National Parks & Conservation Magazine

The Environmental Journal

July 1979

NPCA · National Parks & Conservation Association · NPCA

Illegal Immigration and Democracy

CIVIL LIBERTARIANS (we among them) should be deeply disturbed by the widespread lawlessness represented by the massive illegal immigration across the Mexican border. Civil liberties are protected by a delicate and complex structure of statutory and constitutional guarantees, part of the framework of law and order in democratic societies.

When the observance and enforcement of laws enacted by elected legislatures break down, as has happened along the Mexican border, the civil liberties protected by statute and constitution are gravely imperiled.

The danger signals should be read with concern by all; including the vigilante-type organizations which are appearing in the southwest, and which can be expected in due course to take the law into their own hands, with violence as a consequence.

To oppose the strengthening of the immigration laws from an anxiety for civil liberties is to miss the true peril for those liberties—social and political chaos.

THE DEFENDERS OF CIVIL RIGHTS (we again among them) must feel an equal concern with the preservation of democratic law and order, hence the enforcement of democratically enacted legislation, including the immigration laws. Civil rights are sustained only by the democratic process, based on respect for law.

In this instance there is an added factor of great peril, that minorities are coming into conflict with each other over employment opportunities; when scarce jobs are at stake, pleas by minority leaders for cooperation with competitors are not likely to be heeded.

THE RIGHT TO ORGANIZE and bargain collectively is well established in the jurisprudence of the advanced countries, including the United States. The labor unions are merely discharging their responsibilities in proceeding to organize both legal residents and illegal immigrants in enterprises which employ them.

But they should be on guard against supporting massive immigration running far beyond the quantities designated by statute, and even more so against the illegal aspects of the present influx, because the right of labor to organize and bargain is again a statutory and constitutional structure founded ultimately on general respect for law.

The AFL-CIO has taken an admirable position by resolution on these issues, calling for sanctions against employers hiring illegal aliens, within a humane and libertarian context. It can be a good rallying-point.

HUMANITARIANS (we include ourselves) have a stake in getting illegal immigration stopped. They should look closely at the system: poverty-stricken people in crowded villages pay contractors outrageous sums to smuggle them across the border. Unscrupulous employers hold them in a new bondage under pain of deportation. They take the places of legal residents and impede the self-organization of labor. And in due course, millions are sent home to start over if they can raise the money. The system is inhumane; it should be ended. The problem of poverty in Latin America, as in the other poor countries of the planet, can be handled only by economic modernization and population stabilization; with these efforts the United States can help, but not by serving as a safety valve to defer the task.

CONSERVATIONISTS have the same serious concern with all other citizens for the sanctity of democratic institutions, including the enforcement of the laws. The development of a comprehensive network of statute and regulation for the protection of the environment in recent years should be ample proof of that statement. The non-enforcement of the immigration laws by the Immigration and Naturalization Service has become a mockery; the same could easily happen with the environmental protection statutes if disrespect for democratically enacted law were to spread more widely.

But conservationists have an equally fundamental problem in getting population stabilized in the United States. We have pointed out repeatedly in these columns that our domestic population growth will decline and probably stabilize by the end of the century; offsetting these favorable trends, and negating them completely at present,

Continued on page 31

ISSN 0027-9870

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National Parks & Conservation Magazine

The Environmental Journal Vol. 53, No. 7, July 1979
NPCA · National Parks & Conservation Association · NPCA

COVERS Mammoth Cave, by Roger Brucker, courtesy of the Cave Research Foundation

While thousands of tourists flock to the main galleries of Mammoth Cave, several hundred feet away a few intrepid souls may be exploring places as wild and isolated as any on the planet. On the back cover, Charlotte Mann examines rare transparent crystals. An exceptional natural laboratory, Mammoth Cave National Park is threatened by continuation of past mistakes despite the existence of a good management plan. (See page 4.)

Eugenia Horstman Connally, *Editor*
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National Parks & Conservation Association, established in 1919 by Stephen Mather, the first Director of the National Park Service, is an independent, private, nonprofit, public service organization, educational and scientific in character. Its responsibilities relate primarily to protecting, promoting, and enlarging the National Park System, in which it endeavors to cooperate with the National Park Service while functioning as a constructive critic. In addition, the Association engages in domestic and international programs involving parks, forests, wildlife, wilderness, recreation, open space, rivers, oceans, pollution, pesticides, ecology, environment, population, transportation, historic and archeological preservation, natural resources, and related or comparable matters. Life memberships are $750. Annual membership dues, which include a $7 subscription to National Parks & Conservation Magazine, are $150 Sustaining, $75 Supporting, $30 Contributing, $22 Cooperating, and $15 Associate. Student memberships are $10. Single copies are $2. Contributions and bequests are needed to carry on our work. Dues in excess of $7 and contributions are deductible from federal taxable income, and gifts and bequests are deductible for federal gift and estate tax purposes. Mail membership dues, correspondence concerning subscriptions or changes of address, and postmaster notices or undeliverable copies to National Parks & Conservation Association, 1701 Eighteenth Street, NW, Washington, D.C. 20009. When changing address, allow six weeks' advance notice and send address label from latest issue along with new address. Advertising rates are available on request from headquarters in Washington.

Why has the National Park Service been so slow to implement its master plan for Mammoth Cave National Park?

by WILLIAM P. BISHOP & SARAH G. BISHOP

MAMMOTH CAVE— A Good Master Plan in Trouble

Nearly two hundred miles of passages in Mammoth Cave National Park have been surveyed by underground explorers like the one opposite, which makes its Flint Mammoth cave system the longest on earth. Marshall Avenue (below), a two-mile segment of an ancient underground river conduit discovered under Joppa Ridge in 1968 by the Cave Research Foundation, was named in honor of Charles S. Marshall, former associate director of the National Park Service Southeast Region, who served as chairman of the park's master planning team.

BENEATH the three large ridges—Flint, Mammoth Cave, and Joppa—of Mammoth Cave National Park in Kentucky lies a vast labyrinth of cave passages and vertical shafts. The longest cave in the world, the Flint Mammoth Cave System totals almost two hundred miles of passageways.

The great subterranean galleries and passages of this cave system were dissolved from the limestone rock by underground rivers fed by water captured in thousands of sinkholes to the south of the park. This water flowed north, under the Mammoth Cave Plateau, to the Green River. As the river trenched deeper into the limestone, new underground channels were established and the older ones were left high and dry.

Water that falls on the plateau itself flows on top of the sandstone and shale caprocks to the edges of the ridges. There it seeps downward through the limestone to form underground vertical shafts that intersect the layers of abandoned river channels to form a three-dimensional network of interconnected cave passages.

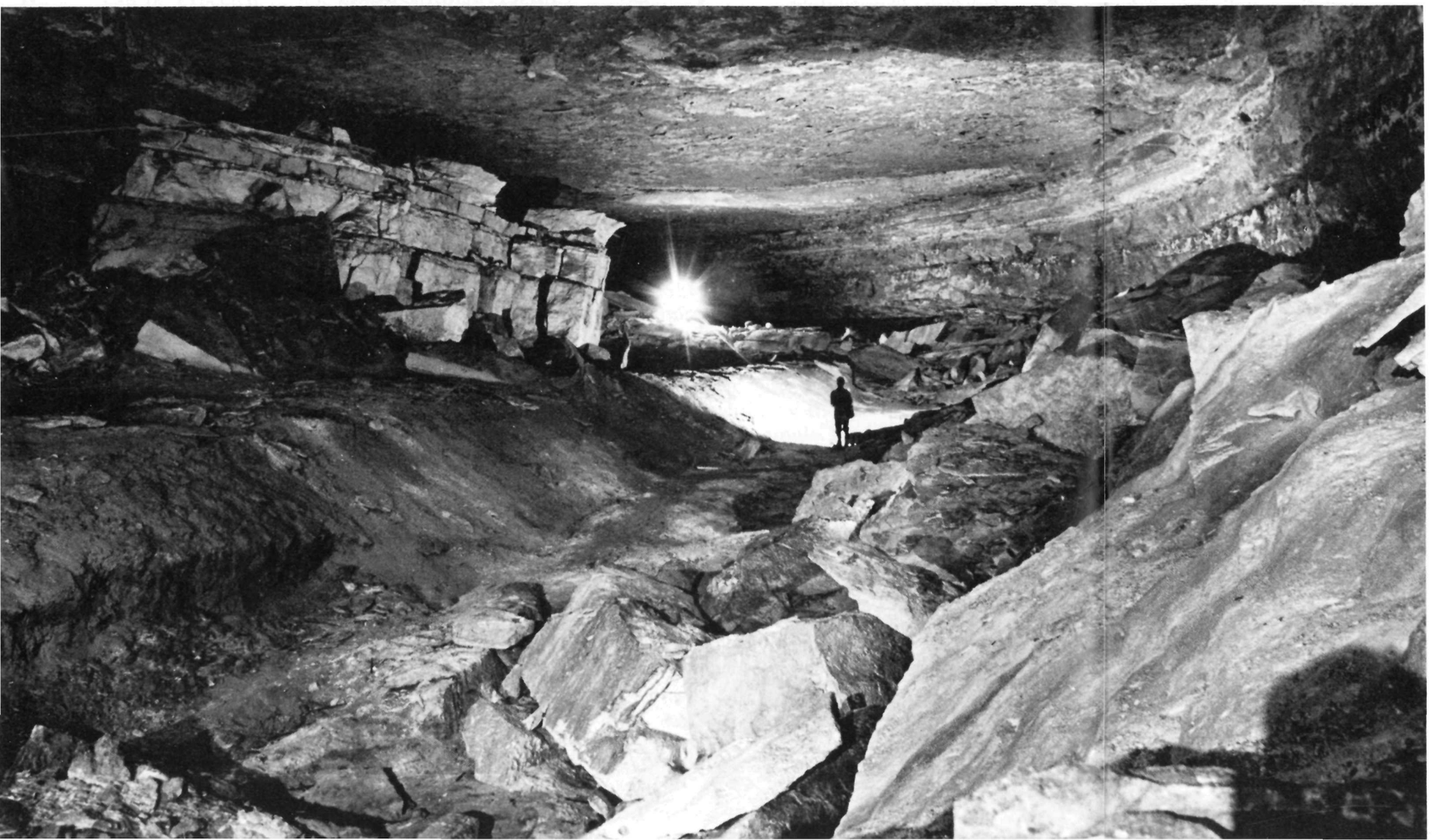
Perhaps driven by the ice ages, two hundred species of animals including fish, crayfish, and insects have adapted to the cool, dark, and food-poor environment with special metabolic and behavioral characteristics—often including blindness. This small ecosystem, so much simpler than that just a few hundred feet above it, intrigues scientists for the lessons to be learned about complex systems. More importantly, because of its dependence on constant conditions and its tenuous connection with the food source outside, the system is very delicate.

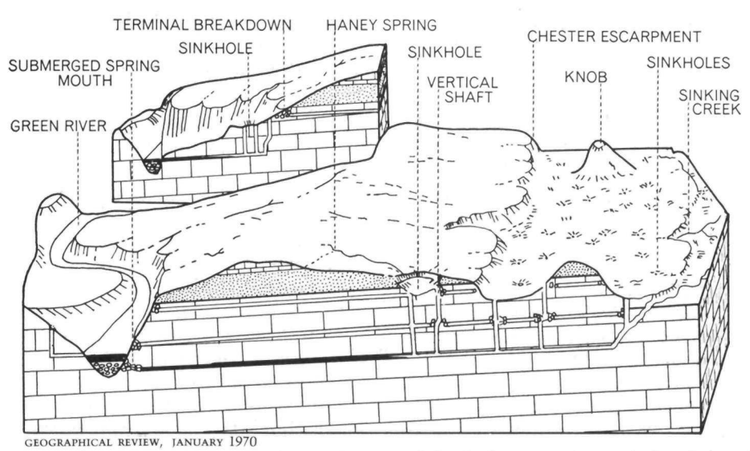
Human beings also have sought shelter or fortune in the caves of the park. The first explorers were aboriginal inhabitants of the "early woodland" culture about 3,500 years ago. Later explorers, since about 1800, sought first saltpeter for gunpowder, then marvels for tourists.

Now guided tours take visitors through the large passages of the old river systems. They visit areas where the sandstone caprock above has allowed the formation of crusts and flowers of gypsum crystals, which are typical of Mammoth Cave. In other areas downward seeping water has formed stalactites, stalagmites, and other flowstone formations, but they are relatively rare in these caves. The major feature of the national park underground is the long sinuous passages—abandoned conduits of a bygone geologic era.

On the surface of the park the deep karst valleys that separate the ridges of the Mammoth Cave Plateau are some of the largest solutional basins in the world. All traces of the old farms and even some of the topography are obscured by dense second-growth forest. A few plots of a few hundred acres each are virgin timber. North of the Green River the topography is dominated by steep sandstone bluffs. Some 40 species of mammals inhabit the surface of Mammoth Cave National Park in a relatively natural community, and 203 species of birds have been spotted. The Green River supports 107 species of fish and the most diverse freshwater mussel fauna known in the world.

In an area of about a hundred square miles, while thousands of tourists may be enjoying guided tours of Mammoth Cave or stroll-

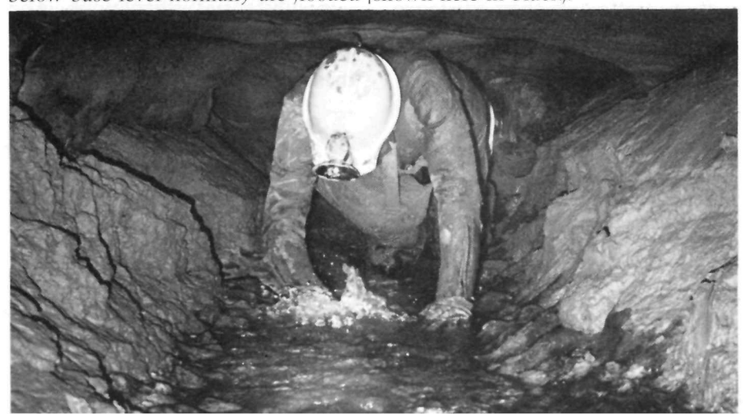




GEOGRAPHICAL REVIEW, JANUARY 1970

Five sources of water to the underground hydrologic system of the Central Kentucky karst (illustrated above) are, from right to left, sinking creeks, sinkholes on the Sinkhole Plain, vertical shafts, sinkholes in the dry karst valleys of the Mammoth Cave Plateau, and backup water from the Green River. Cave passages below base level normally are flooded (shown here in black).

