NATIONAL PARKS *Magazine*

The wolves of Isle Royale National Park

December 1965

Bad Bargain in the Smokies

An Editorial

WE HAVE SYMPATHY FOR THE public administrators charged with the protection of Great Smoky Mountains National Park, yet confronted with the outrageous road-building agreement entered into in 1943 by the Tennessee Valley Authority.

At the same time, we have no admiration for the solution proposed, and perhaps by this time consummated by agreement. The old contract entered into with Swain County, North Carolina, at the time the park was established, contemplated a road from Bryson City at the eastern end of Fontana Reservoir, to Fontana at the western end, following the roadless, mountainous, forested northern shore of the reservoir.

The present solution is to follow the shore half way from Bryson City and then cut across the mountains with a new trans-mountain road to the west.

The accompanying photograph shows the destruction such highways wreak on the steeply sloping forested mountainsides of the Smokies. It is difficult to say which of the two road plans will do the most damage. The trans-mountain road will invite the most traffic, and so it can easily be seen why the tourist-hungry business interests in Bryson City are happy with the choice which has been offered them.

Protectors of the park will not only be unhappy, but bitterly opposed to this choice, because it is a long first step in the direction of the street plan for the Smokies which this Association has criticized.

It is not good enough to say that the administrators were confronted by this ancient document. Dust gathered upon it through the administrations of a long line of Secretaries of the Interior after 1943. No one heard much about it while Luther B. Hodges was Governor of North Carolina and later Secretary of Commerce. Developments like this depend upon a multitude of exchanges between State and Federal officials. An old bargain, struck under very different circumstances from the present, can always be merged into the give-and-take of Government business between Federal and State interests.

Two examples: North Carolina gets massive Federal monetary aid for its highway system; planning in such matters is always drenched in State, local and Federal trading; the Government has built a big road around the south shore of the reservoir, and has plans for enlargement; the north shore road could have been crossed out in the bargaining. The Land and Water Conservation Fund will finance a huge State recreation program with heavy funds; planning must be approved by the Bureau of Outdoor Recreation; the elimination of the north shore road affecting Federal property could be worked out in the course of the discussions.

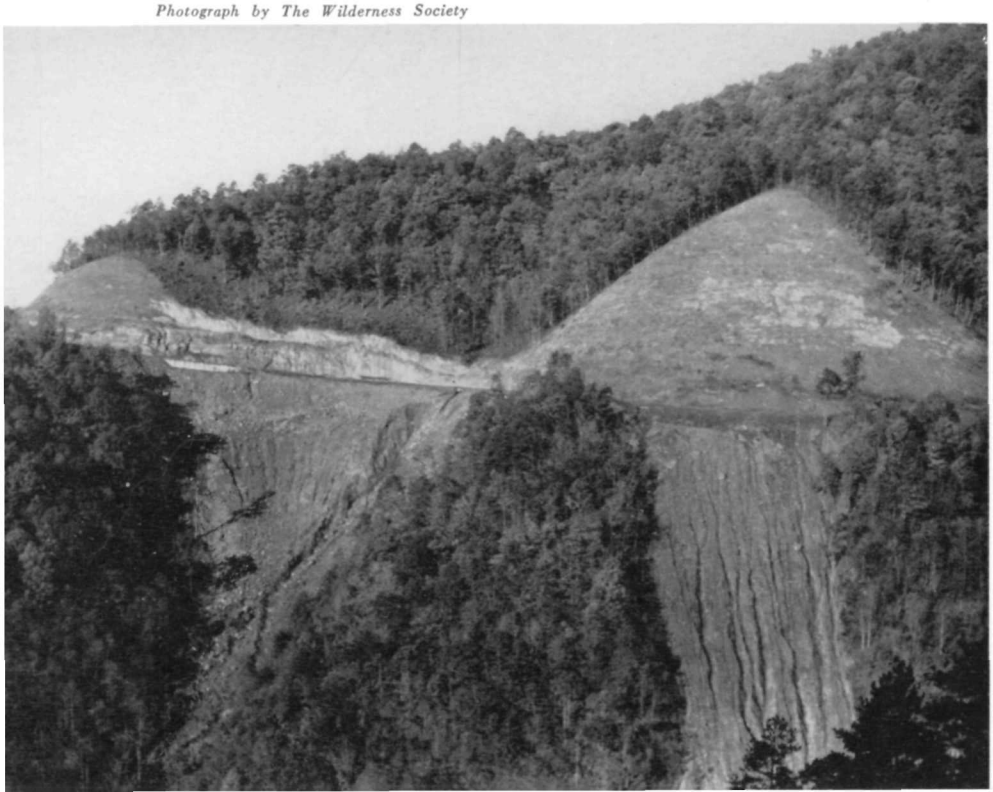
Had the President, with his outstanding acumen, been in charge of the negotiations, we suspect that arrangements could have been reached, highly satisfactory to the County, the State, and the Federal Government, which would have prevented this road-building destruction in the park. But unfortunately such negotiations, considering the press of national and international affairs, must and should be delegated. The negotiators have come up with a bad bargain.

The question remains: What are the plans for the protection of natural country in Great Smoky Mountains National Park? The Wilderness Act calls for the development of such plans, in order that a recommendation for wilderness protection pursuant to the Act may be submitted to the President. Public hearings are required, and for that purpose full information should be made available to the public—now, not six weeks before the hearings.

There is no possibility of protecting wilderness or other natural country in Great Smokies or elsewhere in the park system unless park planning is reorganized and placed in the context of broad regional planning of the kind this Association advocates. Broad regional planning will permit retention of large roadless areas in the parks and national forests and will place high-density recreational development outside the public lands under the auspices of private enterprise, where it belongs. It is time that the high administrators gave some indication that they intend to follow this course, or in the alternative, a public explanation why they do not intend to do so. —*A.W.S.*

View of recent construction on the Bryson City-Fontana road in Great Smoky Mountains Park, near Noland Creek. Above roadbed is a cut of about 200 feet; the fill below is about 300 feet, and already shows severe erosion. October 25, 1965.

Photograph by The Wilderness Society



NATIONAL PARKS *Magazine*

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Front cover photograph by L. David Mech

Most of us think of the wilderness parks and monuments in terms of unmarred natural splendor and as changeless bits of America that stand in relief against a checkerboard of lands shaped to the needs of man. Many scientists, too, view the parks in the same way; but, additionally, as offering myriad opportunities for study of the endless interplay that goes on among all living things. In this issue a scientist takes us to one of the most primitive of the national parks to investigate the interdependence of two splendid American mammals—timber wolf and moose.

The Association and the Magazine

The National Parks Association is a completely independent, private, non-profit, public-service organization, educational and scientific in character, with over 28,000 members throughout the United States and abroad. It was established in 1919 by Stephen T. Mather, the first Director of the National Park Service. It publishes the monthly *National Parks Magazine*, received by all members.

The responsibilities of the Association relate primarily to the protection of the great national parks and monuments of America, in which it endeavors to cooperate with the Service, while functioning also as a constructive critic; and secondarily to the protection and restoration of the natural environment generally.

