management," to encompass material, social, and esthetic values. In this sense the forestry economic equation can be quite favorable; forest outputs can be evaluated much more liberally. Ecological forestry accomplished through intensive silviculture need not necessarily be constrained by the assumption that the market is the sole or proper value system. In other words, we can be more humanistic.

To demonstrate our position, we studied a forest area that had been managed for many years, where complete records had been kept, and where intensive silviculture had been practiced. To

attain the objectives Experimental discussion, forest practices had to include improvement treatments and selection cutting to obtain regeneration. Because central hardwood species need at least partial sunlight to regenerate, the group selection system of cutting trees periodically in small groups of about a fifth to a half acre is required. This provides the continuous, diversified, and dynamic forest desired.

The one place known that satisfied all requirements was part of the Kaskaskia Experimental Forest in southern Illinois, long operated by the U.S. Forest Service. There, in one comprehensive study, group selection silviculture was practiced from 1948 to 1968, when the study was deactivated. The Kaskaskia area is a region of hilly topography with steep slopes, variable site quality (growth potential), a cherty silt-loam soil of variable depth, forty-three inches of annual precipitation, and a typical continental climate. Coves and northerly slopes (mixed hardwood sites) are moist and better-than-average sites for oaks and hickory and about average for yellow poplar. Ridge tops and south slopes are dry and possess about half the productive capacity of the mixed hardwood sites. These forests were partially cut during the period 1890 to 1910 and in some cases have been "high-graded" again since then. Partly as a result of this treatment the study forests are uneven-aged, with many small trees, fewer medium-sized trees, and few large trees on a given area. Many low-quality and cull trees are present as well as trees suitable for future growth and eventual harvest.

We reexamined thirty-eight acres that had been studied over a twenty-two-year period. The study area consisted of coves and northerly slopes representing the average-to-good upland sites of the region. Overstory trees were chiefly white oak, black oak, northern red oak, scarlet oak, hickories, and yellow poplar. There was a scattering of black gum, white ash, beech, elm, sugar maple, black cherry, black walnut, and sycamore. Woody species of the understory included dogwood, sassafras, persimmon, and ironwood. The more tolerant species—beech, black gum, sugar maple, hickories, and white oak—occurred both in the overstory and understory, but crown layering was indefinite or absent. White oak not only is the most valuable combination timber and

wildlife tree, but is long-lived and able to persist in shade for long periods, recovering when growing space is provided by thinning or harvest cutting.

Any forest is in a state of constant change. Without interference by man, natural agents such as fire, windthrow, disease, insects, and natural tree mortality kill existing trees and create space for regeneration and for development of seedlings into saplings and pole size stages. For these reasons, mixed hardwood stands tend to become and remain uneven-aged. When cutting for forest products is done, natural changes are modified and accelerated, the extent of change depending on the severity and nature of the cutting. If forests are clearcut—that is, all trees removed—the new stand will be even-aged. However, there are degrees of clearcutting. A full silvicultural clearcutting removes all trees down to at least two inches in diameter. All small stumps should be killed to prevent stump sprouts. But often markets are not available for small trees, and the owner does not wish to spend money to “clean up” the clearcut area. In such a case, small and cull trees are left scattered over the area and eventually occupy much of it. More often, though, the central hardwoods have been “highgraded” for their largest and best trees, so that most trees below about sixteen to eighteen inches in diameter, as well as the larger undesirable trees, have been left. This happened fifty to seventy years ago on the Kaskaskia study area.

The silvicultural treatments started in 1949 on the study area first consisted of an initial improvement treatment that removed merchantable overmature, high risk, and lower quality trees and killed cull trees. All good growing-stock trees were left. This cut was made, not primarily to obtain new regeneration, but to improve the existing forest. However, some openings were made more or less by chance, and successful regeneration was obtained. In two subsequent cuts made eight years apart, a conscious effort was made to harvest small groups of mature trees to create openings of a fifth to a half acre, to clean up such openings, and to scarify the ground with the skidding tractor on good yellow poplar sites in order to assure reproduction of that species. Improvement treatments also were continued through cutting of poorer merchantable trees in all size classes, killing culls, and weeding in patches of saplings, a practice that was seldom required.

After three cuts over a twenty-two-year period on the thirty-eight-acre study area, the forest in 1971 contained fewer trees five to fourteen inches in diameter, more trees larger than fourteen inches, and many more saplings below five inches free to grow. (The 1949 forest had virtually none.) During the next five to ten years many of these saplings will grow into the pole sizes, and this trend will continue, rather like a wave, to replace poles as they grow into larger sizes.