CAVE RESEARCH FOUNDATION PHOTOS BY ROGER BRUCKER



ing through the lush surface forests, hardy explorers may be at the frontiers of the network of cave passages just a few hundred feet below, in a remote and inaccessible wilderness. The worlds of Mammoth Cave National Park are diverse—from the most civilized to the most primitive.

IN 1972 a carefully prepared and far-reaching draft master plan for Mammoth Cave National Park was published for public comment. The plan was based on six fundamental principles:

- *Manage the park to best preserve, protect, and exhibit the unique natural features.*
- *Move all but the most essential facilities to the periphery of the park.*
- *Eliminate private automobile traffic and provide transit service.*
- *Expand opportunities for appropriate recreational activities.*
- *Encourage tourist accommodations outside the park.*
- *Continue ecologically oriented research.*

These principles survived the subsequent deliberations, and the final master plan, published in 1976, was a remarkably good blueprint for management. All that remains is for the National Park Service to act in accordance with the plan.

Unfortunately, the master plan called for a new waterworks to be constructed in the middle of Flint Ridge, a natural area singled out for the highest level of protection. The location was directly above a chamber, Bennington Grotto, that contains some of the rarest metastable minerals in the world. As Dr. Arthur Palmer of the Cave Research Foundation pointed out, such minerals owe their existence to a special balance among chemistry, humidity, temperature, and factors we do not yet fully understand. Slow undetected leaks from the proposed waterworks could seep into the groundwater and alter its chemical composition—a dangerous experiment on these rare specimens. Recognizing the error, the Park Service quickly signed an agreement with a local water company to bring in a pipeline instead. Environmental statements were prepared, and the line has now been installed, eliminating any need for a water treatment plant on Flint Ridge.

JOB CORPS SEWAGE LAGOON, 1967

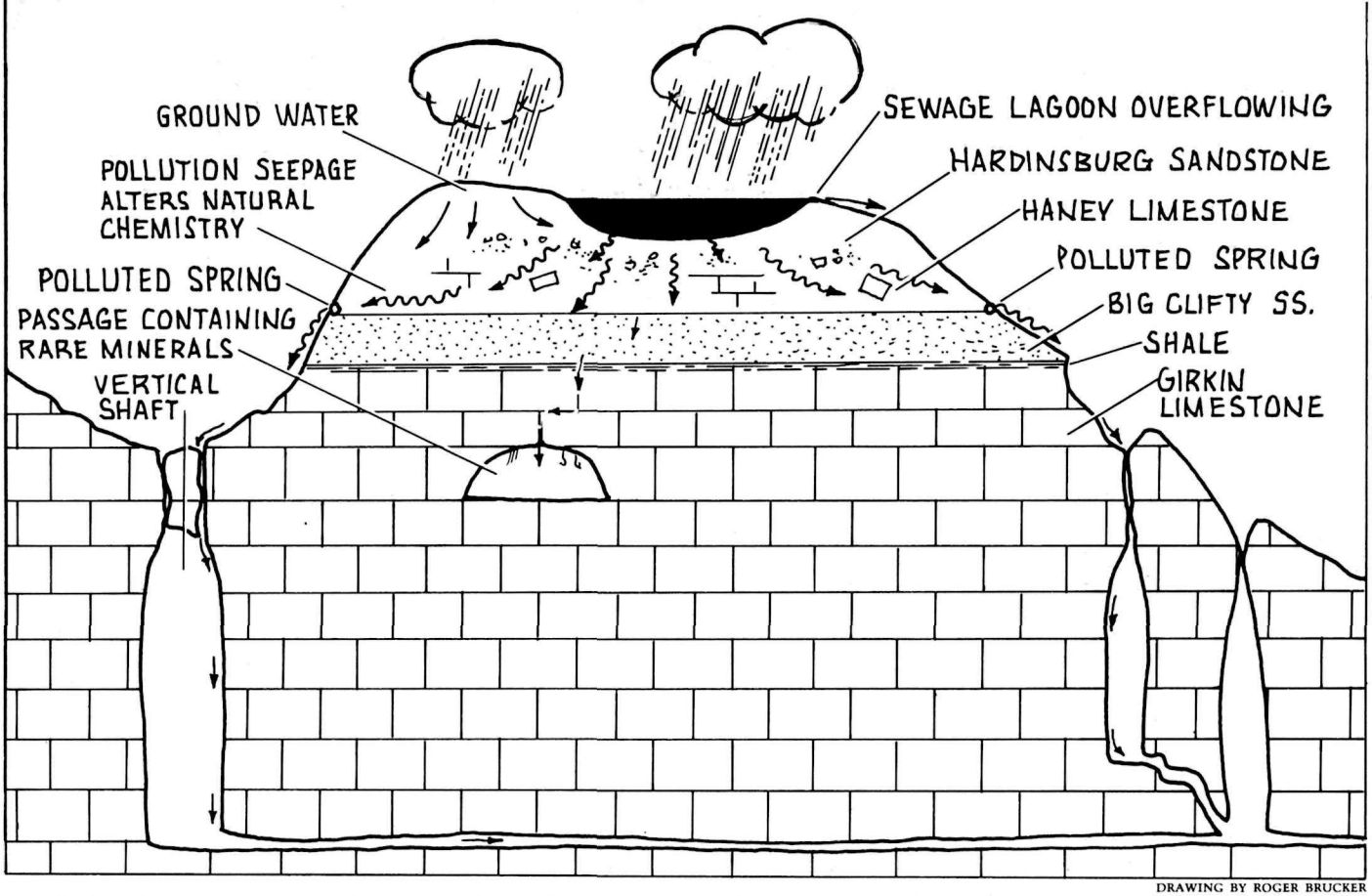
JOB CORPS CAMP, MARCH 1979, BY GRW AERIAL SURVEYS

Ever since it was built in 1964, conservationists have been protesting location of a Job Corps center on Flint Ridge within Mammoth Cave National Park. The National Park Service, too, has long recognized the problems the camp causes; in fact, the park master plan called it a "dangerous intrusion," and the NPS planned to close it in September 1978. But in March 1979 when this aerial photo was taken, the camp was still there. It is still there now, in July 1979—sewage lagoons and all. . . .

A most sensitive issue to local citizens was the closing of roads within the park. Although the master plan did not call for road closings, it did espouse the principle of mass transport, and it did call for further study of transportation. In 1978 the NPS transportation consultant concluded that mass transit and the reduced personal automobile traffic could be sustained on the existing roads without substantial restrictions. The local opposition seemed to move another step toward support for the master plan.

THE JOB CORPS CENTER in Mammoth Cave National Park was recognized by the master plan as a "dangerous intrusion." Its most serious problem was dramatically brought home last January when Roger Brucker, long-time researcher at Mammoth Cave, coauthor of three books on the park, and past-president of the Cave Research Foundation, wandered up a remote hollow in the park and came across an immense wall of ice. "Resembling a small frozen Niagara Falls blocking my way," he wrote, "the ice was from the overflow of the chronically failing sewage lagoons of the Job Corps Center. Polluted meltwater was already trickling into cracks between rocks, to sink downward into the caves below. It dismayed me to think that a few species of cave animals might find the new sewage diet a bonanza. They would flourish and wipe out the other species that depend on natural food inputs. A national park is set up to protect against just such things. I could only be disgusted by what I saw."

A bold stroke of Lyndon Johnson's "Great Society," the Job Corps was intended to work on conservation projects on federal lands by providing enrollees the



An idealized section through Flint Ridge shows the apparent mechanism by which sewage is polluting the perched aquifer and the Flint Ridge Cave System beneath the Job Corps Center in Mammoth Cave National Park.

opportunity to learn construction trades while completing high school. The Park Service, always in need of staff and funds for construction and maintenance, saw the Job Corps as an opportunity to do useful work in the parks without the usual budgetary fights. Thus, in 1965 the Great Onyx Job Corps Conservation Center was established at Mammoth Cave on the site of the old Civilian Conservation Corps camp.

The corpsmen completed a number of projects in the park during the first several years; but by 1973 significant projects had been exhausted, and superintendents could no longer justify the training programs. Not only had the center outlived its utility; for many years it has been uncomfortable and unsafe for the corpsmen. In 1978 the fire hazard was so severe that all-night fire patrols at fifteen-minute intervals were instituted in the dormitories.

In the early 1970s, the Park Service also recognized environmental reasons for moving the Job Corps. Sewage lagoons for the center had been constructed in the gravel layer just above the sandstone cap of Flint Ridge. Over the years these lagoons have intermittently leaked into the perched aquifer that feeds the springs or have overflowed to run over the edge of the sandstone and percolate directly downward into the cave passages of the Flint Ridge Cave System. Soap suds, algae, and odoriferous slime were found in once-clear pools at the bottoms of vertical shafts; and fecal coliform were evident in samples taken after one overflow. Patches to the lagoon and installation of an outflow pipe to the Green River seemed to have stopped the pollution of the caves at least temporarily.

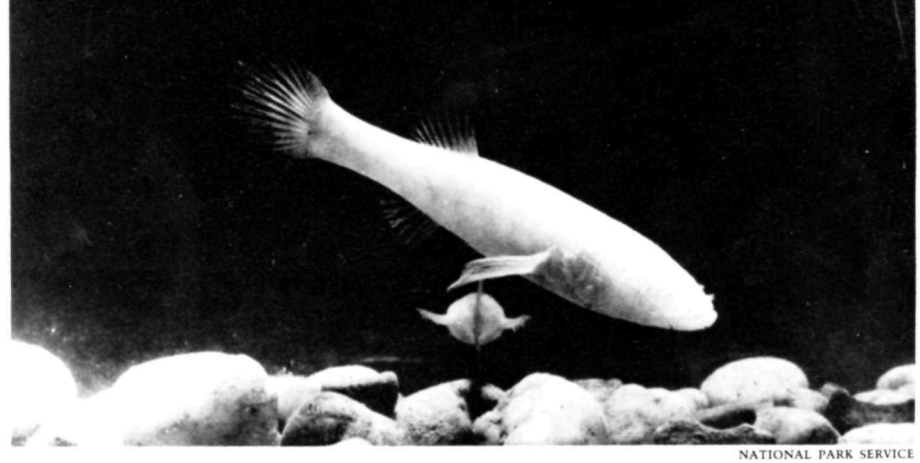
In late 1978 Cave Research Foundation teams found abnormally high chloride levels in one spring—one presumptive test for sewage. They concluded that the most likely source of the pollution was the sewage lagoons, which lay nearly a mile away. If true, sewage from the lagoons was infiltrating the perched aquifer and was being transported over surprisingly large areas of Flint Ridge.

Meanwhile, after heavy rains the sewage lagoon system was discharging two to three times as much water as was entering the system as sewage. There seemed only one explanation—the lagoon leakage was so bad that groundwater was seeping inward and overwhelming the system. We must conclude that the lagoons are in the wrong place, poorly constructed, and simply incapable of operating properly.

Adding to such inadvertent bungling is a history of vandalism by the corpsmen. For the past nine years the young men have broken into the caves, broken and removed formations, marked the cave walls with paint, and left a trail of trash. Such wanton destruction of formations that took thousands of years to form is irreparable.

As early as 1971, transfer of the Job Corps to a new site was under consideration. But the center represented a financial plum to the

CRF PHOTO BY ROGER BRUCKER



NATIONAL PARK SERVICE

Both mineral formations and lifeforms depend on specific conditions within the caverns of Mammoth Cave National Park. These transparent crystals that Charlotte Mann is examining, for example, are metastable; i.e. at other than the cave temperature and humidity conditions the crystals would lose some of the water of crystallization and revert to a common mineral. The blindfish of Mammoth Cave evolved eyeless. Pollutants in the water system could so alter the natural balance as to lead to the extermination of some of the caves' unusual lifeforms.

local economy, and Congressman William Natcher urged the Park Service and the Department of Labor to examine ways to keep the Job Corps in his district. As recently as September 1977 David S. Wright, Acting Regional Director of the NPS Southeast Region, optimistically wrote that the camp could be closed by September 30, 1978.

During the summer of 1978, however, an agreement was quietly reached among the Department of Interior, the Department of Labor, and Congressman Natcher. The NPS files refer to that agreement and call for expenditures of hundreds of thousands of dollars to fix the facilities. The Job Corps Center was to remain in place.

The Park Service flew in sewage experts from its Denver planning center, retained consultants, and purchased more than a mile of flexible plastic pipe to pump out the sewage lagoons. This fix-up of the Job Corps Center directly violated the spirit and letter of the master plan. It ignored the principles espoused in the plan and raised the question of why the plan, validated in a public process, was being ignored. As the Louisville *Courier-Journal* noted in an editorial in February 1979, there is no way to correct what ought not to have been done in the first place. The events of late 1978 and early 1979 precipitated a management crisis for the National Park Service—a crisis that could have been avoided as early as 1972.

In February 1979, after seven years of temporizing, the Park Service seemed ready to act. William Whalen, director of the NPS, formed a task force to rapidly assess the situation and report to him immediately. In the face of its findings he moved to close the center and went to Congressman Natcher to explain the situation.

The corpsmen were moved within two days to new temporary quarters—first in the Mammoth Cave Hotel, then into the gymnasium at the center. In a radio announcement, then, Congressman Natcher reported the housing changes and acknowledged that the center would be moved, *though it would stay within the park.* In a press release of February 27 Amos Hawkins, superintendent of the park, announced a new search for alternative sites. Several possible sites on the north side of the Green River both within and outside the park were identified.

But just as it all seemed to be coming together, it all came apart. Repairs were begun on the old buildings; rumors of all sorts began to circulate; the superintendent was to be replaced (by an ex-director of the Great Onyx Job Corps Center); and a public meeting in Brownsville turned into a disaster. Racial epithets were openly hurled regarding the urban black corpsmen. Someone was turning up the heat, and the National Park Service was melting in the flame.