Dues are $6.50 annual, $10.50 supporting, $20 sustaining, $35 contributing, $200 life with no further dues, and $1000 patron with no further dues. Contributions and bequests are also needed. Dues in excess of $6.50 and contributions are deductible for Federal taxable income, and gifts and bequests are deductible for Federal gift and estate tax purposes. As an organization receiving such gifts, the Association is precluded by law and regulations from advocating or opposing legislation to any substantial extent; insofar as our authors may touch on legislation, they write as individuals.

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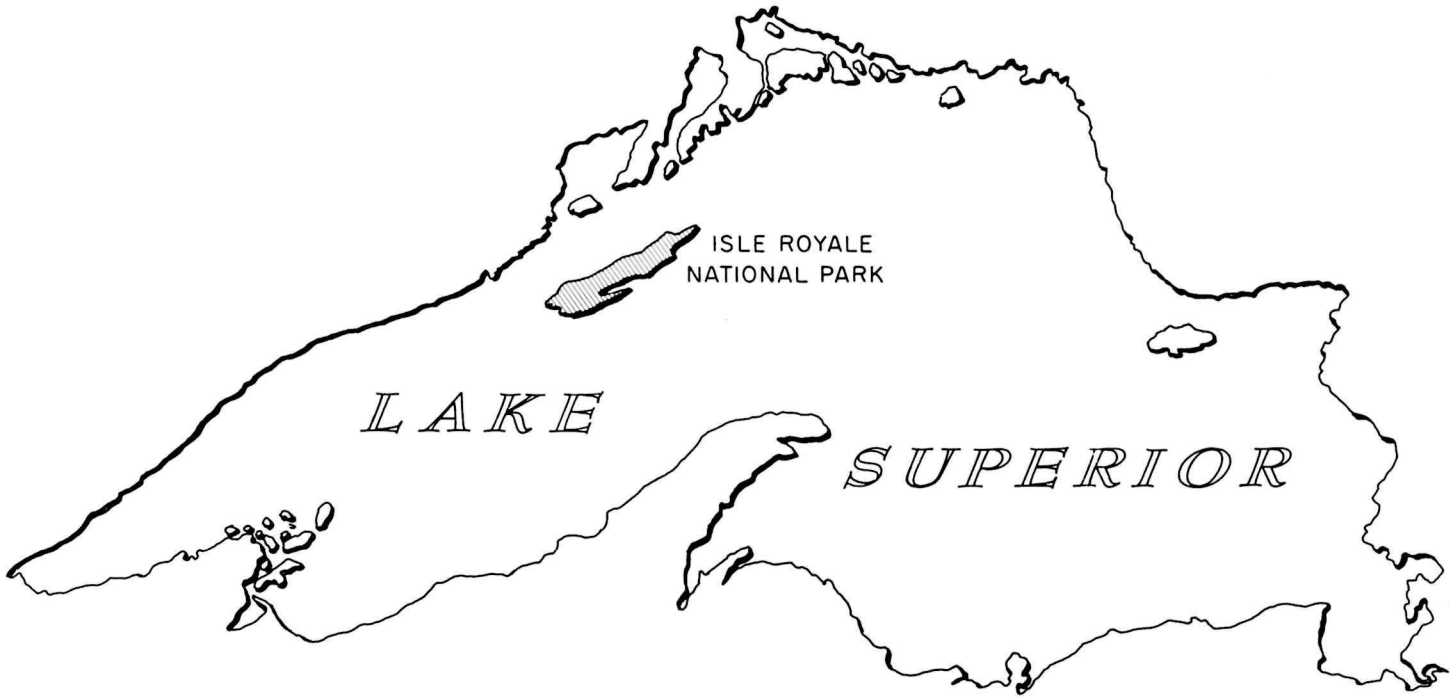


Isle Royale: Laboratory of Lake Superior

Links between timber wolf, moose and browse are studied in a wilderness national park

By L. David Mech

Far out in northwestern Lake Superior lies a sprawling island wilderness. Unknown to the majority of mankind, this primeval area remains as an example of the way in which nature has functioned over the ages.

There, huge rocky outcrops slowly disintegrate, adding their minerals to the sparse humus deposits of the valleys. Poplars and birches, spruces and balsams, maples and oaks capture the sun's energy and contribute their litter to the accumulating soil. Mosses, ferns, fungi, orchids and lilies, grasses and sedges, and innumerable other plants lend great diversity to the biological community. Further complexity results from a small but significant variety of animals that finds shelter within the vegetation, competes for food, and redistributes the basic soil nutrients.

Prominent within this plant-animal community, or ecosystem, exists a subsystem of great interest to many people —the browse-moose-timber wolf complex. At least in a gross manner this complex dominates the ecosystem. However, little had been known about the relationships amongst the wolves, the moose, and the browse until recently, when Dr. Durward L. Allen of Purdue University began directing a series of intensive studies to investigate them. As his first student, I was privileged to carry out the initial study, beginning in 1958 and emphasizing timber-wolf ecology. Philip C. Shelton has just finished the second project, an analysis of the role of the beaver; and Peter Jordan is currently again studying the moose and the browse.

This island is Isle Royale National Park. It is an ideal location for this type of study for several reasons: it is one of the very few areas in the contiguous forty-eight States where a population of timber wolves exists. As an island, it contains relatively discrete

populations; and its status as a national park insures the ecosystem of maximum protection from unnatural disturbances.

Although thousands of people visit the 210-square-mile island each summer, few venture into its interior. The main reason is that vehicles are not allowed on the island, a rather reasonable regulation considering there are no roads. Outboard motors are prohibited in all but one of the inland lakes, and hiking is the only means into the interior. The park is effectively closed to visitors from Labor Day to Memorial Day by adverse weather conditions, and except for the Purdue research team, which spends much of the winter there, no one inhabits the island from early December to early May.

Most of the research on the wolves and moose themselves is conducted in winter, with the aid of a light ski-plane. Donald E. Murray (a 1965 winner of the American Motors Nonprofessional Conservation Award) pilots the aircraft. Each winter a census of the wolf population is taken, and observations are made on wolf social behavior, hunting habits, and feeding and travel patterns. A sample count of the moose is made, and the animals are classified by age and sex whenever possible. In summer the program is to analyze wolf scats, make browse surveys, search for moose remains, and try to determine cow-calf ratios. On the basis of these and past studies, we have pieced together a rough picture of the workings of the wolf-moose-browse relationships.

Habits of the Wolves

For the past several years the wolf population has fluctuated between twenty-one and twenty-five individuals. Fifteen to twenty of these associate as the most dominant pack and range over the entire island, although they tend to utilize the southwest half most intensively. They travel an average of fifteen to twenty miles a day in winter, mostly along the shoreline or on inland lakes. Whenever they detect a moose they make an attempt for it, but they fail most of the time. One day I watched the pack chase sixteen moose without killing any.