The cutting treatments have improved the quality of the forest, produced a cash return, increased net growth, secured new regeneration, maintained a continuous forest, and increased tree age and size diversity of the forest. Species composition parallels that of the 1949 forest except that developing new growth will have more white oak and yellow poplar, both excellent species from a commercial viewpoint. Future cuts and treatments should be flexible and should be designed to maintain a reasonably balanced tree size distribution and preserve the dynamic and diversified nature of the forest.

The Kaskaskia study leads one into another aspect of forest ownership and management. Most forest owners are interested in more than timber values; they want other satisfactions, including esthetics, wildlife, and the maintenance of an unspoiled and undamaged forested area. Beauty in nature is complex and relative; not all people have the same tastes and the same responses to nature. But esthetics is more than visual. It includes a feeling for man's natural and basic relationship with the earth, a feeling that has developed over two million years of evolution. Earth is man's home. Man *properly* feels an interdependence with

nature, but not a dominating and conquering independence. Only with this attitude can he maintain a permanent and stable earth-home.

In the forest, small features may have symbolic and functional meanings that can lead to esthetic experiences. A feeling of stewardship and appreciative interdependence might be derived from tall straight trees, stumps, groups of saplings, a variety of sizes and species of trees, wildlife plantings, trails, and well-built permanent roads with proper drainage and bank stabilization. Most such features are present on the group-selection area at the Kaskaskia Experimental Forest. This condition may be maintained by periodic group-selection cutting of mature trees every eight to twelve years. After three cuts on the study area there is a greater variety of subjects for observation than there was when the forest formed a continuous canopy of leafy crowns.

To most people, a forest is incomplete without wildlife. Various species of animals and birds require differing food and cover requirements. Thus, it is necessary to create and maintain a variety of forest conditions if many species of animals are to find a home within a single wooded area or ownership. For wildlife variety the objective is to maximize the length of edge between vegetation types and create and maintain a variety of such types. For continuity in maintaining diversity, edge effect, cover, and variety of foods, the group-selection method as used in the study area has been effective.

Integrated forestry may not seem credible, however, because many woodland owners do not believe that logging and environmental values can be made compatible. They cannot be blamed for this attitude, because in the past logging usually has been destructive and even downright violent. However, if logging is handled as an *integral part of the silvicultural operation*, considering *all* the objectives of that operation, it need not be destructive.

This effect has been demonstrated on the Kaskaskia study area. Small but adequate equipment was used, and the logging crew was skilled, motivated, and carefully trained, and they understood silvicultural objectives of management. There are permanent, well-built roads on the ridges, and skidding was done uphill, with water bars in skid trails when required. The cut made no major environmental impact on the area, and virtually no damage was done to the remaining stand. Openings for regeneration were cleaned up and sometimes scarified as part of the logging operation. With skilled permanent crews cutting mostly large trees, the costs per volume of logs produced were less than those of clearcutting where many small trees twelve to sixteen inches in diameter had to be harvested.

The silvicultural practices of improvement treatments and group-selection cutting in central hardwood forests constitutes ecologically sound forestry, yielding commercial forest products while protecting and enhancing desired environmental and non-timber values. These practices were actually carried out over a twenty-two-year period on the Kaskaskia study area. The total economic equation—all inputs versus all outputs—usually proved more favorable than that for strict commodity forestry. Our central hardwood forests can provide material values, including wood and clean water, and at the same time those esthetic and ethical values that accrue from wildlife, recreation, natural beauty, and a sense of care for the good earth. This is, indeed, an attractive alternative to clearcutting. ■

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# NPCA at work

**Park wilderness** The House Subcommittee on National Parks and Recreation recently considered Park Service plans for wilderness in California's Lava Beds National Monument which, as proposed, would cover 9,000-odd of the monument's 46,000 total acreage, or about 200 acres more than the Service had proposed before its own public hearings on the matter. On invitation NPCA presented a statement on Lava Beds wilderness and other matters affecting the monument.

The Association pointed out that most lands in the monument are highly suited for inclusion in the wilderness system and that they should be so designated. Once again NPCA objected to the Service's perennial 1/8-mile "buffer zone" around wilderness units for "present and future management needs"; also to a plan for a "motorized nature trail" in the monument, saying that there is already ample opportunity for motorized recreational touring there and that in any case the concept of a "motor nature trail" is self-contradictory. Telephone and power lines in the monument should be placed underground, the Association recommended.

The Service has said that at Lava Beds it will reexamine one of the unit's roadless areas for wilderness at such time as grazing can be phased out. NPCA testified that such a delay is not necessary; that grazing can be compatible with wilderness designation if the use does not detract from the wild aspect of an area, which it does not at Lava Beds Monument.