At this writing the center is still in operation.

EVEN IF the Job Corps Center is moved out of the park, the controversy over the master plan will not end. On April 10, 1979, in a lead editorial entitled "Our Mammoth Mess," the *Louisville Times* identified another major issue. "The most controversial proposal [in the master plan] calls for moving lodgings, restaurants, and other concessions from the Historic Entrance to a new site at the edge of the park . . . [but] local opposition to any significant change has been intense. One rallying point, by all accounts, is National Parks Concessions, Inc. . . . NPC is clearly reluctant to lose what has become a booming trade."

In the master planning process NPC Inc. had argued against the principle of removing facilities from the park, especially its own facilities. Like most large concessioners in national parks, NPC Inc. enjoys a monopolistic position as the only commercial enterprise allowed to operate within the park. Enlightened self-interest surely dictates that NPC Inc. actively resist efforts to implement a master plan that calls for removal of its

facilities from the park. Surprisingly, as the *Louisville Times* wrote, "even though other businessmen in the region should have an interest not only in protecting the caves but in ending [NPC's] monopoly of . . . the tourist business, many of them have joined in fighting the master plan."

Unlike other concessioners, NPC Inc. is a not-for-profit corporation organized at the instigation of the Park Service to provide services to visitors in several parks where the business incentives were judged to be insufficient. In 1977, wondering why a firm in a supposedly marginal business situation should take such a strong stance for maintaining its position in the park, the National Parks & Conservation Association sought information about NPC Inc. from the National Park Service under the Freedom of Information Act. Only after a lawsuit did the Park Service produce the NPC Inc. audit and financial statement, now a part of the public record.

These documents showed that the NPC Inc. was not a struggling, government-harassed, local business. The firm had jacked up prices beyond its expenses and had a net "profit" of almost $2 million. The cream of the tourist dollars, which otherwise would have gone to local profits, was instead safely in a NPC Inc. account at a bank on whose Board of Directors the NPC Inc. president still sits.

The *Louisville Times* said "the Park Service must have the backbone to insist that the national interest, not the whims of a few local businessmen, will determine the future of Mammoth Cave. For starters, the agency should regard the current contract negotiations [with NPC Inc.] as a chance either to return NPC to its subordinate position or replace it with another concessioner."

THE MASTER PLAN for Mammoth Cave National Park has charted a rational course for the protection and management of the unique features of that park. The principles in that plan have withstood several early tests. The process will continue, and the important issues are already apparent.

Movement of facilities outside the park, or to its periphery, will continue to be contested. Removal of the facilities is a key principle to protecting the natural features of the park.

It should now be clear that *sewage from the park* should be treated by the large regional sewage system. Such treatment is not the intent of the plan; but if water can be brought in, sewage can be taken out.

The *cross-park road and bridge* remain an inconsistent proposal in a plan that calls for reduced personal automobile traffic. Such a road does not fit with modern park management principles.

A number of geologically and scenically related features are adjacent to the park. There is strong scientific and management rationale for the *expansion of the park boundaries* where there are willing sellers in order to include these features. The 1972 draft plan called for consideration of some boundary changes. This issue should be kept alive.

Built in 1907 by the Corps of Engineers, lock and dam no. 6 near Brownsville form an artificial pool raising the Green River at Mammoth Cave by about six feet. The higher river level alters both the biological environment in the cave (and along the river) and the geologic processes that would ordinarily flush out the lower reaches of Mammoth Cave. The Corps of Engineers is preparing a Green River Basin Study that may recommend the *removal of lock and dam no. 6*, to the benefit of the park.

Finally, there remains the question of *wilderness* protection for the lands and caves of Mammoth Cave National Park. The NPCA, the Wilderness Society, the Sierra Club, the National Speleological Society, and many other informed organizations have argued strongly for such designation. As a result of this argument the Park Service promised to administer large portions of the park and the caves within it as if it were wilderness. But the legal designation of wilderness is far more binding than a promise in the master plan. It is again time to address the designation of underground wilderness for the majority of the caves and surface wilderness for portions of the park lands.

Overall, the master plan is only as good as those who administer it. Two superintendents, Joseph Kulesza and Albert A. Hawkins, have worked diligently to achieve local acceptance of the plan and to implement its principles. The plan was approved by David Thompson while he was director of the Southeast Region, and he seemed committed to its principles. The new director of the Southeast Region, Joe Brown, was reported in the local newspapers as saying to a meeting of elected officials, "For all practical purposes, the master plan is dead." If the quotation is accurate, Mr. Brown does not share his predecessors' commitment.

The master plan and the record from which it derives provide an enduring yardstick. With that yardstick in hand we can measure the performance of the National Park Service and the individuals within that Service with whom we entrust the management of that very special place. Wake up, Mr. Brown, the spotlight is on you. ■

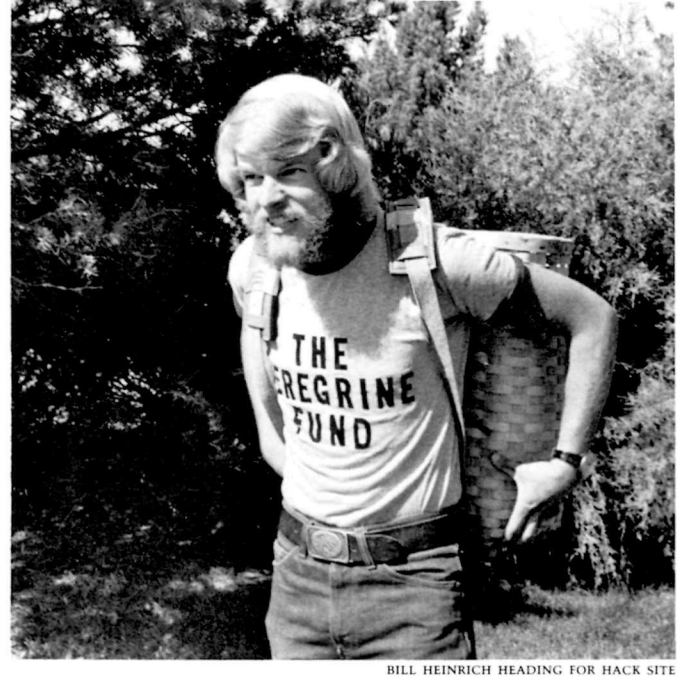
William P. Bishop, a Ph.D. chemist turned administrator, has long participated in the planning for Mammoth Cave as well as for Carlsbad Caverns National Park. He has written several publications on underground wilderness and for several years was a director of the Cave Research Foundation.

Sarah G. Bishop has been active in exploration by the Cave Research Foundation in both Mammoth Cave and Carlsbad Caverns. With a Ph.D. in Romance linguistics, she has planned and directed several minority education programs.

At press time National Parks & Conservation Association was filing a lawsuit against the Park Service to force removal of the Job Corps Center from Mammoth Cave National Park.

article & photographs
by KLASINA VANDERWERF

Rocky Mountain National Park provides a vital link in efforts to prevent the extinction of the peregrine falcon



BILL HEINRICH HEADING FOR HACK SITE

New Hope for the Peregrine

IN JULY 1978 a helicopter cut through the rarefied Colorado air above Rocky Mountain National Park. Dangling from the chopper was an unusual piece of cargo—an empty crate measuring three feet by four feet by five feet constructed of half-inch plywood. One side of the crate was enclosed by metal bars.

The helicopter carefully lowered the crate onto a ledge of a mountain peak, where it was guided firmly into place by members of Cornell University's Peregrine Fund and national park wildlife personnel. This maneuver was only a single aspect of one of the most exciting and promising rescue missions in operation to save a disappearing species.

The next day Cornell's Bill Heinrich began a hike up the mountain. He could have climbed directly to the crate on the ledge, 1,400 feet above him, but that route requires a technical climb, and Bill was not about to risk the safety of the precious load he carried in a woven basket strapped to his back. He chose instead to hike to the top, then rappel the thirty feet back down to the ledge.

In the basket Bill carried five thirty-day-old peregrine falcons—five bundles of fluff that held out hope for the survival of the peregrine falcon in the western United States. Once safely on the ledge, he placed the five nestlings gently in the crate that would be their home for the coming month.

THE MAJESTIC PEREGRINE is an endangered species. Considered extinct as a breeding bird east of the Rocky Mountains since 1965, by the 1970s the number of known peregrine pairs in the West had dwindled to between 100 and 150 pairs. The situation was so critical that some races of peregrine falcons were added to the endangered species list in 1970.

A raptor that measures up to eighteen inches in length and has a wing span that approaches three and a half feet, the peregrine's tremendous wings and sharp-taloned feet enable it to catch other birds in mid-flight. During its "stoop," or dive after its prey, the falcon may reach speeds of 180 to 260 miles per hour.

The steady decline of the peregrine is the result of the disastrous effect on the species of the pesticide DDT. Although this country has banned the use of DDT, many foreign countries continue to use it. In fact, it is still manufactured by one U.S. company for sale abroad. The peregrine falcon feeds on other birds, many of which migrate into Central and South America where DDT is still used.

When migrants return from the South with DDT in their systems and the falcons eat these birds, the poison becomes concentrated in the falcons.

As insidious a killer as DDT has been for many birds, it is especially hard on the peregrine. The damage wrought by DDT is usually not direct death to the falcon. Rather, DDT interferes with the female's calcium mobilizing process, causing a marked decline in the thickness of the shells of the eggs she lays. The thin-shelled eggs thus produced tend to break easily in gravel-lined eyries where the continual turning of the eggs and the weight of the female during incubation may cause them to crack or break. Moreover, in addition to the hazard of breakage, the thin shells do not maintain a proper moisture balance for the embryos inside, which may then become dehydrated.

Plaster replicas will be substituted for the fragile peregrine eggs (left) that might otherwise be cracked or broken in the gravel-lined eyrie by the weight of the parent bird. Thin-shelled from concentrations of DDT in the peregrine's food chain, the eggs will be carefully monitored for temperature and weight loss in Peregrine West's incubator (below) where they must be turned by hand six to eight times daily. Once safely hatched, the eyas, or nestlings, are kept warm in a heated, gravel-lined "nest" (right) and fed raw quail around the clock until, at the age of three weeks, they are introduced into the eyries of unsuspecting adult peregrines or taken to a hack site high on a rocky ledge.

The greatest loss of peregrine falcon populations has occurred in the East. By 1970, when DDT was at last banned in the United States, it was almost too late for the survival of the species east of the Rockies. That same year Dr. Tom Cade began the first large-scale captive breeding project at Cornell University. Cornell's efforts in the East have been aimed at developing methods to reintroduce a new gene pool of peregrines there.

Efforts to save the bird from extinction in the West are focused on arresting its decline by reestablishing and sustaining in the wild a population of one hundred or more breeding peregrines in the Rocky Mountains until such time as the DDT problem can be overcome.

THE WESTERN EFFORT to save the peregrine utilizes several approaches, including artificial incubation, inducing female peregrines to "double clutch" (lay a second set of eggs), utilizing adult birds as foster parents for young nestlings hatched in captivity, and "hacking," a method whereby the artificially hatched chicks can safely and effectively be introduced to the wild without "imprinting" on their human foster parents.

It is not easy to keep the far-ranging symbol of freedom in captivity in order to bolster a dwindling species. But it is necessary.

That is where Peregrine West, one arm of the western recovery program, comes in. Formed in 1974, Peregrine West is the center of the western thrust of the Cornell program. At its Rocky Mountain facility northeast of Fort Collins, Colorado, captive adult falcons are bred, and their eggs are artificially incubated and hatched. Then, depending on the number of young available, the chicks are introduced into the wild in Colorado and other western mountain states.

Bill Burnham, a biologist and experienced falconer, manages the western program. With a long red moustache and a twinkle in his eye, Bill rivals a mother falcon in his fierce determination to protect the peregrine.

"There's nothing we'd like better than going out of business because our efforts are no longer needed," Bill will say as he sits in his office watching the incubating room next door. At the moment, however, everyone involved in trying to help the peregrine has his work cut out for him.

The first order of business in the spring when peregrines mate and lay their eggs is to preserve the fragile thin-shelled eggs that are laid in the wild. At this point the staff of the Peregrine Fund and members of wildlife agencies of the six or seven states involved enter the life and death drama.

In Colorado, Jerry Craig, a biologist for the Colorado Division of Wildlife (who also serves as team leader for the Western Peregrine Falcon Recovery Team formed in accordance with the provisions of the Endangered Species Act), observes known falcon eyries in spring to see which ones contain falcon pairs. Jerry is a lanky man who thrills at the sight of a peregrine and thrives in the outdoors. It's a good thing, too, because much of Jerry's work involves gaining access to the falcon eyries. He has been known to rappel 200 feet to "steal" the falcon eggs from a nest and replace them with "dummy eggs" made of plaster.

After the theft Jerry places the eggs in a portable incubator and rushes them to the Fort Collins station. The eggs must be kept warm (they incubate at 98.5 degrees). "But our main concern is to avoid overheating them and cooking them," Jerry says. Before Bill Burnham built a portable incubator, field workers sometimes resorted to using their own hands and body warmth to protect the eggs.

At Peregrine West Bill Burnham begins the delicate care necessary to keep each thin-shelled future hope alive. Cracked eggs require a little nontoxic glue: "We use Elmer's." All the eggs are weighed constantly. The normal peregrine egg loses about 17 percent of its weight between the time it is laid and when it hatches. Humidifiers in the incubators are adjusted in an attempt to achieve this percentage of weight loss. Occasionally such adjustments are not adequate; then eggs may either be coated with paraffin to prevent water loss or sanded to increase it.