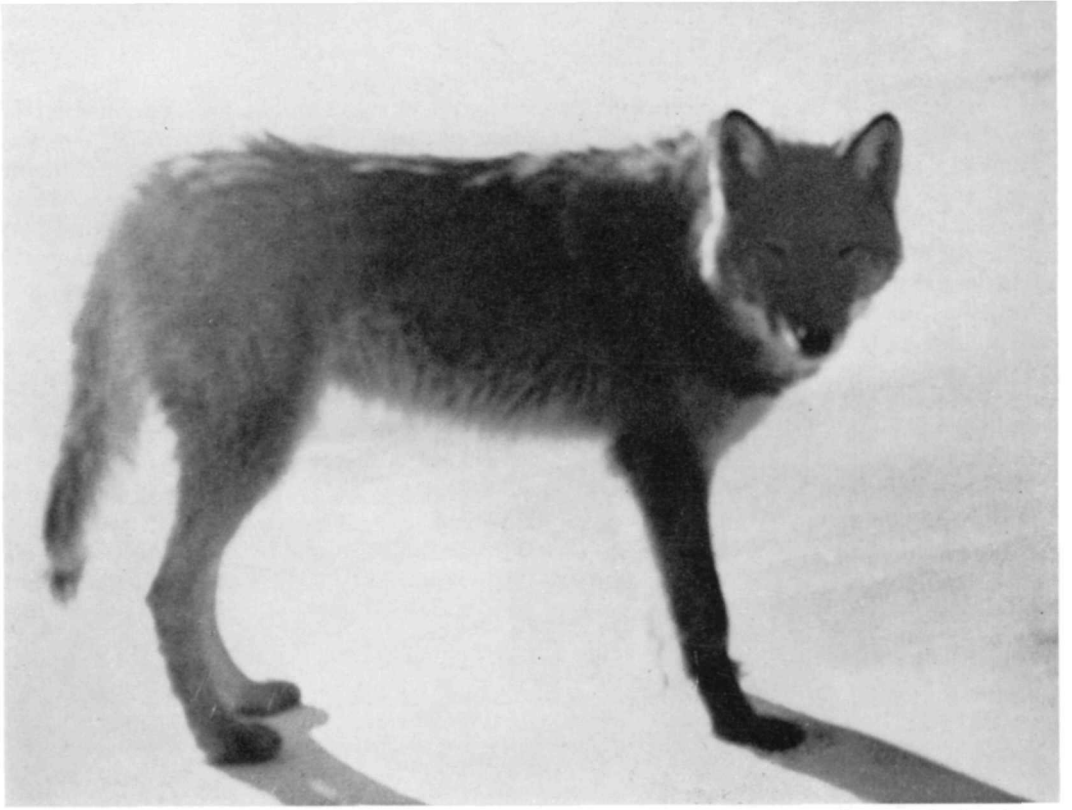
There are at least 600 moose on Isle Royale, and most are strong and healthy and a good match for a wolf pack. But, as in any population, some individuals are old, diseased, or heavily parasitized. These and the young of the year are the types of individuals most vulnerable to the wolves. Of fifty-eight wolf-killed moose found during my three-year study, not one was between one year old and six years old.

Most of the winter, the large wolf pack *does* manage to find and kill a vulnerable moose every three days, but the animals expend a great deal of effort in doing so. I watched a hunting wolfpack detect 131 moose, and of these, fifty-four escaped before the wolves could even get near them. Of the seventy-seven moose that the wolves did confront, only six (one out of thirteen) fell prey to the pack. Many of the moose that survived just stood their ground while the wolves harassed them. As long as the moose did not run, they seemed to be invulnerable; they are very quick with their dangerous hooves. I often saw wolves harry a pugnacious standing moose for only a minute or two and then give up.

However, if a moose ran upon approach of the wolves, the pack inevitably gave chase. Not all of the moose that ran were killed, but all six moose that I watched being killed were running. The wolves would close in around the rear of their prey and attack its rump. While five or six clinging wolves slowed the moose, one animal would lunge for its nose. Once a nose-hold

The author (at left, below) and pilot Donald E. Murray examine the remains of a wolf-killed moose. Over the course of three winters the two men spent more than four hundred hours watching wolves from an airplane.

Photograph by the author



Photograph by the author

During the course of his studies of timber wolf-moose-browse ecology in Isle Royale National Park the author photographed the large wolf above at 15 feet.

was obtained, the rest of the pack was usually able to pull down the moose and finish it off.

The large wolfpack usually spent a day or two feeding on a calf moose, and about three days on an adult. On the basis of the estimated weights of moose in winter, I have figured that each wolf ate an average of ten to thirteen pounds of moose per day. After gorging, the animals often sprawled out on the open ice or a high ridge and sunned themselves.

On such occasions I sometimes witnessed an interesting relationship between the wolves and a small flock of ravens that usually accompanied them. A raven would waddle up to a lolling wolf and peck at his rump or tail, sending the animal straight into the air. Wolves sometimes retaliated by surrounding a raven and closing in on it. Each time, however, the raven would wait until the wolves got to within a jump or so and would then rise out of reach. The ravens usually followed the wolfpack to each new kill, and as soon as the wolves left the carcass, flocked in for their share. Apparently their sole means of support in winter was the wolfpack.

Another interesting relationship in the wolf-moose-browse complex is that of the hydatid tapeworm, *Echinoccocus granulosus*. The adult lives in the intestine of a wolf and is only a quarter of an inch long. It produces hundreds of eggs, which pass out of the wolf and infest the browse. When a moose accidentally swallows one of these along with his food the egg hatches, and the tiny larva bores into the bloodstream. It then comes to rest in a lung, which reacts by walling off the larva and forming a cyst. Within the cyst the larva reproduces asexually, and the cyst grows to golf-ball size. I examined one moose that had fifty-seven such cysts in his lungs. It certainly seems that these would affect a moose being chased by wolves, and predispose it to predation. This would be beneficial to the worm, because in order for the species to perpetuate itself a wolf must eat the cyst. The larvae within the cyst will then change into adults in the wolf's gut, and complete the life-cycle.

Probably anything else that affects a moose adversely would make him easier for wolves to kill, so it is not surprising that the closely-cropped Isle Royale herd is healthy. A good measure of the condition of the herd is its productivity. Aerial and ground surveys have shown that the Isle Royale moose are among the most productive on the continent. No other herd bears such a high proportion of twin calves.

However, the Isle Royale moose were not always in such good shape. They reached the island early in the century before there were any timber wolves there, and by the mid-thirties had increased to an estimated 1,000 to 3,000 animals. The food supply then dwindled rapidly. Soon the moose ate themselves out of house and home, and an extensive die-off occurred. The cycle then repeated itself to a lesser degree. At about the time of the second period of starvation, which was in 1949, timber wolves crossed the fifteen-mile stretch of ice from Canada. It appears that their advent signaled a new era for the moose herd. Not only are today's moose healthy, but so is the browse supply.

It is difficult to predict the future of

The author, a graduate of Cornell University, received his doctoral degree in vertebrate ecology from Purdue University in 1962. He is presently a Research Associate at the University of Minnesota.

the moose-wolf-browse complex with a great deal of certainty. Several more years of study are needed. However, on the basis of the information accumulated to date, it seems likely that the wolf population will not increase substantially, nor will the moose herd. The browse supply seems good, but as the lush second-growth vegetation matures, the amount of available browse can be expected to decrease. In response, sooner or later, the moose herd should decline, and perhaps the wolves. Of course, this can all be upset by the occurrence of any one of a number of unforeseen events. A large forest fire, for instance, might rejuvenate the browse and cause a chain of changes throughout the ecosystem.