At the same hearing the subcommittee took public testimony on Service wilderness plans for Lassen Volcanic National Park in California, on which NPCA also presented its views on invitation. The Association's comment here essentially was similar to that in behalf of Lava Beds—that wilderness is a precious and diminishing commodity and that it should be designated wherever possible in the national park system while it is still possible. "Designation will leave ample opportunity for traditional recreational pursuits on federal lands, as the percentage of land eligible for inclusion is only a small part of the total federal acreage," the Association said. "To make the designation at this time will protect the areas from activities which would destroy their wilderness potential."

It is of interest that two of the points made strongly by NPCA at Park Service wilderness hearings in the field, and at congressional hearings on invitation, are receiving important support. For example, on the occasion of a recent Senate subcommittee hearing on a group of plans for park wilderness (reported in the July Magazine), Senator Frank Church of Idaho was critical of the Service's 1/8-mile "buffer zone" concept. "There is no requirement for that in the Wilderness Act," the senator said at the hearing. "No other agency draws wilderness boundaries in this way, which has the effect of excluding the critical edge of wilderness from full statutory protection." On the second matter, exclusion of lands because of grazing, the senator had this to say: "I note that in national park wilderness, the Department of the Interior maintains that an area under established

and authorized grazing is not, as a matter of blanket policy, considered suitable for wilderness. I am at a loss to find a justification for that policy in the Wilderness Act." (Senator Church was instrumental in making wilderness a national policy, at one time having been Senate floor manager for the legislation.)

**Southwestern forest study** The U.S. Forest Service has published an inventory of roadless areas in the national forests of the Southwest that will form the basis for terrain to be studied for future wilderness recommendations. It has also held a public hearing on the preliminary document. In behalf of NPCA, Robert L. Coshland, Association correspondent living in Tucson, Arizona, presented comments on the study, with emphasis on those national forest areas with which he is personally familiar.

Mr. Coshland objected strongly to the short time allowed the public to familiarize itself with the study document. "It is impossible for even an active member of the public to submit thorough and fully accurate comments within a month on a subject on which so-called 'multidisciplinary teams' have devoted many months of intensive study on a full-time basis," he said. Mr. Coshland pointed out a number of roadless areas on national forest lands in Arizona, with which he was familiar, that the Service had omitted from inventory. Also, he identified other areas that had primitive roads or jeep trails which could be eliminated in future, and the lands carried on inventory.

Mr. Coshland made two major recommendations in regard to the Service's roadless area study: extend the time allowed for public study and comment on the document, and reexamine much Southwestern forest land presently not included for future wilderness study. He said he thought the study team had been ultraconservative in its work, including only those forest lands that were "simon-pure." He gave as an example lands in the Santa Catalina Mountain district of Arizona excluded as wilderness possibilities because they were "too close" to a city.

**Refuge wilderness** NPCA correspondent Coshland also has presented a statement for the Association at a Bureau of Sport Fisheries and Wildlife hearing on plans for wilderness in the Imperial National Wildlife Refuge in Arizona and California. Here NPCA commended the Bureau for an excellent wilderness plan in general outline, including plans for phasing out several roads in the refuge in favor of additional or potentially additional wilderness.

NPCA made several suggestions for increasing refuge wilderness through Bureau acquisition of several parcels of land for addition to various units of the refuge. The Association also strongly urged the Bureau to refuse right-of-way for a parkway currently proposed along the Colorado River, saying that wildlife refuges are not designed to act as thoroughfares; it further insisted that wilderness boundaries in the overall refuge extend to mean water level of the Colorado for protection of marshland wildlife habitat.

NPCA also has had the opportunity to congratulate the

Bureau on another of its wilderness proposals, that for the Oregon Islands National Wildlife Refuge, which includes several score of small but highly scenic islands of the "seastack" type off the Oregon coast. The islands are important habitat for sea lions, seals, sea otters, and oceanic birds. NPCA pointed out, through Dr. John W. Grandy IV, administrative assistant, wildlife, that "the situation regarding many of these species is critical, and habitat preservation is the surest way to insure the opportunity for survival." The Association urged, however, that the Bureau acquire as soon as possible another twenty-six of the islets that it has included in its wilderness plan but does not own as yet. "This wilderness, combined with the existing Oregon Islands Wilderness and the Three Rocks Arch Wilderness, will be a valuable asset to Oregon and the United States," Dr. Grandy testified.