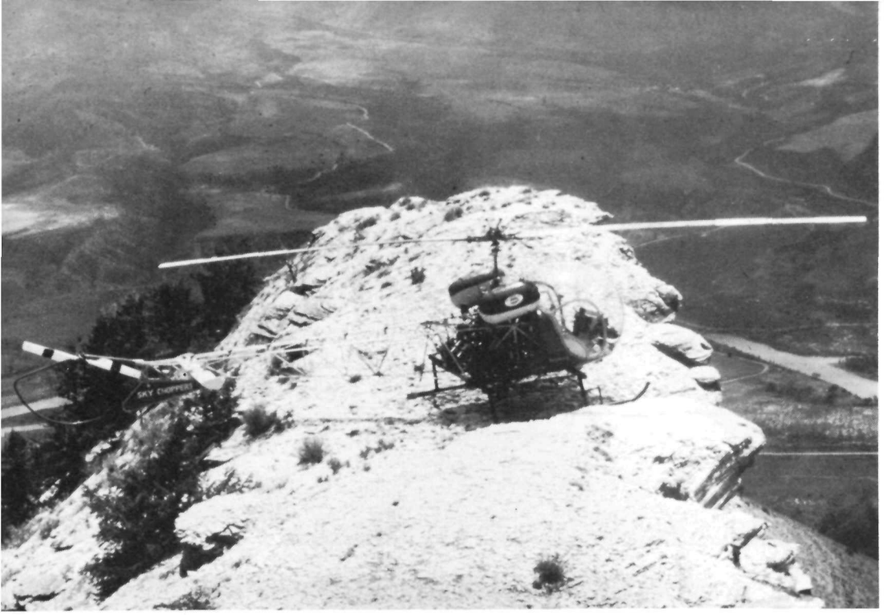
These procedures are just a fraction of the care the eggs receive, however. In addition, eggs are turned six to eight times a day, by hand. Their incubation period is thirty-five days.

Egg care is nothing compared to the work of caring for the eyas, or nestlings. Once the chicks hatch, the four a.m. feeding becomes standard routine—along with the midnight feeding. The nestlings are fed small bites of quail.

The same intricate care goes on year-round for the inhabitants of the breeding barns. Peregrine West has three barns, each capable of housing twelve pairs of peregrines.

Each pair lives in a breeding chamber 20 feet by 10 feet by 17 feet. The chamber sidewall is open to weather but protected by bars and welded wire mesh. Every chamber has several perches, including a natural branch.

Birds can be viewed through one-way glass, and the Peregrine Fund's Dan Konkel tries to keep human interaction with the birds at a minimum, entering the chambers only to clean them, change water, or to manipulate



Banded for future identification, the captive-bred peregrine nestlings (above) are on their way to the hack site that will be their home for the next six to eight weeks. Designed to allow parentless birds to fledge safely in the wild without imprinting on humans, a protective crate, or hack box, was installed on a suitably high ledge at Rocky Mountain National Park by helicopter (top, left). The fledglings will remain in the safety of the hack box and be fed by remote control until they have "fixed" on their wild surroundings and are ready to fly. Then they will be released to the freedom of the skies (top, right). It is hoped they will return to the site to nest.

eggs. The peregrine falcon egg is so precious and holds out such hope that even the eggs of these captive birds are incubated artificially.

Fortunately, there are still naturally occurring eyries and mating pairs in the West. In Colorado, Jerry returns three-week-old nestlings to the eyries of the adult or "foster" birds and removes the dummy eggs they have been diligently tending all this time.

"Parent birds are nonspecific," says Jerry; they will rear the nestlings that appear in their eyrie.

HACKING is still another method being used to return young peregrines to the wild. The hack site in Rocky Mountain National Park was chosen to rear the last of the chicks hatched at Peregrine West in 1978: three males and two females. Dave Stevens, research biologist for Rocky Mountain National Park, looked hard in the summer of 1977 to find a site that would serve as a likely falcon eyrie and meet with Bill Heinrich's approval. Heinrich handles much of the field work for the peregrine reintroduction program at Peregrine West. Hacking has been used almost exclusively in the East to reintroduce the peregrine falcon there. Rocky Mountain National Park is the proud provider of the first hack site in Colorado. There are now hack sites in Utah and New Mexico as well.

In falconry, the falconer helps the young raptor develop its flight muscles by feeding the bird on an object such as a tree stump or a board called a "hack board." The bird is free to fly, because it depends on the food the falconer leaves at the hack site and must return there to feed. Just after the bird reaches the stage of being able to capture its own prey, the falconer must recapture his fledgling and attach jesses—straps attached to the legs to which a leash to confine the bird can be fastened until it is trained and flying free again. In Rocky Mountain National Park, though, young falcons are introduced to the wild instead of to jesses.

In the wild, a parent falcon plays the crucial role of warding off such potential enemies of the young falcons as eagles and great horned owls, but hacking doesn't use parent birds. Although it is dangerous to leave young falcons unprotected in the wild, it is also desirable that they fledge in the wild in order to "fix" on their hacking site, because when they reach maturity, peregrines may return to nest in the cliffs near those from which they learned to fly.

The box on top of the mountain in Rocky Mountain National Park is the solution. The nestlings cavort in the safety of their plywood box while their enormous eyes absorb everything outside. The box also keeps the young birds from fledging before they are strong enough to leave the protection of the hack site.

The nestlings are fed through a long pipe that extends from the mountain peak down to their ledge. At this time they are at a critical "imprinting" stage in their development, and they must not be hand-fed. If they grow up believing that their source of food—therefore their parent—is a six-foot man wearing glasses, they will have imprinted on humans and probably will never successfully mate. In addition, birds that are hand-fed develop a strong human-oriented food-begging response, not a desirable trait for a bird that must survive in the wild. In the hack box, they are surrounded by siblings, which ensures that they all grow up knowing they are falcons.

Two attendants hired by the Peregrine Fund guard the Rocky Mountain National Park's charges continuously during July and August and tend the four-inch feeding pipe. This means also tending a cage of a hundred and fifty quail—future peregrine meals. Last year they had one setback, recalls Dave, "when a raccoon got into the cage and killed about fifty quail."

When the falcons reach the age of about sixty days, and are old enough to fend for themselves, the door to their hack box is opened. Fortunately, young peregrines can learn to fly without parental example or guidance. As Dave Stevens put it, "They just get up enough nerve and jump off the cliff." At first the falcons return to the hack site to be fed; but eventually they plummet through the Rocky Mountain skies after their own prey.

One advantage of utilizing a national park for a hack site is the superintendent's complete authority to manage areas for resource protection. "Hopefully, when the birds come back in several years, we'll see them before they nest," Dave Stevens says. "If it is a heavily used area, we'll close the area to visitors."

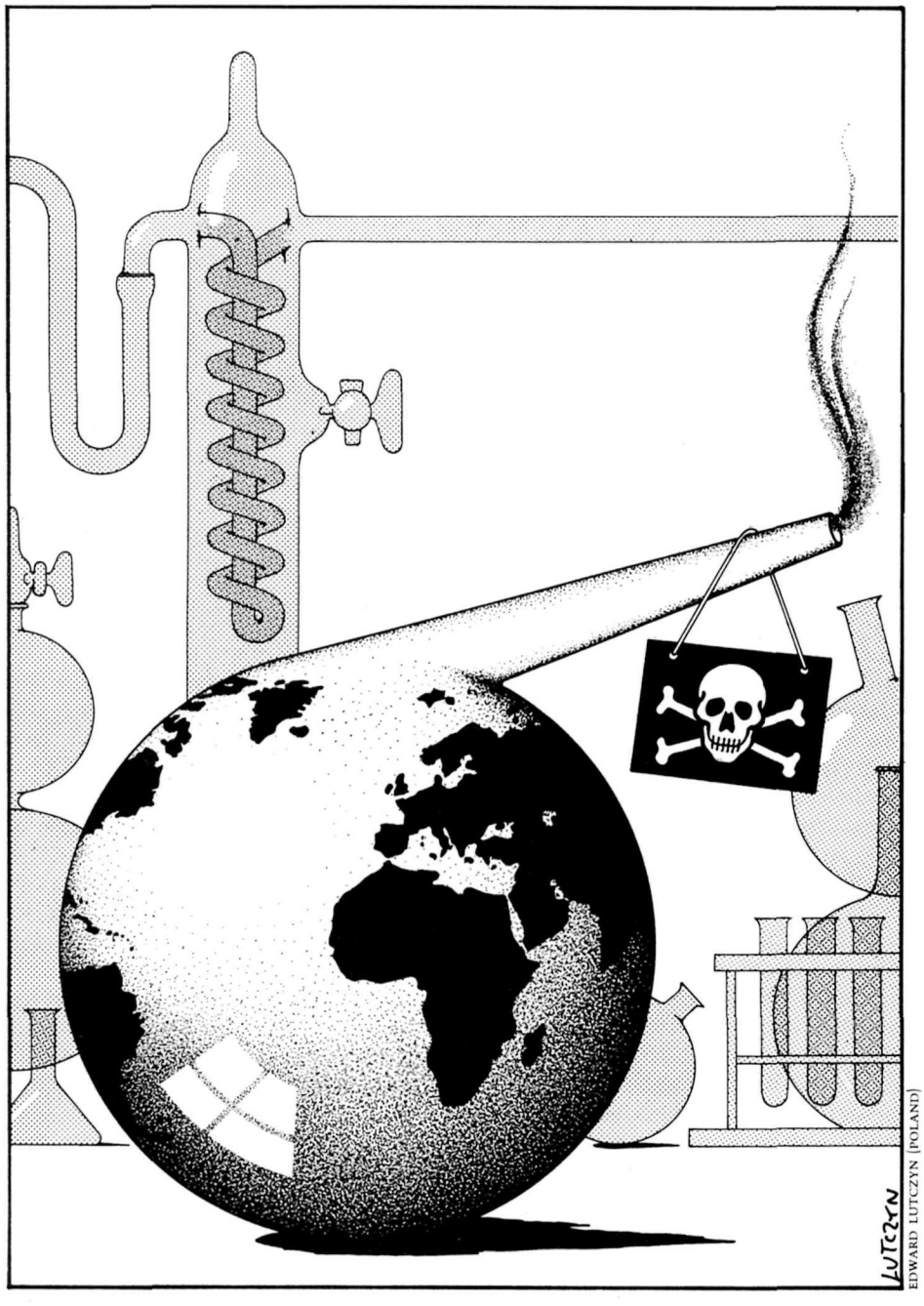
THE SIGNIFICANCE of the return of the peregrine to its old haunts is described by Tom Cade: "A falcon crag is one of those very special places on the face of the earth where we human beings have the opportunity to become peculiarly attuned to the oneness of living things and the environment. . . . Remove that falcon from the scene, and the whole landscape becomes diminished by more than the absence of the bird. The natural integrity—the rightness—of that particular place is somehow distorted, and the cliff is never the same again."

One of the most exciting aspects of the western peregrine recovery program is the strong possibility of its success. Last year in Colorado alone, twenty-five captive-produced young birds were successfully introduced into the wild.

At the end of the summer, all five of the young peregrines installed in that crate in July 1978 by Bill Heinrich were practicing their flying skills over Rocky Mountain National Park. But this is only the beginning of the story. It takes about three years for peregrines to reach sexual maturity. When these first peregrines mate and choose their eyrie, visitors to Rocky Mountain National Park may again experience the sense of completeness a high-flying peregrine brings to the landscape. ■

Her love of the outdoors and belief in the need to preserve our wildlife led Colorado free-lance writer Klasina VanderWerf to undertake this story about the falcon restoration program.

Chemicals in the Environment



EDWARD LUTCZYN (POLAND)

AT HOME, in industry, in agriculture, and in the control of disease man uses a great number of different chemical substances. According to recent estimates, about four million chemical substances have been identified so far. Of this huge number, only some thirty thousand different chemicals are commercially produced. Most of the remaining are intermediate, waste products or laboratory chemicals that do not directly reach the public. Many of them are ingredients in mixtures, solutions, powders, and other products. The number of such products is probably more than one million. Each year several thousands of new chemical substances are discovered. Although most new compounds are laboratory curiosities that will not be produced commercially, several hundred new chemicals are introduced into the market annually. There can be no question that many chemical products have brought beneficial effects to man and his environment; others, however, have brought unprecedented harmful effects.

CHEMICAL SUBSTANCES enter the environment—and man himself—through complex and interrelated paths. Some of them, such as fertilizers, pesticides, herbicides, enter the environment as a result of direct application. Others—for example, sulphur oxides, nitrogen oxides, polycyclic aromatic hydrocarbons—result from combustion processes. A third source of chemical substances is to be found in

Although the long-term effect of chemicals in the environment is still largely unknown, 30,000 chemicals have now been commercially produced, and several hundred more are being put onto the market each year

by MOSTAFA KAMAL TOLBA

waste effluent from the manufacture, transport, and consumption of almost all products used by modern society.

Many manufacturing processes generate unwanted byproducts and air- and water-borne wastes that are sometimes more toxic than the raw materials. Once chemical substances have entered the environment, they undergo physical and chemical changes—including combination with other chemicals—that affect their toxicity. Through such chemical transformation a relatively harmless chemical may become a toxic byproduct in the environment. It may further enter the food chain and accumulate in living organisms.

A vast amount of scientific information is available on the short-term effects of well-known chemicals hazardous to human health or to animal species, especially domestic animals. If human beings are exposed to enough arsenic to cause death or illness, for example, the effects are immediate and obvious. But it is still not known what happens if man is exposed to this or other chemicals at very low concentrations over a period of twenty or thirty years. Effects may appear a long time after exposure to either a large dose over a short period, or a relatively small dose over an extended period. The consequences can be measured in terms of mortality and morbidity and of physiological changes that precede morbidity. Genetic mutations (production of new mostly detrimental hereditary traits) may be induced in protoplasm by chemical mutagenesis, and they can be permanent. Other hazards to health resulting from long-term exposure to toxic substances include the possibilities of carcinogenicity (cancer) and teratogenicity (birth defects).

PHARMACEUTICAL products have been great assets in the treatment and prevention of human disease. In recent years, however, the hazards of drug therapy have attracted special attention. Patients who receive certain types of drugs or more than one drug at the same time may experience an unexpected adverse reaction.

Not only is it possible for a drug to influence the action of another drug, but it has been found that exposure of humans to certain chemicals—for example, insecticides, atmospheric pollutants, and compounds contained in cigarettes—may influence drug action.