It does *not* appear that the wolf population will cause a decrease in the size of the moose herd. It has not over a period of fifteen years, as far as can be determined. The wolves do prey exclusively on moose in winter and primarily on them in summer. However, based on known kill figures for the wolf population in winter and on liberally calculated rates for summer, the total annual moose kill does not exceed the total estimated recruitment to the Isle Royale herd.

People have sometimes asked what good is such a study as this. The answers, of course, are several. Most of the principles at work in this relationship are applicable to predator-prey situations all over the world. Thus people interested in managing populations of wild animals for food or sport, or both, can make use of them. Again, other natural areas lacking large predators and beset by problems with large grazing and browsing animals can look to Isle Royale as an example of how their problems might be lessened. The best answer to the question, however, is that this study adds additional infor-

In the spectacular photograph below the Isle Royale wolfpack is seen chasing a moose. On average, the wolves manage to catch only one of each thirteen moose they pursue.

Photograph by the author

mation to our store of knowledge and thereby helps science understand the workings of man's natural surroundings. This is especially important in today's age of pesticides, fallout, and human overpopulation.

It is fortunate indeed that the national parks have been maintained as natural areas. No doubt they will play an ever-increasing role in environmental research. Their potential for this was officially recognized in a statement from the report of the National Academy of Sciences-National Research Council Committee to the National Park Service on Research: "In the national parks it is possible to study the structure, interrelations and behavior of biological communities, discover how they are adapted to their environment and compare them with the artificial communities elsewhere created by the clearings, drainage, and contamination, and by the introduction of exotic animals and plants by man. They offer the opportunity to pursue long-term ecological studies difficult, if not impossible, to conduct elsewhere.

The Isle Royale National Park wolf-moose project that we have outlined above is a remarkably good example of just such a study. ■

Save for three seemingly non-conformist individuals, the timber wolves in the pack shown below are travelling in their usual formation, which is single-file.

Photograph by the author

Ratchet and the Wildlife Refuges

Some units of the national wildlife refuge system have been caught in a recent economy squeeze

TODAY THERE ARE MANY FACETS TO America's conservation and preservation picture. There is the great national park system which, despite the pressures of a population rising rapidly toward the 200-million mark, remains the object of worldwide admiration and imitation.

There is the national forest system with more than 200 million acres of timber and grass lands administered for perpetual yield, recreational, and special conservation and preservation purposes. Our national forest system is also looked upon from afar with envious eyes.

There are the 300-plus units of the national wildlife refuge system which have been created over the years for wildlife protective purposes and human outdoor enjoyment.

There are the public lands, on which a good start has already been made in the direction of outdoor recreation and preservation, and which are currently being viewed by administrators with a specific eye toward furthering these purposes.

There are the conservation polices and programs of Federal agencies not primarily engaged in land administration but which nonetheless possess jurisdiction over Federal lands—the various branches of the armed services, for example.

All these lands, plus myriad other public holdings at the State, county and local levels, are administered for special conservation purposes or under special conservation programs; they are the facets of the American conservation and preservation picture. It is a picture which has one thing in common with a well-cut gemstone: the impairment of one facet mars, even if ever so slightly, the brilliance of the whole stone.

Within the national wildlife refuge system are land areas of every description, each acquired for some protective purpose. Below, a snowy egret and its young nest in hardstem bulrush at the Malheur Wildlife Refuge in Oregon.

Photograph courtesy Fish & Wildlife Service: Winston Banko

Above, a view in Red Rock Lakes Wildlife Refuge, Montana, a sanctuary primarily responsible for snatching the trumpeter swan from the brink of extermination. Lower Red Rock Lake is being scanned by a Fish and Wildlife Service observer. Below, a group of musk oxen in the Nunivak National Wildlife Refuge of Alaska.

Photograph courtesy Fish & Wildlife Service: Paul Adams

Just such an impairment, many conservationists think, could be be inflicted on our national wildlife refuge system by the unimaginative application of a generally praiseworthy policy of economy in government. The economy program in question, which the Bureau of the Budget is charged with enforcing, is popularly called "Ratchet" by Bureau employees, and one turn of the wheel was designed to squeeze $200,000 from the operating budget of the national wildlife refuge system for Fiscal Year 1966 through reduction in size or disposition of areas.

Purposes and Administration

The national wildlife refuge system is, of course, administered by the Interior Department's Fish and Wildlife Service to provide nesting, resting and wintering quarters for migratory birds, ranges for large mammals like bighorn sheep, bison and elk, and sanctuaries for endangered animal species of all kinds. The agency in immediate charge of the refuges is the Bureau of Sport Fisheries and Wildlife. Thus, the Bureau was faced with the task of deciding how the $200,000 economy could be made with the least damage to its refuge system. After a study of the matter it was decided that nine wildlife refuges, one game range and one game preserve would have to be either closed for disposition to other Federal agencies or agencies of the States in which they were situated, or retained in the system and managed with reduced personnel and protection.

The eleven parcels of Fish and Wildlife Service lands to be closed out or managed at reduced levels total more than three-quarters of a million acres, half a million of which lie in one tract—the vast Desert Game Range in Nevada. The balance is in the Havasu Refuge along the Colorado River in Arizona and California; Piedmont Refuge in Georgia; Moosehorn Refuge in Maine, Monomoy Refuge in Massachusetts; Killcohook Refuge in New Jersey; Bosque del Apache Refuge in New Mexico; Sullys Hill Game Preserve in North Dakota; Carolina Sandhills Refuge in South Carolina; Little Pend Oreille Refuge in Washington State; and the Pathfinder Refuge in Wyoming. The areas which the Service finally decided to retain in full acreage but on a reduced level of management

were Carolina Sandrills, Monomoy, Piedmont and Sullys Hill.

No tears were shed over disposition of Killcohook Refuge in New Jersey by either the Bureau or conservationists, since this swampland refuge was on Corps of Engineers land and had been diked and used as a dredge-spoils dumping ground. But conservationists were well able to imagine the reluctance with which the Bureau must have decided to dispose of its splendid 44,000-acre Little Pend Oreille Refuge in Washington, for a claimed saving of $29,000 a year and two permanent jobs. Or, for that matter, more than half of its Bosque del Apache Refuge, with its fragile desert upland ecology, for a saving of $10,000 a year.

It is easy to assume that the Bureau is just as unhappy as conservationists over disposition or reduction of wildlife refuges to effect savings that, in some instances at least, are quite obscure. But the Bureau and its conservationist allies have not been entirely alone in their resentment of a seemingly heavy-handed savings operation. At least some members of the Migratory Bird Conservation Commission, which passes on recommendations of the Interior Secretary for additions of migratory bird refuges to the national refuge system, have viewed the supposed savings of Ratchet in this direction as short-sighted. The Commission, created by Congress, consists of the Secretaries of Interior, Agriculture and Commerce, two Senators, and two Representatives. It acts, in the words of one of its members, as "trustees of the funds of organizations and private individuals, who have contributed millions of dollars for acquisition, and in some cases development, of these refuges."