**Soft-iron shot** NPCA has been campaigning for many months for substitution of soft-iron shot for lead shot, historically used by waterfowl hunters but also responsible for the death by poisoning of hundreds of thousands of waterbirds every year in this country. The Association long ago requested the Secretary of the Interior to use his authority under the Migratory Bird Treaty Act to require the substitution and put an end to loss of 2 to 3 percent of the continental waterfowl population yearly by lead poisoning. Lead shot is ingested by waterfowl as food and grit.

The Association recently has had information from the Bureau of Sport Fisheries and Wildlife indicating that the agency plans to go ahead with further testing of iron shot. In letters to the Bureau's director and to the Deputy Assistant Secretary of the Interior, NPCA has termed the new testing commendable but has pointed out that Interior already has conducted controlled tests of soft-iron shot and that the tests have shown it to be safe and effective. New tests should not be allowed to delay promulgation of regulations prohibiting use of lead shot in aquatic areas. NPCA insisted, and industry and hunters should be required to make the change to soft-iron shot by the start of the 1973 hunting season.

**Endangered species** We have reported several times in recent issues on the part played by NPCA in helping to shape U.S. recommendations in regard to the International Union for the Conservation of Nature's convention on rare and endangered species of plants and animals. No assessment of the way in which the convention will go eventually can be made in this issue, but several important corollaries have grown out of NPCA's thinking in the matter.

One of these has been a major effort

by the Association to identify, with the assistance of many American universities, as many endangered native species of plants as possible under the criteria developed by NPCA for the IUCN convention, summarized in the February 1972 Magazine.

A related major effort, under direction of Dr. John Grandy IV, Association wildlife specialist, will undertake to identify endangered American species of animals, including mammals, birds, reptiles, amphibians, and fishes, under the same criteria. The inventory will consider the status of isolated population segments of particular species, under which treatment an animal might be identified as endangered in one area but not in another. In such a circumstance NPCA will endeavor to discover underlying reasons.

Obviously, a list prepared in this way would not resemble, except in a coincidental way, any current American or international list of endangered animal species. As a first step, NPCA has commenced sounding out the fish and game commissions of the forty-eight conterminous states, with other sources of information to be canvassed later.

**Storm King decision** One chapter in the long story of conservationist efforts to prevent defacement of the scenic Hudson Highlands of New York came to an end in late May when the Supreme Court declined to review Federal Power Commission approval of a pumped-storage reservoir and electrical generating plant at Storm King Mountain.

Lead by the Scenic Hudson Preservation Conference, a group of national conservation and environmental organizations, including NPCA, has opposed the project for many years while advocating a number of alternative power sources for New York City. The case has been historic in that earlier efforts of the group lead to a ruling by the Second Circuit Court of Appeals for New York that the FPC was obliged to take environmental impacts into account in its rulings on such matters—a landmark decision that was to initiate widespread court consideration of large construction projects whose benefits had previously been measured in terms of dollars and cents alone.

The Storm King case is not yet closed, however. Presently in New York courts is

another suit by environmentalists that challenges the hydroproject on the grounds that implementation would violate state water quality standards—specifically, that daily filling of the 12-billion-gallon reservoir would allow salt water intrusion into the Hudson from Long Island Sound, to the detriment of the river's fresh water ecology, especially its fish life. A water quality certificate already has been issued by the state for the project, but construction, if there is to be any, awaits resolution of the second case, which also may eventually land in the Supreme Court.

**DDT order** NPCA has commended William D. Ruckelshaus, administrator of the Environmental Protection Agency, on the agency's recent decision to halt most of the remaining uses in the United States of the pesticide DDT. (The decision triggered an immediate suit in a U.S. Circuit Court of Appeals by 27 manufacturing and formulating firms seeking revision of the order.)

In its letter to Mr. Ruckelshaus the Association pointed out that it long has advocated a switch from "hard" pesticides like DDT to "soft" pesticides and biological controls, and thus has been even more pleased by the decision.