Concern has also been expressed about the safety and efficacy of new drugs that have to be given for prolonged periods, as well as of those that have been used for a number of years. The thalidomide tragedy in the early 1960s caused great concern about the possibility of some drugs inducing congenital malformations.

Some drugs normally used under medical supervision are now known to cause cancer; animal experiments have shown that other drugs or hormones have carcinogenic effects. The scientific knowledge required to interpret the results of such animal tests in terms of potential harm to man is still most primitive. The long latency period in humans from the time of exposure to an observed effect makes it difficult to establish a cause-and-effect relationship in human beings. It is thus essential for such drugs to undergo careful screening before they are widely used and distributed. This is especially true for the thousands of "over the counter" drugs and cosmetics in daily use.

ANTIBIOTICS and hormones have been used widely in the production of farm animals, both as growth-promoting agents and as medicines. It is estimated that 80 percent of all the animal protein produced for food in the United States of America comes from animals that have received medicated feeds for at least part of their lives.

In spite of the experience gained in this area, there continues to be a great deal of uncertainty and controversy over the degree to which these substances represent a hazard. The suggested or implied risks are of several types: (a) residues of drugs used in animal feed emerging in the meat for human consumption; (b) development of resistant pathogenic bacteria harmful to other animals; (c) development of resistant bacteria potentially pathogenic to man.

CHEMICAL PESTICIDES are used globally on an increasing scale. Currently about one thousand such chemicals are in common use. More than a quarter

of a million tons of insecticides are sold annually. Public health use accounts for about 10 percent of annual production, the remainder being used in agriculture, forestry, the preservation and storage of food products, horticulture, and household use.

Over the years pesticides have prevented untold misery in many tropical and semitropical countries through control of the mosquito that spreads malaria. Their contribution to increased agricultural production cannot be denied. But pesticides have also caused unprecedented ecological damage.

Although chlorinated hydrocarbons (for example, DDT, Aldrin, Dieldrin) are not as toxic as carbamates or organophosphates, several of their characteristics (especially their slow rate of biodegradability), have made them hazardous, mainly through their indirect effects on nontarget organisms. Their persistence and ubiquitous nature, coupled with a tendency for them to concentrate in organisms as they move up the food chain, increase their toxicity to fish, birds, and other wildlife and, in turn, to humans.

Although there is no direct evidence that pesticides currently in use have caused cancer or birth defects in man, a few animal studies at high dosage levels have shown such effects, as well as a few cases of suspected mutagenesis.

The future need is for pest control, but not necessarily for pesticides of the type currently in use. Much has been said and written in recent years about alternatives to the use of chemical pesticides; the expectation is that by combining biological and chemical control methods, pests can be controlled more effectively, thereby alleviating possible adverse environmental impacts.

Nitrate and phosphate fertilizers are used in copious quantities to increase agricultural output. Parts of these inorganic salts that are not utilized by plants eventually end up in rivers, lakes, and the sea (through leaching). At high levels, these inorganic nutrients cause overfertility of the receiving waters. Such eutrophication of the waters manifests itself in the occurrence of nuisance organisms, such as perpetual algal blooms, and the deterioration of the aquatic environment.

Excessive uses of fertilizers may also have detrimental effects on plants and soils. The accumulation of nitrate in some food plants, for example in spinach, has been found hazardous to infants.

WITH ADVANCES in food production and processing technology and as a result of socioeconomic changes (for example, increasing use of processed rather than raw food, new patterns of food intake, user convenience, wide marketing) thousands of food additives are presently in use. These additives include nutrients, flavor enhancers, preservatives, anti-oxidants, emulsifiers, stabilizers, and so forth. Although much work has been done to standardize the use of such additives, knowledge about their long-term health effects is not sufficient. Some food additives are suspected to be carcinogenic, while others could be transformed into carcinogenic compounds under favorable conditions.

TRACE METALS are widely distributed in the atmosphere, lithosphere, biosphere, and hydrosphere. Their natural concentrations rarely reach harmful levels. Many of these trace metals are essential to plant and animal life; but when present in excessive amounts, they can threaten human health and the environment.

Much attention has been focused on heavy metals like cadmium, lead, and mercury; but other metals are also hazardous, for example, arsenic, beryllium, zinc, copper, antimony, and selenium.

Certain metals can combine with organic substances to form highly toxic metallo-organic complexes—for example, methyl mercuric chloride—and some of these transformations can be carried out by micro-organisms. The outbreak of Minamata disease in Japan in the 1950s and 1960s as a result of consumption of fish from Minamata Bay (mercury wastes were discharged into the bay from an industry producing formaldehyde and vinyl chlorides, which used mercuric oxide as a catalyst) and the Agano river estuary focused attention not only on the uptake and enrichment of mercury from the water by marine organisms, but also on the capacity of these organisms to convert mercury into the more toxic methyl mercuric chloride. Certain organisms have a high affinity for particular elements; e.g. zinc is concentrated to very high levels in oysters, and cadmium reaches a high concentration in other shell fsh. The mechanism and cause of this bioaccumulation are still not understood, but there is evidence of apparent serious direct harm to organisms containing high concentrations of these metals.

Discharges in the air or on land of wastes containing heavy metals have serious environmental impacts. Consumption of rice polluted with wastes from a zinc smelter in Japan led to an epidemic of cadmium poisoning (Itai-Itai disease). Lead emitted with the exhaust products from motor vehicles contributes to abnormal concentrations of the metal in streets with heavy traffic.

Concern about the harmful effects of lead on human health has led to the reduction of the lead content in gasoline additives in some countries and the search for a substitute in others. Unduly high levels of several heavy metals associated with the discharge of wastes into the environment have been recorded in several countries.

The World Health Organization (WHO), in collaboration with the United Nations Environment Programme (UNEP) and other organizations, has embarked on the formulation of environmental health criteria for such metals.

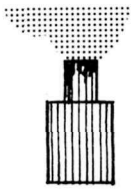
Besides heavy metals, industrial liquid wastes frequently contain a wide array of chemicals (for example, nondegradable biochem-

Chemical Pollution

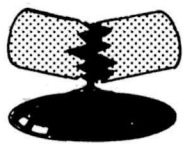
"As a result of the rapidly increasing production and consumption of goods, control of the flow of hazardous wastes into the environment is becoming a major concern to almost all governments" UN Environment Programme "State of the World Environment Report, 1978."

HOW CHEMICALS GET INTO THE ENVIRONMENT

30,000 chemicals are now in commercial production and several hundred more are being put on to the market and into the environment each year.

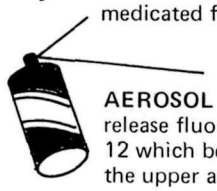


COMBUSTION
burning of oil, gas, coal, wood and animal dung puts nitrogen compounds and other chemicals into the atmosphere.



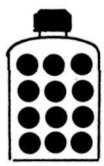
ACCIDENTS
leakage and container breakage.

MEAT PRODUCTION
hormones and antibodies used to fatten and protect livestock. 80% of animal protein for food in USA comes from animals fed on medicated foods.



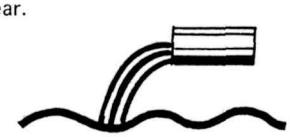
AEROSOL SPRAYS
release fluorocarbons 11 and 12 which become active in the upper atmosphere.

DRUGS AND COSMETICS
thousands of drugs and chemicals contained in medicines obtained on prescription or sold "over the counter".

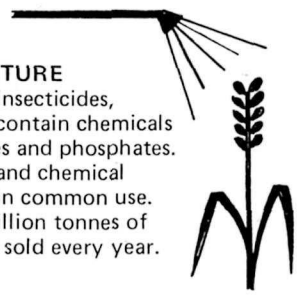


FOOD ADDITIVES
thousands of chemicals now used in food as colorants, preservatives, emulsifiers, nutrients, flavor-enhancers.

INDUSTRIAL WASTE
French rivers carry 18 billion cubic metres of liquid pollutants into the sea each year.



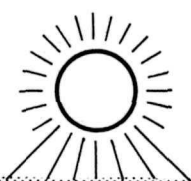
AGRICULTURE
Fertiliser, insecticides, pesticides contain chemicals like nitrates and phosphates. One thousand chemical pesticides in common use. Quarter million tonnes of insecticide sold every year.



THE RISKS

Individually harmless chemicals released into the environment can combine to form toxic substances. Sudden large dose of toxic chemicals can kill. But effects of small doses of chemicals over a 20 to 30 year period not known.

SMOG
sunlight on chemicals in atmosphere can cause photochemical smog leading to health risk and respiratory problems.



INCREASED ULTRA-VIOLET
Fluorocarbons from aerosols can attack stratospheric ozone layer which protects the earth from dangerous ultra-violet light rays.

WATER POLLUTION
run-off from nitrate and phosphate fertiliser reaches rivers, lakes, seas. Is affecting aquatic life causing weed and algal bloom problems.

SOIL DAMAGE
excessive nitrates can damage soil and accumulate in food.

POISONING
chemicals enter food chain and become more concentrated. Rice polluted by Japanese zinc smelter caused Itai-itai disease. Minamata deaths from mercury wastes.

GENETIC MUTATIONS
chemicals can affect hereditary traits and cause birth-defects.
e.g. thalidomide

CANCER
20 chemicals are known to cause cancer in humans. 137 are known to cause cancer in animals and human exposure is known for 89 of them.

WILD LIFE THREATENED
DDT present throughout ecosystem threatens wild life with population crashes and local extinction.

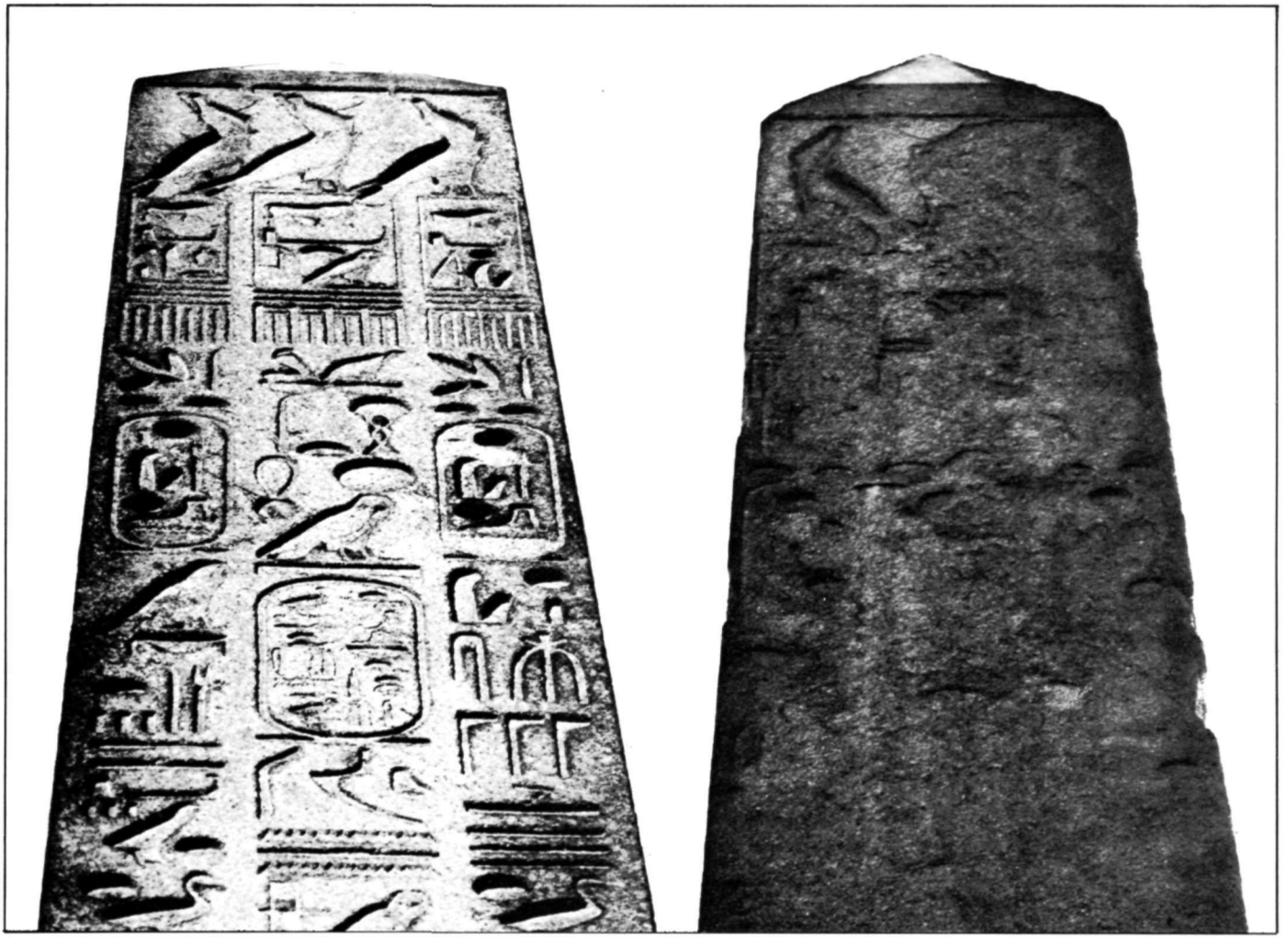
icals, acids, and so forth). Discharged into the environment without appropriate treatment, such wastes cause considerable ecological degradation. The consequences of industrial waste for aquatic populations have been exhibited in various ways in the Rhine. Examples of similar environmental degradation exist in many countries, and this problem has triggered several technological and regulative activities for the treatment of such wastes prior to their disposal.

GASEOUS emissions are also frequently encountered in industry. These emissions consist largely of sulphur oxides, nitrogen oxides, carbon monoxide, carbon dioxide, and hydrocarbons. Over the years a number of acute air pollution episodes have been reported. Oxides of sulphur interacting with particulates in the air have contributed significantly to the health effects associated with these episodes.

Photochemical smog (produced by the reaction of NO_x, sunlight, and hydrocarbons) has detrimental effects on human health, as well as on vegetation and materials. Nitrogen oxides emitted from various sources, chlorofluoromethanes used as aerosol propellants and refrigerants, and a number of other chlorinated compounds such as carbon tetrachloride and methyl chloroform are potential sources of catalytic agents that penetrate the earth's stratosphere and decompose the ozone layer that shields living things from the harm of the sun's ultraviolet radiation.