Conflict in Policy

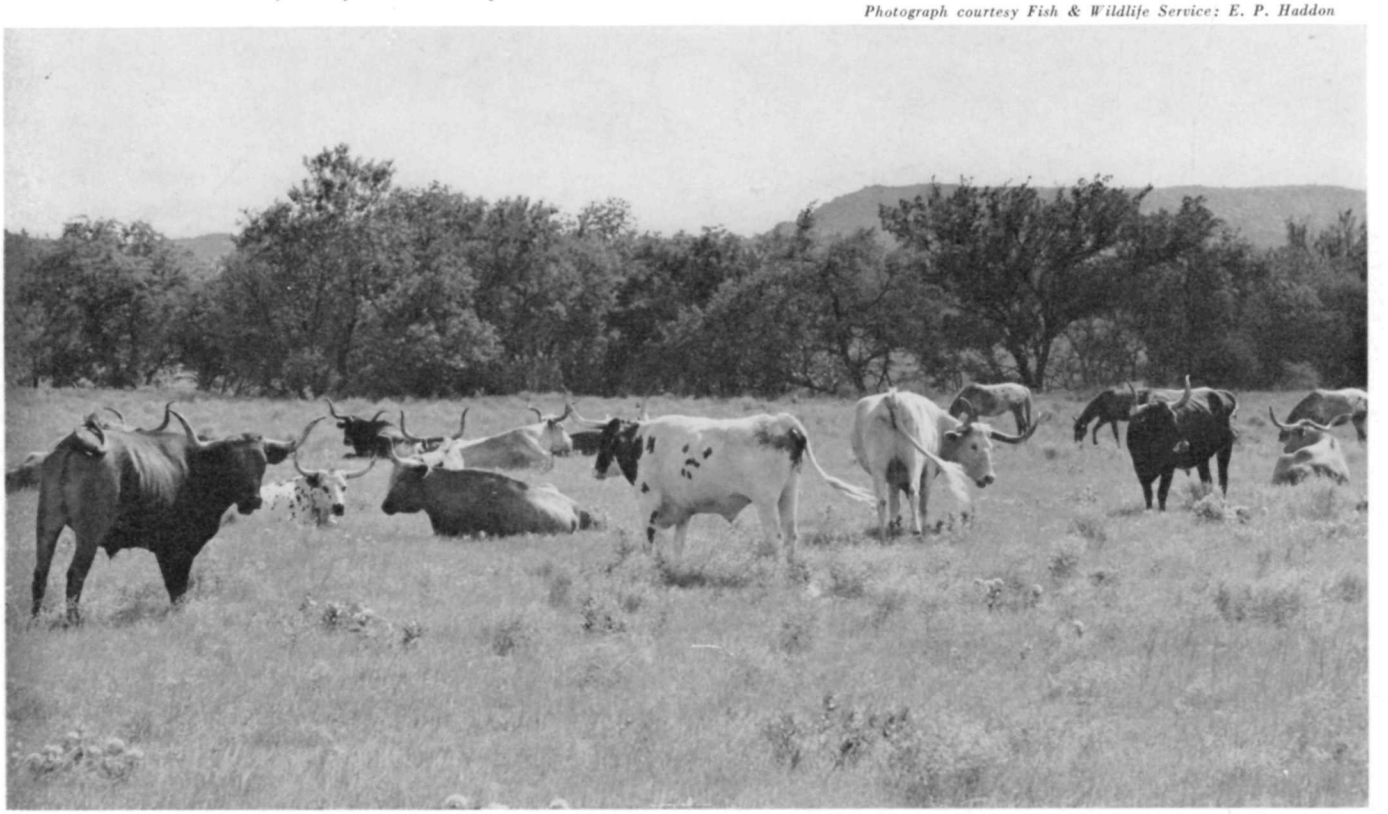
The Commission member, continuing, said that "during the past few years, there has been an urgent drive to acquire more public recreation areas, including the open space program. I wonder about the advisability of buying such land in one place while disposing of it in another." And again, "We are involved in a program to protect so-called endangered species of wildlife. Is adequate consideration given to this wildlife resource when refuges are proposed for disposal?"

The Fish and Wildlife Service, which has its roots, if not its name, far back in the early days of the American conservation movement, is responsible, over-all, for the conservation and management of America's wildlife for its recreational and economic values. The Service, and its Bureau of Sport Fisheries and Wildlife, has in general done a splendid job in protecting, preserving and insuring the perpetuation of American animal life for recreational, scientific and esthetic reasons.

The Service arrived on the American scene too late to prevent the extinction of animals like the heath hen, passenger pigeon, Carolina parakeet, Arizona elk, eastern forest bison, and many another native bird, mammal and fish. But since the first wildlife refuge was established by President Theodore Roosevelt in 1903—Pelican Island, on the coast of Florida—the managers, scientists and wardens of the Service and its predecessor agencies have saved numerous other native animal species

In the ninety-two-square-mile Wichita Mountains National Wildlife Refuge of southwestern Oklahoma there is a small herd of Texas longhorn cattle, relics of a breed fabled in stories of the American West but today nearly extinct as a pure stock.

Photograph courtesy Fish & Wildlife Service: E. P. Haddon



from complete biologic disaster. Notable among its successful and dramatic rescues during recent years have been those of the trumpeter swan, at Red Rock Lakes Refuge in Montana, and the whooping crane, at the Aransas Refuge in Texas; while other refuges have provided last-ditch havens for animals like the tiny Key deer and Everglades kite in Florida, the Delmarva Peninsula fox squirrel in Maryland, and the Hawaiian monk seal in the Hawaiian Islands.