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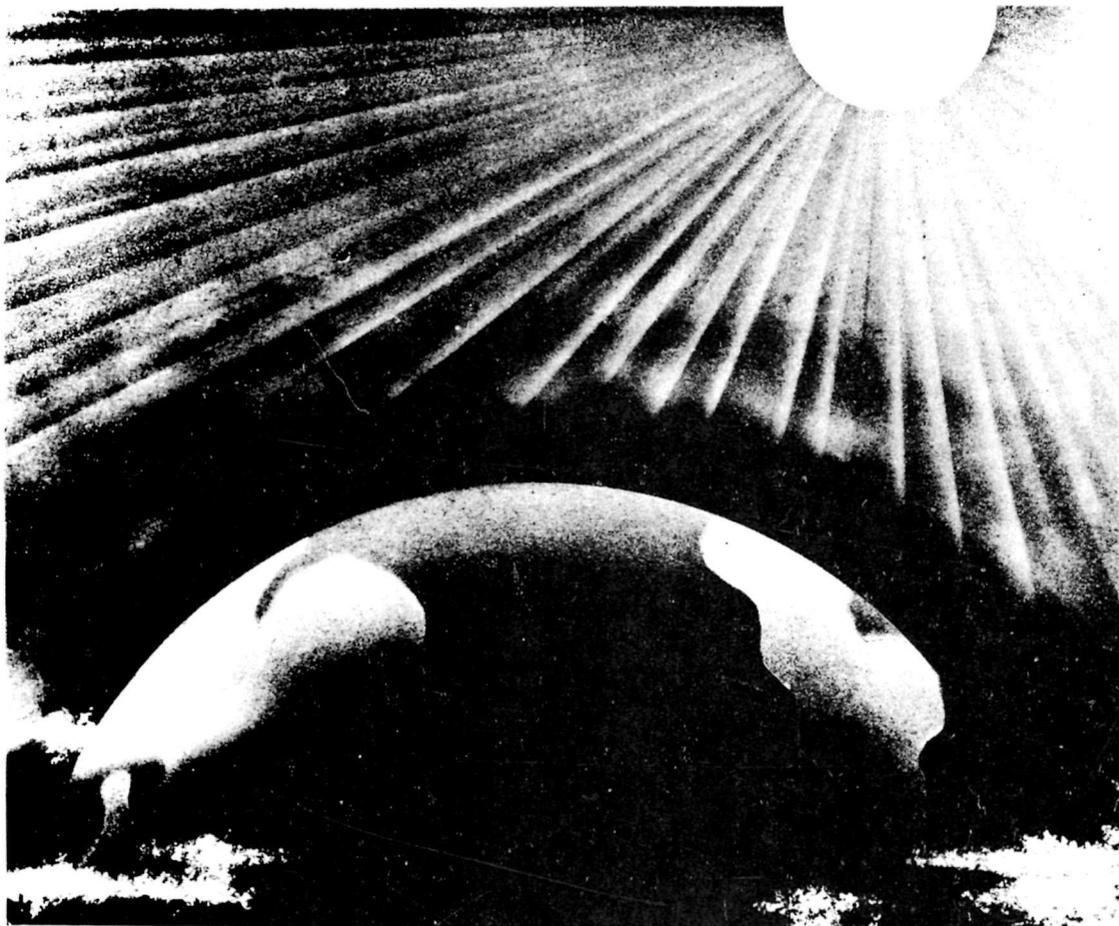
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## conservation news

**Back Bay Refuge** Conservationists who have been following the fortunes of the Back Bay National Wildlife Refuge on Virginia's Outer Banks—subject of a number of earlier reports in the Magazine—will be interested in the latest turn of events there.

The Bureau of Sport Fisheries and Wildlife has prepared a very good plan for managing the refuge and saving it from off-road vehicle destruction and misuse, while at the same time providing for people who must gain access to their properties south of the refuge. The plan was to have gone into effect in early summer, and the refuge had hired additional personnel to enforce the new regulations.

These regulations would have become effective 30 days after publication in the *Federal Register* last spring. In the meantime, however, beach-buggy and real estate interests, among others, suddenly demanded an environmental impact statement on the proposed new plan. While enforcement at Back Bay Refuge has been tightened up, and may be tightened even further during the summer, the new regulations now will not be in effect officially until August at the earliest, since new publication in the *Federal Register* will have to await a final environmental impact statement—plus a period for public comment.

**Back-country crunch** A trial program for rationing national park back-country use, put in effect by the Park Service for Great Smokies, Sequoia-Kings Canyon, and Rocky Mountain national parks for the 1972 summer season, seems to argue effectively for including maximum acreages in NPS wilderness plans—an idea that constantly has been promoted by NPCA ever since the Service began to consider park wilderness, and even before then. Permits for back-country park travel now will be issued in the three trial parks on a first-come, first-served basis to prevent overuse of the resource. Secretary Morton, announcing the trial program, says he is confident that “the prospect of retaining these areas in their natural condition, untrammelled and unspoiled, is more than adequate compensation for temporary inconvenience.”

Temporary inconvenience? NPCA has argued, pleaded, and published for years against the buffer zones, the big exclusions of legitimate wilderness, the oversized enclaves, the wilderness setbacks from roads, the big developments, the airports and jet-ports, the motor nature trails, all of the back-country eaters and wilderness destroyers that have led or will lead to less

wilderness and more rationing. What will it take to convince the wilderness planners?