NOT ALL the chemicals produced by industry reach the general public. Many of these chemicals are "intermediate" products used in processing or manufacturing an "end" product for public consumption. Polychlorinated biphenyls (PCBs), acrylonitrile, and vinyl chloride are examples of these intermediate prod-

A monument to air pollution: "Cleopatra's Needle" was sent from Egypt to New York City in the 1890s, but ninety years in New York did more damage to the stone than 3,500 years in Egypt had done. The inscription on the east face of the monument is still legible, but the one on the west face has been destroyed by chemicals in the prevailing westerly winds.



ucts, some of which are potentially hazardous. Vinyl chloride, for example, has been identified as a powerful carcinogen for humans when present in the atmosphere. PCBs, diozines, and several such "intermediate" compounds are highly toxic, carcinogenic, teratogenic, or mutagenic.

Occupational health has become an issue to more and more industrialists, workers, and governments. In order to control occupational exposure to airborne particulates, gases, and vapors, safety regulations for the work environment are in force in many countries. In some of these countries maximum permissible limits for as many as five hundred harmful substances have been given. Many developing countries are tending to adopt the work-exposure standards recommended by the International Labor Organization (ILO). However, enforcement of these standards may not be stringent enough or may not be applied to workers in small industries, in spite of the fact that such industries may employ a major part of the working population.

The accidental release into the environment of these hazardous chemicals has led to various detrimental impacts. PCBs have been a focal point among substances inadvertently released into the environment through leakage, breakage of containers, and other accidents. In large-scale leakage in Japan, with contamination of rice oil by PCBs from leaking heat exchangers, there was evidence of serious illness, leading to death in severe cases and with a chloracne-type skin eruption in milder cases, among human consumers. PCBs have been found also to be highly toxic to marine crustaceans, when a large accidental discharge of this material in Escambia Bay, Florida, led to large-scale mortality of shrimps. Dioxin released into the atmosphere after the explosion of a chemical plant in Seveso, Italy, in 1976 caused considerable ecological damage and detrimental health effects in the area. About 340 cases of chloracne have been reported among school children exposed to the dioxin.

THE MOST EFFECTIVE way to control the flow of harmful chemicals throughout the environment is naturally to minimize or prevent their production and release. As the type and quantity of toxic emissions and byproducts are largely determined by the technology used, improvement of the equipment and development of alternative technologies is a key element in controlling the occurrence of hazardous substances.

Many chemicals that are intentionally applied to the environment because of their toxic properties may be a threat to human health and cause harm to living organisms other than the target populations. Although the real risks of several families of chemicals have not yet been fully documented, evidence gathered so far clearly indicates that efforts should be made to develop nontoxic alternatives.

As a result of the rapidly increasing production and consumption of goods, control of the flow of hazardous wastes into the environment is becoming of major concern to almost all governments. The first problem is encountered in approaches to identifying, defining, and classifying toxic wastes. Secondly, a choice has to be made among the different waste management options, which range from complete recovery and reuse to secure disposal sites.

Waste reduction at the source could be achieved through changes in technology, restriction of the use of hazardous chemicals, or substitution by less toxic or nontoxic substances and improved quality control to reduce spoilage. Treatment procedures may include waste separation and concentration, energy and material recovery, incineration, detoxification, and neutralization.

Finally, storage under safe conditions may provide a suitable method of disposal for toxic residuals that do not lend themselves to the above methods of handling.

Several countries have established mechanisms to control the use of chemicals: test requirements have been defined, standards and tolerance levels have been set, and lists have been established of allowed or prohibited ingredients. In addition, emissions of chemicals through chimneys and waste pipes are regulated. Through air and water pollution laws, measures are taken to curtail environmental deterioration of effects on humans from a contaminated environment. However, with the expansion in the number of chemical products every year, there is a great need for extensive research to assess the environmental impacts of chemicals. Furthermore, it has been observed in the past that when certain hazardous chemicals are banned in one country, the manufacturers in the same country sometimes export them to other countries, where such bans are not in operation.

Through its global assessment programme known as "Earthwatch," the UNEP encourages and coordinates many activities designed to improve the evaluation of trends and environmental impacts of chemical compounds, particularly long-term effects. Active participants at the international level include WHO and ILO in respect to occupational health, the International Agency for Research on Cancer (IARC) in evaluating the carcinogenic hazard of chemicals, and the International Register of Potentially Toxic Chemicals (IRPTC), as well as the Global Environmental Monitoring System (GEMS), in which many national and international bodies join forces to monitor the occurrence of hazardous chemicals in the environment. ■

Dr. Mostafa Kamal Tolba is executive director of the United National Environment Programme. This article first appeared as a section of the UNEP 1978 State of the World Environment Report and is reprinted here by permission.

ALASKA D-2

Alaska Coalition Beats the "Rape, Ruin, and Run Boys" 360 to 65 in House

Congratulations—you did it! Thanks largely to the efforts of thousands of citizens across the nation—including NPCA members like yourself—on May 16 legislation to protect 128 million acres of Alaska's wildlands swept through the House of Representatives. In fact, the margin of victory was so overwhelming that it surprised conservationists as well as developers.

Conservationist-backed legislation sponsored by Rep. Morris Udall (D-Ariz.) and Rep. John Anderson (R-Ill.) beat out another version backed by heavyweight lobbyists from oil, mining, and timber companies; from the National Rifle Association; and from the state of Alaska. Some of these lobbyists tried to throw a smokescreen over the true issues in the Alaska debate by scare tactics, falsely branding the bill a "gun control" and "energy lockup" measure.

The House didn't buy that story; by a margin of 268 to 157, the Udall-Anderson package was chosen for consideration over the developers' bill offered by Rep. John Dingell (D-Mich.), Rep. John Breaux (D-La.), and Rep. Jerry Huckaby (D-La.). Then the House passed the Udall-Anderson bill by a vote of 360 to 65.

Rep. Udall, Interior Committee chairman, told conservationists, "You have just taken on the most powerful lobby in Washington—the oil and gas industry—and won." Udall said the "oil boys" were "outfoxed by the tremendous, sophisticated grassroots lobby of the Alaska Coalition." (NPCA is one of the leading organizations among the more than forty conservation, civic, and labor groups in the coalition.)

The bill's other chief champion, Rep. John Seiberling (D-Ohio), also attributed much of its success to citizen action both in Washington and around the nation: "You don't know how gratifying it is to me that when people really believe in a cause, the democratic process still works." He added a special note of thanks to "God and Phillip Burton"—the latter, of course, being the powerful California Democrat who was instrumental in rounding up support for the bill and the former presumably needing somewhat less identification to our readers.

The legislation will put about 128 million acres into thirteen national parks, preserves, and monuments; twenty-one national wildlife refuges; twelve national wild and scenic rivers; and two national forest wildernesses. Within those areas, an overlay of 67 million acres would be protected as wilderness.

In a major victory for conservationists, the bill would forbid oil exploration in the Arctic National Wildlife Range, calving grounds of the nation's last large caribou herd and a refuge for other international wildlife resources. Nevertheless, 95 percent of all Alaska lands with "high" or "favorable" potential for oil and gas and 100 percent of offshore oil and resources would be left open to development. In fact, an area of Alaska larger than Texas and Montana combined would remain outside conservation units and be available for mining, timbering, oil and gas production, or other development. (Unfortunately, the Udall-Anderson legislation was amended to allow easier access to a mining claim in the Misty Fjords wilderness of Southeast Alaska.) Subsistence hunting by natives could continue in the conservation areas and in addition, some 90 percent of the state would remain open to sport hunters.

Although much of the acreage already has been protected under President Carter's proclamations of December 1978 and pending administrative action, the House-passed bill extends protection to wilderness lands and wild and scenic rivers, actions for which the President has no authority. The bill, in fact, draws heavily from the Carter Administration's recommendations—based on years of research by the Interior Department—as well as from unusually detailed congressional research and more public participation than anything since the civil rights movement of the 1960s. During the 95th Congress, Rep. Seiberling and his Subcommittee on General Oversight and Alaska Lands conducted what Udall calls "the finest subcommittee work that I have ever observed."

Secretary of the Interior Cecil Andrus threw his weight behind the conservationist legislation, and indications have been that President Carter

Saving Alaska's wildlands for "future generations" . . .

PHOTOS BY STEVEN C. KAUFMAN

would veto any legislation that would destroy the integrity of the conservation areas in Alaska.

Such legislation has been introduced in the Senate, where conservationists will have to contend with a more pro-development atmosphere than in the House. NPCA's T. Destry Jarvis coordinates Alaska Coalition work in the Senate Energy and Natural Resources Committee, where conservationist legislation will have to compete with legislation even worse than the Huckaby-Dingell-Breaux proposal that the House rejected. What's more, in this case, the development-oriented bill, S 9, was introduced by the committee chairman, Sen. Henry Jackson (D-Wash.).

At press time conservationists were anticipating that the committee would take up the issue before the August recess but follow the strong stand taken by the House.

NPCA and other members of the Alaska Coalition support S 222, legislation introduced by Sen. John Durkin (D-N.H.), Sen. Gaylord Nelson (D-Wisc.), and Sen. William Roth (R-Del.). It is very similar to the legislation that just passed the House. Like the House bill, it attempts to balance development with conservation in administrative units organized to serve land management and wildlife needs with maximum efficiency.

By contrast, S 9 fragments this orderly design into a hodgepodge of artificial boundary lines and management classifications that will sell the American people short on preservation of their own public lands. The basic principle of preserving complete ecosystems—of learning from our nation's past mistakes in the Lower 48—has been disregarded.

The bill slashes millions of acres from the national wildlife refuges—either dropping them completely or proposing them as national forests, BLM "conservation areas," or national recreation areas.

For instance, in northeast Alaska NPCA supports an expanded Arctic National Wildlife Range—which

NPCA at work

would protect not only the porcupine caribou herd but also polar bears, musk oxen, and other wildlife—and a Yukon Flats National Wildlife Refuge—which would protect waterfowl migrating to virtually all the states in the Lower 48.

Instead of these two contiguous refuges, S 9 would call for five land classifications under four jurisdictions and would allow mining, road-building, and other developments. It would mandate oil exploration on the calving grounds of the caribou herd—an area Administration experts say is the last place in the country that should be drilled for oil and gas.

Although S 9 includes similar park system acreage and boundaries to conservationist-supported bills, less than half the total acreage in S 9 is placed into national parks and national monuments. The rest is placed into NPS-administered national recreation areas—where mining and hunting are allowed—and national preserves—where sport hunting is permitted. About half the land in national park status is nothing but barren ice and rock. This bill even takes the ultimate wilderness parks—Gates of the Arctic—and carves out two national recreation areas that would facilitate mining at the doorstep of the scenic gates.

You Can Help: NPCA members are asked to call the Alaska Coalition Hotline for the latest information on how to help in the Alaska legislative battle. Your help is urgently needed to make sure that the Senate does not listen to those whom Secretary Andrus calls the "rape, ruin, and run boys"—those who would not be satisfied by a balanced bill such as that passed by the House but want to open even our nation's best wildlands to destructive exploitation. In the evening, you can listen to the recorded update on the Hotline for just pennies. Why not call 202-547-5550 right away? ■

NATIONAL RESERVES

NPCA Sponsors Conference

On May 3 and 4, 1979, NPCA was host to a conference of citizens from around the nation to discuss areas that possibly could be preserved as "national reserves" or "areas of national concern."

The national reserve is a new designation, created by the National Parks & Recreation Act of 1978, that emphasizes federal, state, and local cooperation to protect areas that are not suited to the national park, forest, or wildlife refuge systems or that will not be included for other reasons.

The Pinelands of New Jersey were protected as the first national reserve. Areas discussed at the NPCA conference include Jackson Hole, Wyoming; Tallgrass Prairie, Kansas/Oklahoma; Lake Tahoe, California/Nevada; Columbia River Gorge, Oregon/Washington; the Catskills, New York; Hudson River, New York; Crested Butte, Colorado; and the Suwanne River, Florida.

A future issue of *National Parks & Conservation Magazine* will feature more information on possible reserves and on various legal, fiscal, and other protective mechanisms discussed at the recent conference at NPCA. ■

AROUND THE PARKS

More NPCA at Work

Acadia National Park: NPCA opposition to proposed deletions from Acadia National Park continues to be the principal deterrent to approval of the unsatisfactory new general management plan for this park.

Appalachian Trail: Despite our successful efforts during the 95th Congress to increase the authorization for the Appalachian Trail land acquisition program to $90 million over three years, the Administration has failed to request adequate acquisition funds to carry out the program on a timely basis. The proposed trail route is being adversely affected daily by adjacent development and must be acquired quickly if it is to be diverted off roads and out of people's backyards. We continue to seek adequate appropriations for the trail from the Land and Water Conservation Fund.

Continued on page 27

conservation docket

ENDANGERED SPECIES

Sour Grapes Over Snail Darters Endanger Act Again

The Endangered Species Act is once again plagued by the Tellico–Snail Darter controversy as Congress moves to reauthorize the Act's programs. Although in 1978 Congress approved an extension of the Act to mid-1980, the congressional budget process requires that any authorizations for FY 1980 be enacted this year.

During last year's bitter reauthorization battle, Sen. Howard Baker (R-Tenn.) was lead proponent of the Tellico project, the ten-year-old TVA dam project that, if completed, would inundate the last known habitat of the endangered snail darter fish. Baker coauthored an amendment that established a cabinet-level exemption committee. The committee, commonly referred to as the "extinction" committee, is authorized to grant exemptions from the requirements of the Endangered Species Act if they determine that a project has overwhelming public benefits that outweigh the need to conserve endangered species.