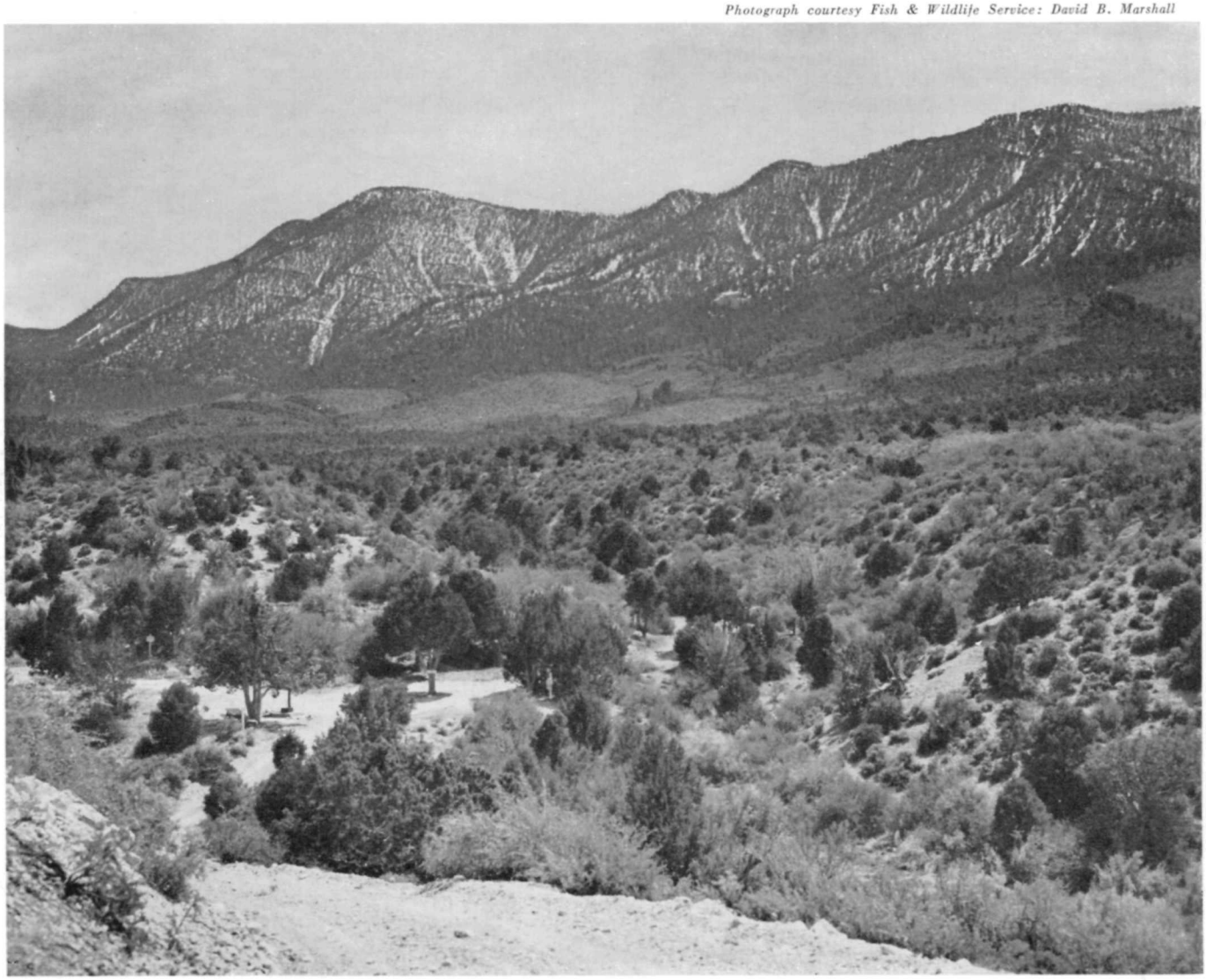
Conservationists ask: must there be an attempt to reduce the value of the national wildlife refuge system to a matter of dollars and cents? Perhaps Senator Lee Metcalf, member of the Migratory Bird Conservation Commission, was asking himself the same question when he discussed the effect of the Bureau of the Budget's economy knife on the floor of the Senate.

The Senator tartly noted that there is "no one in this agency of bookkeepers qualified to make such important policy decisions." Those wildlife refuges which have been set aside primarily for migratory birds, at least, are administered under a public law—the Migratory Bird Conservation Act—which provides for refuges acquisition "in perpetuity;" the balance of the refuges have been acquired under authority of a long series of other Congressional acts. Thus it seems intolerable that either the Service or the Budget Bureau should be able to abolish wildlife refuges without the express approval of the Congress; and Senator Metcalf's irritation with the entire operation was quite understandable.

The disposition of refuge lands and the reduction of administrative and management levels in other refuges is already largely accomplished under the 1966 fiscal-year turn of Ratchet's wheel. But conservationists have reason to believe that the wheel may be turned again during the coming year. If it is, further valuable refuges may be squeezed from a wildlife protective system that is second to none in the world. ■

Units of the wildlife refuge system benefit humans as well as other animals—bird enthusiasts, scientists, sportsmen, and all manner of outdoor folk. Below, against a backdrop of Nevada's Spring Range, is the Cold Creek campground in the huge Desert Game Range.

Photograph courtesy Fish & Wildlife Service: David B. Marshall



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Water for Arizona

Summary statement and analysis by Anthony Wayne Smith, President and General Counsel, National Parks Association, submitted on invitation to the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs, House of Representatives, on August 31 and 30 respectively, 1965.

SUPPLEMENTING my statement of yesterday, in view of the question put to me at the end of the session, the immediate problem before all of us is to help Arizona get the water it needs right away.

This is a question of aqueducts and pumps and the electric power to do the pumping. This electric power can be produced by coal-fired thermal plants at from 3 to 4 mills or less, according to Commissioner Dominy. Hydro-electric power for pumping purposes will be more expensive; 4.2 mills for Marble Canyon. One coal-fired thermal plant, capacity 600,000 kilowatts, the prime power capacity of Marble Canyon, will do the entire pumping job.

Why should we choose the more expensive method when a cheaper one is available? In this case the cultural values also favor the cheaper method.

Why should we embark on a course involving a multitude of bitter conflicts and protracted delays, when a better course is available which everyone would support?

The interests of the people of Arizona dictate that there be no further delay in getting water into Arizona; the prompt way to get water into Arizona, the cheapest way, and the way which will have the least opposition, is to use coal.

I would make this practical suggestion to the Subcommittee: authorize the construction of the pumps and aqueducts at once; authorize the construction or licensing of a 600,000 kilowatt coal-fired thermal power plant to do the pumping at 3 to 4 mills delivered cost at once; put the money the water will earn into a development account for research and development in fission, fusion, and solar energy and in water production for southern California and Arizona, looking toward the use of the Gulf of California and the Pacific Ocean.

There could be a very broad consensus on this approach. I do not know who would oppose this approach. There is no apparent reason why the authorizing legislation could not be passed at the next Session of Congress.

Bridge and Marble Canyon Dams

MY NAME IS ANTHONY WAYNE SMITH. I am President and General Counsel of the National Parks Association, which is a private, non-profit, membership organization, educational and scientific in nature, with about 30,000 members throughout the United States and abroad. The Association publishes the monthly *National Parks Magazine* received by all members. I am an attorney admitted to practice in New York and the District of Columbia and a specialist in river basin planning and natural resources management. I appreciate the invitation to present this statement to the Subcommittee.

Analyses of the Central Arizona Project and the Pacific Southwest Water Plan by Mr. Stephen Raushenbush, former Chief of Research, Power Division, Department of the Interior, now economic consultant to the National Parks Association, were published in the *National Parks Magazine*, April and June, 1964. Supporting data for the conclusions reached by Mr. Raushenbush were tabulated at the request of the Assistant Secretary of the Interior, Mr. Kenneth Holum, later that year and submitted to him and Commissioner Dominy of the Bureau of Reclamation, together with a covering memorandum and letter of transmittal. I submit copies of all these documents for your convenience; much of what I have to say in my present testimony is based on the data previously made public in these documents. I submit also copies of the current September 1965 issue of *National Parks Magazine* which contains editorial comment on the problem before you. If the Subcommittee, the Committee, or the Committee staff desire further information on any points which I may deal with or which are covered in the supporting material, we shall be happy to attempt to supply it.

In recommending recently that authorization of the proposed Bridge Canyon dam on the Colorado River below Grand Canyon National Park and Monument be deferred for more careful study and later consideration, the Bureau of the Budget rendered a significant public service.

Bridge Canyon dam, if constructed to the elevation presently proposed by the Department of the Interior, would flood reservoir water into Grand Canyon National Monument throughout the entire length of the river through the monument and into Grand Canyon National Park some 13 miles. Such inundation would be in violation of the established national policy against reservoirs in national parks and monuments; it would not fall within the proviso of the Grand Canyon Park Act which has been relied upon to justify it, and which I shall discuss in a moment.