**Jackson airport** Pressure for lengthening and upgrading Jackson Hole airport in the southern part of Grand Teton National Park continues to be applied in and around Jackson, Wyoming. NPCA has opposed such plans, designed to allow jet aircraft at the airport.

The Association has learned that a petition is in circulation in public places at Jackson favoring reconstruction of the park airport to higher standards, for signature by local residents and tourists at motels. The petition says, among other things, that the airport expansion will not significantly affect the natural environment of Jackson Hole. Nowhere does it mention that the airport is in a national park, or that jet aircraft would need a long, low approach through the park to land at an enlarged airport. Improvement and expansion, it is said, would “contribute to the development of an overall healthy economic and social environment in an orderly manner.” Translated into plain English, this means that Jackson wants a big winter ski-complex as well as summer tourist business, and that a jet airport is seen as a first step in that direction. In any event, the petition would have its signers saying that they “support this improvement and expansion as soon as possible,” apparently whether or not they understand its implications for natural conditions in Grand Teton.

**Amchitka in retrospect** Among the numerous arguments made by environmentalists against the Atomic Energy Commission's Amchitka nuclear test of November 1971 was serious damage to wildlife refuge animal life. The northern sea otter was a case in point, and it may be of interest to now compare AEC's pre-blast estimate of likely otter casualties with figures developed since Cannikin, both by AEC and other researchers.

The earliest prediction by AEC was for a possible kill of from 20 to 100 otters. This was later revised upward to 20 to 240. After the test shot AEC reports became somewhat vague. A first release mentioned 18 dead otters. Another report several months later made casualties 23, with the qualification that the figure might represent “only a fraction of the otters killed. . . .”

Biologists of the Alaska Department of Fish and Game have painted a different picture of the otter kill. Two surveys gave them estimates of between 1,000 and 1,350 otters dead—a substantial percentage of the total Amchitka otter population. These figures may be compared with AEC estimates.

One might hope that percentage error figures of this magnitude do not apply to other AEC operations.



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## conservation docket

After a legislative measure, or bill, is introduced into the Congress, it is referred to one of the many standing committees of that body, which in turn may refer it to an appropriate subcommittee for initial consideration and public hearing. The subcommittee may report out a bill to its parent committee, which in turn may designate a date or dates for public hearings. NPCA members, as citizens, are free to write committee or subcommittee chairmen requesting that they be notified of public hearings on measures of interest. Should they not be able to appear in person at hearings, they may submit a statement for the public hearing record. Committee members will consider such statements during their deliberations on a legislative proposal. Copies of bills may be obtained from the House Documents Room, Washington, D.C. 20515, or the Senate Documents Room, Washington, D.C. 20510, without charge. Names and addresses of Congressmen and committee and subcommittee chairmen, as well as officials of the various executive agencies of the government, may be found in the official *Congressional Directory*, obtainable from the Government Printing Office, Washington, D.C. 20420, in hard cover at \$5.50 or paper cover at \$3.00, both postpaid.

Legislation touching on the national park system introduced or acted upon by the Congress since publication of the July Magazine has been:

**PARK WILDERNESS:** HR 15026 and S 3618, both designating certain lands in California national parks and monuments as wilderness. To House and Senate Interior and Insular Affairs committees, respectively.

**TUSKEGEE HISTORICAL PARK:** S 3662, to provide for establishment of a Tuskegee Institute National Historical Park in Alabama. To Senate Interior and Insular Affairs Committee.

**CLARA BARTON HOME:** S 3646, to provide for establishment of the Clara Barton National Historic Site in Maryland. To Senate Interior and Insular Affairs Committee.

**TINICUM URBAN PARK:** HR 7088, to establish the Tinicum National Urban Park in Pennsylvania; passed by the Senate with amendments.

**AMISTAD RECREATION AREA:** S 1295, to establish the Amistad National Recreation Area in Texas; passed by the Senate with amendments.

**GLEN CANYON:** S 27, establishing the Glen Canyon National Recreation Area in Arizona and Utah; passed by the Senate with an amendment and cleared for House consideration.

**SAWTOOTH RECREATION AREA:** HR 6957,

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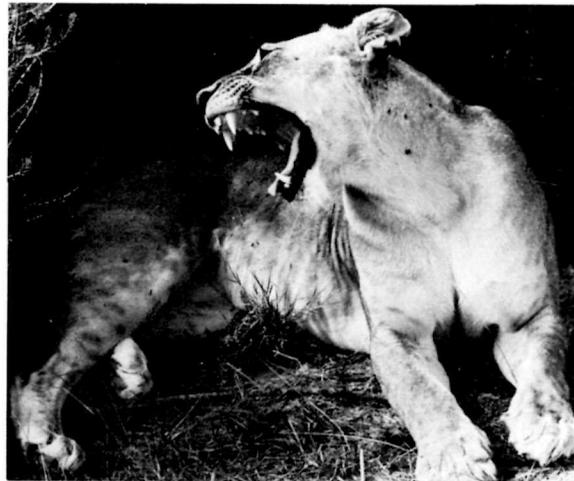


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to establish the Sawtooth National Recreation Area in Idaho; passed by the Senate as amended and sent to the House.