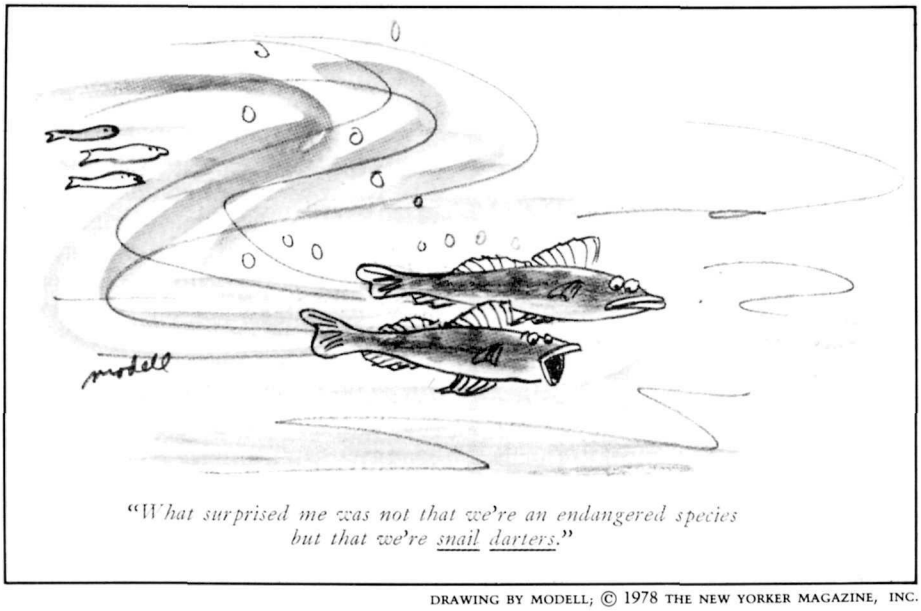
Counting on the committee to exempt Tellico, Baker was outraged when, as its first official action, the committee ruled unanimously *against* exemption of the project.

In defense of the committee's decision, Charles Schultze, Chairman of the Council of Economic Advisors and a member of the exemption committee commented, "The interesting phenomenon is that here is a project that is 95 percent complete, and if one takes just the cost of finishing it against the [total] benefits . . ., it doesn't pay, which says something about the original design."

Suffering from a bad case of sour grapes because the committee he helped create did not exempt Tellico, Baker has vowed to seek a *congressional* exemption for the project. His first attempt at amending the reauthorization legislation so as to exempt Tellico was soundly rejected by the Senate Environment and Public Works Committee during its May markup of the bill, S 1143. Undaunted, Baker has promised to bring up his amendment when the reauthorization legislation reaches the Senate floor.

Similar amendment attempts are expected from Rep. John Duncan (R-Tenn.) when the House version of the reauthorization legislation (HR 2218) goes to the floor. Last year the House passed an exemption for the Tellico project. However it was later dropped in conference with the Senate.

At press time, floor action in both the House and the Senate on this year's reauthorization legislation was expected in late June or thereafter. ■



"What surprised me was not that we're an endangered species but that we're snail darters."

DRAWING BY MODELL; © 1978 THE NEW YORKER MAGAZINE, INC.

How You Can Help Plan The Parks

The following National Park Service general management plans will be released for public comment in 1979 and 1980. We urge you, as NPCA members, to request from park superintendents pertinent documents and press releases for the parks in which you are interested, and to stay in touch with NPCA so that we can keep you informed about the latest developments in your favorite parks.

Acadia National Park, Rte. 1, Box 1, Bar Harbor, ME 04609 (207) 288-3338

Appalachian National Scenic Trail, Project Office, NPS, Harpers Ferry Center, Harpers Ferry, WV 25425 (304) 535-6371

Assateague Island National Seashore, Rte. 2, Box 294, Berlin, MD 21181 (301) 641-1441

Badlands National Park, Box 6, Interior, SD 57750 (605) 433-5361

Big Bend National Park, Big Bend National Park, TX 79834 (915) 477-2251

Big Cypress National Preserve, Box 1247, Naples, FL 33939 (813) 262-1066

Bighorn Canyon National Recreation Area, Box 458, Fort Smith, MT 59035 (406) 666-2412

Big Thicket National Preserve, Box 7408, Beaumont, TX 77706 (713) 838-0271, x373

Boston National Historical Park, Charlestown Navy Yard, Boston, MA 02129 (617) 242-3250

Bryce Canyon National Park, Bryce Canyon, UT 84717 (801) 834-5322

Buck Island Reef National Monument, Box 160, Christiansted, St. Croix VI 00820 (809) 773-1460

Canaveral National Seashore, Box 2583, Titusville, FL 32780 (305) 867-4675

Cape Lookout National Seashore, Box 690, Beaufort, NC 28516 (919) 728-2121

Chaco Canyon National Monument, Star Rte. 4, Box 6500, Bloomfield, NM 87413 (505) 786-5384

Channel Islands National Monument, 1699 Anchors Way Dr., Ventura, CA 93003 (805) 644-8157

Chickasaw National Recreation Area, Box 201, Sulphur, OK 73086 (405) 622-3161

Congaree Swamp National Monument, c/o Southeast Regional Office, NPS, 1895 Phoenix Blvd., Atlanta, GA 30349 (404) 996-2520

Coulee Dam National Recreation Area, Box 37, Coulee Dam, WA 99116 (509) 633-1360

Cumberland Gap National Historical Park, Box 840, Middlesboro, KY 40965 (606) 248-2817

Curecanti National Recreation Area, Box 1040, Gunnison, CO 81230 (303) 641-2337

Delaware Water Gap National Recreation Area, Bushkill, PA 18324 (717) 588-6637

Ebey's Landing National Historical Reserve, Pacific Northwest Regional Office, NPS, Room 601, 1424 Fourth Ave., Seattle, WA 98101 (306) 442-1006

Eleanor Roosevelt National Historic Site, Hyde Park, NY 12538 (914) 229-9115

Everglades National Park, Box 279, Homestead, FL 33030 (305) 247-6211

Fort Point National Historic Site, Box 29333, Bldg. 989, Presidio of San Francisco, CA 94129 (415) 556-1693

Fort Union Trading Post National Historic Site, Buford Rte., Williston, ND 58801 (701) 572-9083

Fossil Butte National Monument, Box 527, Kemmerer, WY 83101 (307) 877-3450

Gettysburg National Military Park, R.D. 1, Gettysburg, PA 17325 (717) 334-1124

Glen Canyon National Recreation Area, Box 1507, Page, AZ 86040 (602) 645-2471

Golden Gate National Recreation Area, Fort Mason, San Francisco, CA 94123 (415) 556-2920

Grand Canyon National Park, Box 129, Grand Canyon, AZ 86023 (602) 638-2411

Gran Quivira National Monument, Rte. 1, Mountainair, NM 87036 (505) 847-2770

Grant-Kohrs Ranch National Historic Site, Box 799, Deer Lodge, MT 59722 (406) 846-2070

Great Smoky Mountains National Park, Gatlinburg, TN 37738 (615) 436-5615

Indiana Dunes National Lakeshore, R.R. 2, Box 139-A, Chesterton, IN 46304 (201) 386-3625

John D. Rockefeller, Jr., Memorial Parkway, c/o Grand Teton National Park, Box 67, Moose, WY 83012 (307) 733-2880

Lincoln Boyhood Home National Monument, Lincoln City, IN 47552 (812) 937-4757

Mesa Verde National Park, Mesa Verde National Park, CO 81330 (303) 529-4465

Mineral King, Sequoia-Kings Canyon National Parks, Three Rivers, CA 93271 (209) 565-3341

Monocacy National Battlefield, c/o C & O Canal National Historical Park, Box 158, Sharpsburg, MD 21782 (301) 432-2231

Mount Rushmore National Monument, Keystone, SD 57751 (605) 574-2523

New River National River, c/o National Capital Regional Office, 1100 Ohio Drive, S.W., Washington, D.C. 20242 (202) 426-6700

Ocmulgee National Monument, 1207 Emery Hwy., Macon, GA 31201 (912) 742-0447

Ozark National Scenic Riverways, Box 490, Van Buren, MO 63965 (305) 323-4236

Palo Alto Battlefield, Southwest Regional Office, NPS, Box 728, Santa Fe, NM 87501 (505) 988-6415

Pictured Rocks National Lakeshore, Box 40, Munising, MI 49862 (906) 387-2607

Rainbow Bridge National Monument, c/o Glen Canyon NRA, Box 1507, Page, AZ 86040 (602) 645-2471

Redwood National Park, Drawer N, Crescent City, CA 95531 (707) 464-6101

Rio Grande Wild and Scenic River, Southwest Regional Office, NPS, Box 728, Santa Fe, NM 87501 (505) 988-6415

Rocky Mountain National Park (Indian Peak Study), Estes Park, CO 80517 (303) 586-2371

San Antonio Missions National Historic Site, Southwest Regional Office, NPS, Box 728, Santa Fe, NM 87501 (505) 988-6415

San Juan National Historic Site, Box 712, Old San Juan, PR 00902 (809) 724-1974

Santa Monica Mountains National Recreation Area, 23018 Ventura Blvd., Woodland Hills, CA 91364 (303) 888-3550

Shenandoah National Park, Rte. 4, Box 292, Luray, VA 22835 (703) 999-2242

Shiloh National Military Park, Shiloh, TN 38376 (901) 689-5275

Sleeping Bear Dunes National Lakeshore, 400½ Main St., Frankfort, MI 49635 (616) 352-9611

Stones River National Battlefield, Box 401, Old Nashville Hwy., Murfreesboro, TN 37120 (615) 893-9501

Vicksburg National Military Park, Box 349, Vicksburg, MS 39180 (601) 636-0583

Voyageurs National Park, Drawer 50, International Falls, MN 56649 (208) 283-4492

War-in-the-Pacific National Historical Park, Western Regional Office, NPS, 450 Golden Gate Ave., San Francisco, CA 94102 (415) 556-6481

William Howard Taft National Historic Site, 2038 Auburn Ave., Cincinnati, OH 45219 (513) 684-3262

NPCA at work

Parks—Continued from page 24

Badlands National Park: NPS has proposed an exceptionally poor draft general management plan for Badlands that calls for construction of approximately 60 miles of "motor nature trails" (new roads) in the newly expanded park. NPCA will continue to oppose this unnecessary road construction.

Big Cypress National Preserve: Special management regulations for Big Cypress recently have been the focus of our attention. Regulations covering oil and gas leasing activities, hunting, ORV access, and water management are critical to the future of this preserve. A major Corps of Engineers drainage project just to the north of the preserve in Hendry County, Florida, could have disastrous effects on the preserve's water supply, and ultimately that of Everglades National Park to the south.

Cape Hatteras National Seashore: The seashore recently approved an inadequate offroad vehicles management plan allowing continued ORV use on a vast majority of beach at Cape Hatteras. NPCA also is opposing construction of an electric transmission line across a portion of the seashore because it would induce development. NPCA has commended NPS director Whalen for rejecting the granting of a special use permit for this line pending completion of an environmental assessment. The agreement will be released this summer.

Fire Island National Seashore: With a workable general management plan finally completed, NPCA efforts will shift to individual management issues such as offroad vehicle activity, dune manipulation by the U.S. Army Corps of Engineers, and potential wilderness designation for an eight-mile natural zone.

Redwood National Park: Following expansion of the park, NPS has begun to develop a general management plan. Early indications are that the agency will place heavy emphasis on external facilities and visitor transportation systems, modeled, at least in part, on NPCA's proposals. In addition, heavy emphasis is being placed on rehabil-

Continued on page 30

NPCA 30 YEARS AGO

GLACIER VIEW DAM—A VICTORY

In 1949, The National Parks Association—now NPCA—celebrated its 30th Anniversary. In its statement of purpose that year, the Association pointed out that although "most people believe that the national parks have remained and will remain inviolate . . . this is not wholly true." In addition to the dams mentioned in the following editorial, the Association was combatting such threats to the national parks as proposed lumbering in Olympic park, widespread poaching of wildlife and the proliferation of feral animals in the parks, roads and recreation facilities in wilderness areas, and the Park Service's perennially inadequate budget.

Nature and wilderness preservationists from coast to coast have every right to be gratified over the outcome of their efforts of recent months to protect Glacier National Park. . . .

On April 27, a notice was sent to conservationists by Newton B. Drury, Director, National Park Service, informing us that the proposed Glacier View Dam be omitted from the Columbia River basin development plans. Mr. Drury said, "Because of the concern you have expressed with regard to this proposed dam, which would flood nearly 20,000 acres of scenic wilderness and winter wildlife range in Glacier National Park, I am pleased to be able to inform you that the Secretary of the Army and the Secretary of the Interior, in their report accompanying a joint letter of April 11 to the President, agreed that the Glacier View project should be eliminated from the present development plans for the Columbia River basin. . . ."

Mr. Drury further said, "The wide interest of all conservationists in the preservation of Glacier National Park has been most gratifying. Without it the importance of keeping Glacier National Park inviolate would not have received such recognition. . . ."

Although this is fine news to Association members, and constitutes a victory for them and their allies all across the country, it must not be overlooked that this struggle has been costly in money and time not only to the many groups and individuals that fought it, but also to the taxpayer in financing the exploration of the dam site and the drafting of plans. Many headaches and the waste of great sums of money could be avoided if, once and for all, the officials of the Bureau of Reclamation and the Army Engineers would realize that the national parks and monuments have been set aside by law to be preserved as nature made them. The parks are protected for the enjoyment of all of the people, including those officials. The areas are not to be used for economic purposes that would destroy the very characteristics and features which they were established to protect. It is time that the construction bureaus recognize the importance of preserving existing values.

We have prevented construction of Glacier View Dam, but the Army Engineers and the Bureau of Reclamation are attempting to invade the parks elsewhere. The Mammoth Cave story was ably told by Tom Wallace in our foregoing issue [a proposed flood control dam on the Green River would flood the park's caverns and submerge much of its above-ground area], and the story of Bridge Canyon Dam, as it relates to Grand Canyon National Monument, appears in this issue. Our October-December magazine will present the Kanab Tunnel proposal threatening Grand Canyon National Park, and a later issue will contain the story of the plan to inundate the magnificent canyons of Dinosaur National Monument. Our struggle with the two federal bureaus is far from ended, and it is imperative to remain alert and on the job until the slate is wiped clean of park-destroying projects.