The scenic resources of the Grand Canyon of the Colorado, whether in the monument or the park, are irreplaceable. These resources have world-wide significance, and their wanton destruction for questionable utilitarian purposes would have serious repercussions on the American image abroad. The cultural, scenic, and ecological values at stake in this situation are, of course, intangible; they cannot be measured in dollars and cents as monetary economic advantages can; but in our judgment, which we think is likely to be the ultimate judgment of the American people as a whole, they far outweigh the very doubtful dollar values on which these projects purport to be justified.

While the Secretary of the Interior has recommended the authorization of Bridge Canyon dam, and the project has been a favorite of the Bureau of Reclamation for many years, other agencies of the Department of the Interior seemingly dissent. The National Park Service has stated that the reservoir would inevitably result in the loss of park values of national significance. The Bureau of Outdoor Recreation has stated that no new recreation benefits can be claimed, and pointed to the unusual existing recreation values of the area and the adverse effects the reservoir would have on them; it has elaborated its position at some length along such lines. Unfortunately, we have the impression that these agencies do not feel entirely free to state their honest opinions in this situation, in view of the position of the Department; if this Subcommittee has not already done so, I would suggest that the Directors of the National Park Service and the Bureau of Outdoor Recreation

be called to this stand and asked to state their views as they would state them if they were not component parts of the Department of the Interior. You might also wish to call two former Directors of the National Park Service, Conrad L. Wirth and Newton B. Drury, again with the reassurance that their uninhibited opinions are being sought.

THIS SUBCOMMITTEE and the full Committee will, in our opinion, wish to give careful consideration to the implications of the last sentence in Section 302 of the proposed legislation, which says that "the Congress hereby declares that the construction of the Bridge Canyon dam herein authorized is consistent with the Act of February 26, 1919 (40 Stat. 1175)," the Act which created Grand Canyon National Park.

The Grand Canyon Park Act contains the following Section 7:

> That, whenever consistent with the primary purposes of said park, the Secretary of the Interior is authorized to permit the utilization of areas therein which may be necessary for the development and maintenance of a Government reclamation project. (U.S.C., title 16, sec. 227.)

Obviously, the questions are whether the utilization of areas of Grand Canyon National Park for the Bridge Canyon reservoir is *consistent* with the primary purposes of the park and *necessary* for the development and maintenance of a reclamation project.

The entire tradition of the protection of national parks in this country is eloquent testimony against the proposition that flooding a reservoir into Grand Canyon Park is *consistent* with the primary purposes of the park; we suggest that by far the dominant sentiment of the American people runs counter to the declaration of consistency contained in the measure under consideration.

Moreover, it is quite clear that this use of the land is not *necessary* to any Government reclamation project. Bridge Canyon dam could be eliminated completely from the Central Arizona Project, as far as pumping is concerned, and such elimination would not have the slightest effect on this project; the pumping power could be supplied entirely from Marble Canyon. Bridge Canyon has been represented as being entirely a peaking power project, and this has nothing whatsoever to do with any Government reclamation project; it has been represented as a money-earner for the construction of reclamation projects elsewhere; but such money can just as well be provided out of the general treasury, and Bridge Canyon is not necessary to such financing. If it be true, as now suggested, that Bridge Canyon may be used to provide a small measure of pumping power, it is not necessary that it should be so used. There is no way in which the language of the Grand Canyon Park Act can be tortured into consistency with the provisions of the measure under consideration. Needless to say, Congress is privileged, if it wishes to modify basic national policy in regard to park protection, to do so; but in that event, it would be preferable, in all candor, to state frankly that such a course had been chosen. A declaration of consistency where no consistency exists would, in our judgment, be unbecoming to the Congress of the United States.

I NEED HARDLY SAY to this Subcommittee, which is already well informed about these projects, that neither Bridge Canyon nor Marble Canyon dam will store any water whatsoever for irrigation purposes; in fact, both of them will cause severe losses of the irreplaceable water resources of the Pacific Southwest through evaporation.

Nor will Bridge Canyon be used in any significant measure for pumping water into central Arizona or elsewhere. In the original proposal for the Central Arizona Project and the Pacific Southwest Water Plan, advanced by the Department of the Interior, Bridge Canyon would not have been used at all for pumping; its functions would have been to supply peaking power, mainly for sale in California; it would earn money for the Basin Account which could be used for subsequent projects, mainly in California. We have been told recently that some of the Bridge Canyon power would be used for pumping, but a relatively small amount; apparently the purpose of this adjustment is to bring the project within the exception of the Grand Canyon Park Act as a reclamation project; but the power is not needed for this purpose.

As originally presented, Bridge Canyon was to produce and sell peaking power at about 6 mills; after the retirement of the investment, it would earn money for a Basin Account for new construction, mainly in California. This inducement was thought to ensure support by California for the project as a whole. However, there seems to be no good reason why any further projects, if desirable, should not be financed directly from the general treasury of the United States; such direct financing might give Congress greater control over the basic decisions; moreover, the projects could be authorized later, if, as, and when the need for them became more apparent.

But the truth is that Bridge Canyon dam is not needed as a money-earner. A much larger percentage of the water which will be pumped into central Arizona from the lower Colorado River near the Mexican border pursuant to any Central Arizona Project will be sold at high municipal and industrial prices, as contrasted with low irrigation prices, than the Department of the Interior originally represented. At least 100,000 acre feet more municipal and industrial water will be sold at $45 an acre foot than originally stated; this is in contrast with irrigation water at $10 an acre foot; if realistic estimates of urban population growth and water consumption are made, the shift may be much higher.

The result is to make the Central Arizona Project more of a money-earner, considered merely as a water-pumping project, than was represented to the public; Bridge Canyon becomes a fifth wheel, even if we really want to earn money in this way in a public enterprise. There may be some people who would question the desirability of the Government getting into purely money-making operations of this kind: I suggest that the Committee give careful consideration to this question.

We had originally supposed that the changeover from irrigation to industrial and municipal water in Arizona would be even higher than the amount I have mentioned. Certain it is that M&I use will grow much more rapidly than that in the Phoenix-Tucson area. However, it seems that some of this M&I use will be satisfied from water in the old Salt River Project; this is a situation where the land owners acquired a vested interest in reclamation water at low prices and can retain that interest even though the water is put to a much more profitable use by municipalities and industries. The old laws provided no safeguards against such speculative profits. The land owners and water users can therefore split the difference, and Salt River water will be more attractive than Central Arizona Project water. We suggest that the Subcommittee look into this situation very carefully; you might wish to call Commissioner Dominy to the stand on that point.

THERE IS ANOTHER QUESTION which deserves attention by this Subcommittee. There will be a considerable amount of effluent from the municipal and industrial projects using both Salt River and Central Arizona Project water. It is not at all clear who will get the advantage of this water; who will own it, buy it, reap the profits inherent in it. Much of it may have great value for both irrigation and fertilizing purposes. This Subcommittee might consider safeguards against unreasonable speculative advantages going to persons who do not deserve them; Commissioner Dominy might be able to shed some light on this question.