**SEWARD RECREATION AREA:** HR 15359, to establish the Seward National Recreation Area in Alaska. To House Interior and Insular Affairs Committee.

Legislation dealing with American rivers or river valleys:

**HOUSATONIC RIVER:** HR 15122 and S 3632, to amend the Wild and Scenic Rivers Act by designating a segment of the Housatonic River in Connecticut as a potential addition to the wild and scenic rivers system. To House and Senate Interior and Insular Affairs committees, respectively.

**MIDDLE SNAKE:** S 488, to prohibit licensing of hydroelectric projects on the Middle Snake River below Hells Canyon Dam in Idaho before September 1978; passed by the Senate without amendment.

Proposals touching on wildlife or wildlife refuge matters:

**DOLPHINS & PORPOISES:** HR 15254, to require the Secretary of the Interior to make a comprehensive study of the dolphin and porpoise to develop adequate conservation measures. To House Merchant Marine and Fisheries Committee.

**WHALES:** Senate Joint Resolution 115, instructing the Secretary of State to call for an international moratorium of 10 years on the killing of all species of whales; passed by the Senate with an amendment and cleared for House consideration.

**PREDATORY MAMMALS:** HR 14163, providing that the Secretary of Agriculture shall indemnify farmers and ranchers for certain farm animals killed by predatory animals; favorably reported, as amended, by the House Committee on Agriculture.

**SAN FRANCISCO REFUGE:** HR 12143, providing for establishment of the San Francisco Bay National Wildlife Refuge; favorably reported by the Senate Committee on Commerce.

In the American forests:

**FORESTRY INCENTIVES:** S 3105, to authorize the Secretary of Agriculture to develop and carry out a forestry incentives program to encourage a higher level of forest resources protection, development, and management by small nonindustrial private and nonfederal public forest landowners; favorably reported, as amended, by the Senate Committee on Agriculture and Forestry.

**MONTANA WILDERNESS:** HR 7295, authorizing and directing the Secretary of Agriculture to classify as wilderness those national forest lands in Montana known as the Lincoln Back Country, and parts of the Lewis and Clark and Lolo national forests; approved by the House Subcommittee on Public Lands.

**CLEARCUTTING:** HR 15042 and HR 15077, to establish a commission to investigate and study the practice of clearcutting timber

resources on public lands. To House Committee on Agriculture.

**VERMEJO RANCH:** S 2699, to authorize acquisition of lands in the Vermejo Ranch, New Mexico and Colorado, for addition to the national forest system; favorably reported by the Senate Committee on Agriculture and Forestry.

Measures of general interest to conservationists and environmentalists:

**ALASKA PIPELINE:** HR 15227, providing for a study and investigation of alternative routes for the Trans-Alaska Pipeline. To House Committee on Interior and Insular Affairs.

**PESTICIDES:** HR 10729, the Federal Environmental Pesticide Control Act of 1972, was ordered favorably reported by the Senate Committee on Agriculture and Forestry and referred to the Senate Committee on Commerce for 30 days. (This bill has already passed the House.)

**UN ENVIRONMENTAL FUND:** Senate Concurrent Resolution 82, urging creation of a United Nations voluntary fund for the en-

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vironment; ordered favorably reported by the Senate Committee on Foreign Relations. House Concurrent Resolution 621, to accomplish the same objective, has been introduced and referred to the House Committee on Foreign Affairs.

**ENVIRONMENTAL MONITORING:** S 3628, authorizing and directing the Secretary of Commerce to report to Congress on environmental monitoring systems, national and international. To Senate Committee on Commerce.

**NOISE POLLUTION:** S 3342, the Noise Pollution Control Act of 1972; ordered reported favorably by the Senate Subcommittee on the Environment. (This is a subcommittee of the Senate full Committee on Commerce.)

**ELECTRICAL ENERGY:** S 3631 and HR 15199, to promote commerce and assure protection of environmental values while facilitating construction of needed electrical energy supply facilities. To Senate Committee on Commerce and House Interstate and Foreign Commerce Committee.