Education, not only of the public, but also of the federal officials, remains our strongest weapon, for, as Robert Sterling Yard once wrote, "The enemy we fight is neither people, nor business, nor state, nor section, but ignorance. We shall win in the end, not by conflict, but by bringing to those who have not discovered it, knowledge of the purpose and mission of our national park system."

—*National Parks Magazine,*
July-September 1949

reader comment

Needs Info on Virgin Woods

I've been a member of your Association for some years now, and I'd like to tell you how I've enjoyed the *National Parks and Conservation Magazine.* Perhaps more than anything else, I've appreciated the information and facts concerning Old Growth Forest, such as the article on the Congaree Swamp, South Carolina [December 1976].

As a result of that article I ventured to Columbia, South Carolina, last November to walk freely through this unique area with cameras. I documented a considerable section of this swamp-forest.

I have been working on a book dealing with Old Growth Forest (a study of virgin woodlands) for some time now. . . . As this book (working title: The Original American Forest) deals with all virgin forestlands nationally, I wonder if you or someone referred by you could help me locate these areas. I've located a considerable amount of this forest already, but am far from locating all of it. It is a big task. For example, it took years to locate small pockets of this forest in New Hampshire alone, my home state. But I've not located any as yet in Maine or Vermont. For the last two years I've concentrated my efforts on lands east of the Mississippi, but I realize most Old Growth exists on the West Coast and in Alaska. I will deal with these areas later.

Please let me know if you can help me, or direct me to someone who can. I would also like to know how much of these areas remain intact today, and what areas are slated to be cut.

One more question: Can you help me get the precise location of bristlecone pine forests in eastern Nevada? I thank you for your consideration.

N. Jeffrey LaBerge
Brooklyn, New York

Readers may wish to supplement the information that NPCA has provided to Mr. LaBerge. Write him at 1372 East 10th Street, Brooklyn, NY 11235.

National Parks Need Support More Than Ever

Supporters of national parks are again in debt to your magazine, this time for your March and April 1979 coverage of the serious problems facing park units caused by adverse impacts of developments beyond their borders.

We at Indiana Dunes have been struggling with the many forms of pollution you so ably describe for years. Although we agree with your description of the problems which affect the Indiana Dunes National Lakeshore, we hasten to assure your readers that, in spite of them, the lakeshore remains the oasis which it was designed to be, attracting more than a million visitors in 1978. In addition, Indiana Dunes is fortunate to have a team of National Park Service scientists who are beginning to gather the baseline data needed to identify and document the effects of pollution on park resources. Without proof, we have found it is difficult to initiate legal action—the only recourse that seems to work with persistent offenders.

While we agree wholeheartedly with your recommendations, it is our observation that a policy issue needs to be faced head on—whether or not the National Park Service will undertake to preserve and protect the natural resources with which it has been entrusted when those resources are threatened by sources beyond park boundaries. Will the National Park Service take the same attitude toward protecting national parks that a private property owner would take in similar circumstances?

We believe that National Park Service Director William Whalen has accepted the concept of vigorous protection, aided in no small measure by the 1978 Redwoods Act. But translating concepts into operating policies at individual parks is the next and by far more difficult step.

National parks, today more than ever, need a large constituency of supporters to counter the considerable political muscle of the polluters—be they big corporations or local governments—who have yet to accept responsibility for the harmful effects their activities are having on our natural treasures.

You have identified the problems, and have proposed solutions. But it will take the active involvement of park users and supporters to protect our parks from outside threats.

Charlotte J. Read
Executive Director
Save the Dunes Council
Beverly Shores, Indiana

Axiom on Direct Killing

As a professional ecologist, I want to object to the statement in Alan O. Hart's article on the Kauai oo [December 1978]: "This practice undoubtedly contributed to its extinction." With twenty-five years experience in this field, I have yet to see evidence of any species exterminated by direct killing unless it is very valuable commercially or is a very serious threat (or perceived as a threat) and stimulates a bounty or extermination program. It is nearly always alteration of the environment which brings about extermination. I object because attributing a wrong cause always guarantees ignorance of how to deal with a problem.

In those species where direct killing was responsible for a decline such as bison, gray whale, or beaver, the institution of protection resulted in an immediate bounce-back of population. It is almost axiomatic that if shooting or some other direct killing by man is responsible for decline, then protection produces immediate growth.

Wm. Alan Stumpf
Golden, Colorado

Sequoias and Fire

Your December 1978 cover is indeed beautiful, but I wonder how many of the Association's members appreciate that it is a sad picture of mismanagement.

A *Sequoia gigantea* forest is a fire community, shaped and maintained in health by fire. Under misguided fire protection since it became a national park, a situation has developed that threatens the survival of the sequoias.

Fires used to run through the forests as soon as enough fallen leaves and other debris had accumulated to carry a fire. Occasionally a sequoia would be

scarred but would rapidly heal without decay, as was the one of which there is a cross-section in the Hall of the Forests of North America that I did over for the American Museum of Natural History some years ago.

Now a deep blanket of humus has accumulated as a result of fire protection. The nutrients locked up in it are not being recycled to nourish the sequoias, and little of the rain that falls sinks into the mineral soil in which the sequoias are rooted.

Instead, this humus blanket has favored the invasion of the forest by *Abies concolor*, the white fir. Firs love humus and compete with the sequoias for both of the above.

Most serious of all, though, is the risk that someday a fire that cannot be controlled will start in this tremendous bed of fuel, crown into the firs and very likely burn the tops off the sequoias and kill them.

Moreover, there is no regeneration of *Sequoia gigantea* in the area as its seeds need mineral soil in which to germinate, doing so most readily where the nutrients in the ashes of fire are present.

Richard H. Pough
Natural Area Council
New York, New York

NPS Makes Historians Underdogs

I read with interest your article, "Year's End" in the December 1978 issue of the NPCA journal. I wanted to tell you how pleased I am that the NPCA is now taking an interest in the preservation and protection of historic parks.

I highly respect the National Parks and Conservation Association and the work it does. And I have always tried to remember the ideals of Stephen Mather, the Association founder. I have worked for the National Park Service for five seasons and always remembered the early efforts of those individuals who worked to establish the park system. I felt that I, too, held those same ideals. I have studied history and have two degrees in it and also a graduate degree in forestry specializing in interpretation. I worked in two historic parks.

But I found that the ideals and the reality are so very far apart. I encountered people who had no training in interpretation and who seemed to have no deep feelings for the places they were assigned to protect and to interpret. My experience was a horror story. Many times I was told that the NPS did not want to hire historians. I was even told by staff at the Lincoln Home NHS that they did not want to hire someone such as myself; they preferred to hire biologists because these people fit into the master plan of the park.

What is going to happen to our historic parks with people like this? I hate to think. I am devoted to preserving our history and hope one day to work for the NPS in a permanent position or teach interpretation and history on the university level. Then, and even now, I want to do all that I can to help. This is why I am so glad to hear that the NPCA is going to take an interest in the historic sites and parks of this nation.

Let me know how I can help the efforts of the National Parks and Conservation Association. Good luck and best wishes.

Patricia Ann Owens
Godfrey, Illinois

USGS & NPCA Birthdays

I am enclosing "A Brief History of the U.S. Geological Survey" for your attention. This year is the centennial of my agency and I am on the Centennial Committee. Although there are no direct links between the U.S. Geological Survey and the National Park Service, there are a number of indirect ones. If it were not for F. V. Hayden, there might never have been a Yellowstone park and thus perhaps no Park Service. It is not my aim to garner any propaganda for my agency, but we do a good job for the taxpayers and frankly it would be nice to have people know that we have been in the business of doing that for a century and propose to continue! If nothing else, your readers use our maps. . . .

There is also an historical tie between the USGS and your group. C. D. Walcott was the third director of the USGS. In 1907 he left to become the fourth Secretary of the Smithsonian Institution. The National Parks Education Committee was formed in 1918, the organization coming to birth in his office. The following year this became the National Parks Association.

Ellis L. Yochelson
Bowie, Maryland

Thanks much for calling the USGS Centennial to our attention and for reminding us about the historical ties between NPCA and USGS in terms of the contributions of Charles Walcott. Happy Birthday, USGS!

Readers can obtain a copy of "A Brief History of the U.S. Geological Survey" by writing the U.S. Geological Survey, Branch of Distribution, 1200 S. Eads St., Arlington, VA 22202. Single copies are free; for more than one copy, send 70¢ each. A free list of all their publications is available, "Popular Publications of the U.S. Geological Survey."

Members may be interested in more information on the National Parks Educational Committee to which Mr. Yochelson refers. The committee, the forerunner of NPCA, was formed on June 26, 1918, in the east committee room of the Smithsonian Institution.

Members of the 1870 Hayden expedition into Yellowstone country dine al fresco.

USGS PHOTO BY WILLIAM HENRY JACKSON

reader comment

The minutes of the National Parks Educational Committee describe a subsequent meeting of those on the executive committee in Dr. Walcott's office:

The first meeting of the Executive Committee was held in Dr. Walcott's offices in the Smithsonian Institution on April 9, 1919, at 4 o'clock in the afternoon. It was called in pursuance of the purposes for which the Educational Committee was created, which were to consider the opportunities which the national parks offered for a popular educational movement in certain natural sciences, and to organize a National Parks Association to carry this movement into realization, whenever, in its judgment, time and conditions were propitious.

Present, Henry B. F. Macfarland, Chairman, Charles D. Walcott, H. K. Bush-Brown, Eleanor Marshall, William H. Holmes, and Robert Sterling Yard, Secretary.

The Chairman reported verbally upon the work and findings of the Committee since organization. The growth of public interest in the national parks was evidenced by the increase of 32 percent in the visitors to parks under the strenuous conditions of war. Of the half million busy Americans who visit these parks yearly and the millions who do not visit them but show interest in their exhibits, few have any but the vaguest ideas of the origin and meaning of their scenery, but the great majority are anxious for knowledge. It is not the province of government to interpret the national parks or realize other of their higher uses. These must be accomplished, if at all, through the medium of an organization wholly outside of government; the Committee's investigation showed that the universities, schools, societies, motion picture industries, and many other agencies were ready and waiting for leadership in this work.

In his opinion, present conditions highly favored the immediate organization of the National Parks Association to assume this leadership.

NPCA at work

***Redwood**—from page 27*
itation on cutover lands added to the park.

Zion National Park: NPCA is working to ensure that concession facilities in Zion will be relocated as scheduled in 1981. Zion is emerging as a major focus for adjacent lands problems such as those covered in a recent system-wide survey by NPCA. In particular, NPCA is concerned with major coal mining operations to the north of the park along the Virgin River, which flows through Zion; proposed construction of a major coal-fired power plant to the south of the park; and development of ancillary facilities including a major rail line and housing development near the park. ■

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Continued from page 2
is massive illegal immigration, mainly across the Mexican border.

Incredibly, some of the conservation organizations do not understand, or will not face the fact, that all their protective efforts will come to nothing at home unless the population of the United States can be stabilized. It is not good enough to take a hands-off attitude, commenting in conservation publications on the pros and cons of population stabilization with which we have been familiar for many years; nor to take the position that because an organization knows nothing about illegal immigration it should not proceed to learn and act; nor to oppose the efforts of others to deal with the problem. It is high time the environmental movement pulled itself together on this issue.

ONE OF THE ABSURDITIES of the situation is the numbers game in which so many public officials and private organizations are indulging. Because of the necessarily secret nature of the invasion, accurate figures as to its size are difficult or impossible to obtain. We know, for example, that about a million persons are sent back every year after illegal crossings into this country; but it seems probable that two or three times that number escape detection and vanish into the general population. Again, because of the furtive nature of illegal residence here, it is difficult for the Bureau of the Census to obtain reliable data as to the total number of illegal immigrants now present in the country.

From all of this the *non sequitur* frequently emerges that because we do not have the precise figures we ought not to do anything about the problem. What we do know, however, is that the influx is enormous. Careful estimates indicate that an additional 40 million persons may well be added to the population of the United States by the end of the century if the present illegal flow continues.

Domestic increase will probably result in growth by another 40 million, but will terminate, and no longer be a problem, by that time. On the other hand, there will be no end to continued growth as the consequence of illegal immigration at perhaps the rate of a further 20 million every decade; these numbers are so large, and the predictable consequences so catastrophic, that to quarrel about the precise statistics is to fiddle while Rome burns.

WHAT NEEDS TO BE DONE is very clear. Present law makes it a criminal offense, subject to both prosecution and deportation, for a person to enter the country in violation of the immigration statutes. Present law also makes it a criminal offense to harbor illegal immigrants, but does not make it an offense of any kind merely to employ an illegal immigrant; this loophole needs to be closed. It is the job opportunities which bring the illegal immigrants into the country; no border patrols can stem the tide while this enticement continues; to place employers on an equal footing with other persons harboring lawbreakers will be the first long step toward stemming the tides of destruction.

If such measures are to be just and enforceable, effective systems must be developed for the verification of the legal residential status of law-abiding persons applying for jobs. The responsibility of the employer should turn around requiring applicants to produce such verification and reporting receipt of proofs to the law-enforcement agencies of the government. In addition, the course of misfortune having run as far as it has, a system of some kind will probably have to be established to legalize the presence of some of the immigrants who have become a settled part of their communities during a substantial period of time. Methods should also be contrived to train the unemployed of our cities to help meet the legitimate needs of agricultural employers who have been plagued by labor shortages for at least a century. Is it conceivable that the farm and labor organizations of America might cooperate in the development of such a system?

THAT THE AMERICAN PEOPLE as a whole want illegal immigration stopped is the burden of all the opinion polls. This is true of public opinion within the Hispanic-American community. American citizens of Spanish descent suffer just as grievously as those of other origins from the competition and the disrespect for law which result from the present unrestricted crossings.

The public agencies having responsibilities in these matters have a primary obligation to the nation as a whole to deal with these issues in a forthright and courageous manner. This applies to the new Select Committee on Immigration, to the Immigration and Naturalization Service, and to the White House; to beat a cowardly retreat from these duties is to betray the nation.

—Anthony Wayne Smith

Metastable crystalline formation, Bennington Grotto, by Roger Brucker