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will continue to pollute the rivers and the oceans and imperil the life of the seas, from which the United States draws a measure of its prosperity and sustenance. There is no way to deal with this problem on a worldwide basis without providing the technical and economic assistance which will enable India and other nations similarly situated to complete a transition from hard to soft pesticides and to biological or integrated controls. A change of policy by the United States is urgently needed in the interests of the American people and all the peoples of the world.

**T**HE PROPOSED Environment Secretariat will be gravely handicapped by inadequate financing. Granted that the proposal by the United States for the establishment of a \$100 million Environmental Fund was a commendable gesture, the American share will be but 40% of \$20 million a year for five years, or a relatively trivial \$8 million a year.

The discussions of population, although the subject is one of the utmost gravity, were in another sense amusing. The population explosion, so the Chinese contended, is a capitalistic fiction; communism will always be able to feed all the people the world may bring forth. The fact that mainland China seems to be dealing rather vigorously and successfully with its own population explosion suggests that the Chinese do not take their ideological position very seriously. A statement introduced successfully by Norway and Peru called for more technical assistance to the less affluent countries for the stabilization of population.

Two years hence the United Nations will face the population issue in a conference called exclusively for that purpose. Meanwhile it seems probable that the less affluent nations will be pressing their case for United Nations assistance in population stabilization.

**U**NDER PRESSURE from the United States, the Conference largely avoided the issue of ecocide within the context of the war in Indochina. All might have agreed that modern warfare means ecocide; also that such peacetime practices as strip-mining,

the widespread dissemination of hard pesticides, and the extinction of ocean mammals are ecocide. Grant also that worldwide poverty is a root cause of environmental degradation. The Conference necessarily proceeded with its unique responsibilities, the creation of the initial worldwide institutions needed to deal directly with environmental issues.

A number of side activities kept the observers and visitors at Stockholm very busy, but unfortunately somewhat distracted from the responsibilities of the main sessions. Among them were the Environmental Forum, where a variety of dissenting views were expressed without much impact on the Conference, an encampment of alienated youth at an unused airport, a series of sedate afternoon discussions at the historic Lutheran Church behind the Royal Palace, and a schedule of mid-day lectures at the Grand Hotel. All of these activities drew participants away from the Conference, but contributed to the atmosphere of intense interest in the environmental problem.

**T**HERE WAS considerable jockeying for position among the nongovernmental organizations (NGOs) of the United States, both during and after the Conference. What kind of a world coalition of NGOs might come out of the Conference? Who would run it? The NGOs from the other continents expressed resentment at possible American domination.

The final decision was to set up a Convening Committee to hold meetings in New York, Geneva, and somewhere in the underdeveloped world to make plans for NGO activities at the General Assembly this fall, where action will be taken on the recommendations of the Conference.

**W**E SUGGEST that all concerned have a great deal of work to do. It might be appropriate for the private organizations in the United States to address themselves to the solution of some practical problems.

They could make a great contribution in professional services in ecology, economics, and governmental science; it will tax the intellectual capacities of the human race to create the world institutions which will be needed to deal with the ecological crisis. Cooperation should be the order of the day.

—Anthony Wayne Smith



Yosemite Valley, Yosemite National Park. National Park Service photo by Ralph H. Anderson.

## Saving the parks for people

For many years it has been NPCA's position that visitor accommodations should be located on peripheral areas and operated by private enterprise, with public transportation provided into the national parks by comfortable motorcoach or similar means.

It is encouraging to see our efforts bear fruit in Yosemite National Park, where traffic congestion is being eased by the use of public transportation facilities.

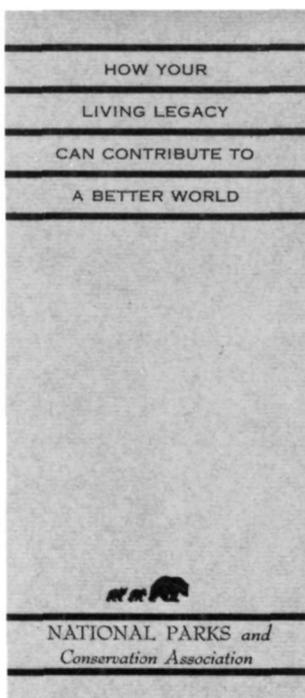
NPCA will continue to press for adoption of this program in other parks where private automobile traf-

fic has impaired seriously the park experience for millions of people.

You can help insure that NPCA's work in the area of park protection will continue through a bequest or other form of deferred giving.

Your attorney can point out how you can enhance the effectiveness of your estate by careful planning to provide financial stability for your loved ones and at the same time extend your conservation stewardship.

For further information write for a copy of NPCA's brochure: "How Your Living Legacy Can Contribute to a Better World."



NATIONAL PARKS *and* Conservation Association

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