There will also be some exchanges of water among these various projects in Arizona: Salt River, municipal effluents, and the CAP, which become rather complex; in view of the amount of land speculation likely to be involved, you might wish to question the Commissioner on these points.

Bridge Canyon dam and reservoir would be highly destructive in terms of the scenic, recreational, ecological, and cultural values of the Grand Canyon in both the monument and the park. It is not needed, and it is of questionable desirability, as a money-making project. It will not store any water for irrigation anywhere, but will, on the contrary, evaporate water; it will do little, if any, pumping. Its only value, if any, would be for generating power, and I would now like to turn to this point.

About a year ago a spokesman for the Bureau of Reclamation stated that the cost of power generated at coal-fired thermal plants in the Colorado Basin was being brought down to 5 mills a kilowatt hour or less. Just a month ago the Commissioner stated that it was coming down, in larger plants, to 3 or 4 mills or less. Bridge Canyon dam will produce peaking power at 6 mills; with firm power at 3 or 4 mills or less, it would behoove this Subcommittee to inquire very carefully into the profitability of peaking power at 6 mills. The Department of the Interior has not yet demonstrated, as far as we know, that Bridge Canyon dam would pay its way, principal and interest, over the 50-year repayment period, as a peaking power plant, as against such competition.

The Office of Science and Technology has indicated that nuclear power produced by the fission process, in conjunction with the desaltation of saline water, will probably be available within the next 10 or 15 years at a cost of 3 or 4 mills. There have been suggestions that such power will be well adapted to peak load purposes, and not merely to base load. If so, Bridge Canyon dam cannot be justified for peaking purposes; this last possible justification collapses. Presumably, this was one of the questions which the Bureau of the Budget thought should be very carefully examined before this project had serious consideration for authorization. It seems quite likely that in the 4- or 5-year period suggested by the Bureau for restudy, it will become abundantly apparent that better alternatives than Bridge Canyon for peaking power production exist.

Since the time when plans were crystallized for Bridge and Marble Canyon dams by the Department of the Interior, a serious doubt has been growing as to the probable quantities of water available in the Colorado River Basin. The very low flows of recent years may be more typical than otherwise. If so, the big reservoirs, including Glen Canyon, and most certainly Marble Canyon and Bridge Canyon, will not fill or refill on schedule. To the extent that their schedules are unmet, interest on the investment will rise, and power costs with it; Bridge Canyon power might be 6.5 mills instead of 6 mills, making it even more vulnerable to competition from coal-fired and nuclear-fission energy. By the time the waiting period of 4 or 5 years suggested by the Bureau of the Budget has passed, we shall have better information on weather cycles in the Basin; this is another excellent reason for denying authorization.

Just beyond the horizon is nuclear fusion. This process, as you certainly know, will produce fresh water as well as abundant power. The Office of Science and Technology has suggested that the cost would be between 2 and 3 mills. It is widely supposed that this process will have been developed by the end of this century, before the end of the pay-out period for Marble and Bridge Canyon dams. Any such development could bankrupt both of these projects.

I am sure that the members of the Subcommittee have in mind that we are talking about the probable inability of Bridge Canyon dam to make payments on principal and interest throughout the pay-out period. Even if debt service proved possible at the beginning, it might fail in later years. It is not at all certain that competing power sources are not superior even now; it is almost certain that they will prove superior by the end of another decade or so, and that either the power consumers will be caught with long-term contracts at high prices or prices will have to be reduced and the project will prove to be uneconomic.

Turning to Marble Canyon dam, this project would be located above Grand Canyon Park, and the reservoir would not invade any unit of the national park system. However, Marble Canyon is also famous for its wild scenery and natural outdoor recreation opportunities, and most of the same cultural evaluations are applicable at Marble as at Bridge. Marble Canyon should not be destroyed for the sake of an unnecessary and unprofitable hydroelectric power project; certainly not where superior sources of power exist.

The comments made about Bridge Canyon are in the main applicable at Marble except that the purpose of Marble was announced originally as that of pumping water from the Colorado River near the Mexican border into central Arizona for reclamation and municipal and industrial purposes. It was represented as producing firm power at 4.2 mills a kilowatt hour, and apparently no peaking power, and no uses other than those of the Central Arizona Project, were contemplated. We are now being told that it will also produce peaking power; this appears to be in line with the current thinking of the Department of the Interior that coal-fired plants will beat hydropower for base load purposes, and that hydro-power can be used only for peaking purposes. This Subcommittee will probably, therefore, receive the Marble Canyon proposal as a peaking power proposal, and the considerations involved will be more similar to those discussed in connection with Bridge Canyon.

But even the original proposal was unsound, if we accept the present analyses of the Department of the Interior. If it be true, as the Commissioner of the Bureau of Reclamation has said, that coal-fired plants may shortly be able to produce power at 3 or 4 mills or less, then they will obviously beat Marble Canyon at 4.2 mills. Moreover, the cost of hydro-power production, following construction costs generally, is constantly increasing, while the cost of coal-fired thermal power, due to advancing technology, is constantly declining.

It is difficult to understand how a project of this kind can be realistically appraised, whether by the Bureau of the Budget, or this Subcommittee, or public-service organizations like the National Parks Association, interested in presenting an objective analysis of the situation, if the purported justification of such projects changes from year to year in this chameleon fashion. I feel sure that this Subcommittee will take a great interest in finding out whether the Marble Canyon project is intended for pumping purposes, and hence for reclamation, with about 15% of the investment non-reimbursable, and about 50% interest-free, or whether it is a peak load project, not intended for irrigation, with principal and interest fully repayable.

If the Marble Canyon project is an irrigation project, intended for pumping, then we need to add the amount of interest lost and the non-reimbursable principal if we are to make a proper comparison with coal-fired costs at plants constructed by privately-owned, publicly-regulated electrical utilities. If this be done, the gap, if any, between hydro-power at 4.2 mills and coal power at 5 mills or less, as estimated by the Bureau last year, probably disappears. And of course, if coal costs are 3 or 4 mills or less, as apparently now admitted, the advantage is on the side of coal, even without consideration of the subsidy given to hydro-power.

You will bear in mind also, of course, that in the offing, first of all, is nuclear fission, with power costs at 3 or 4 mills: moreover, it is not at all clear that peaking power will not be produced by these methods at rates lower than hydro-power. This is a question of a 10- or 15-year development, and this competition will be in the picture long before any investment in the Marble Canyon dam, or Bridge Canyon, can be repaid. And in the longer perspective, but still within a generation's time, in

all probability, there will be nuclear fusion, with power costs at 2 or 3 mills, according to the Office of Science and Technology.

We are not urging that nuclear fission plants be substituted for coal-fired steam plants, or for hydro-power plants, for that matter, because we are not satisfied as yet that the problem of disposing of radioactive wastes has been sufficiently solved. But it seems quite certain that atomic fission will be used for the desaltation of sea-water and the generation of power in the Pacific Southwest in the readily foreseeable future; even if opposed on radioactive waste grounds, these developments are almost certain to take place. We mention the prospect merely as a fact, and without advocacy of any kind.

ATOMIC FUSION, as we understand the situation, presents different questions. Radioactive wastes are not produced, and on the other hand, quantities of excellent water are developed. The difficulty appears to be the generation of enormous quantities of heat with adverse effects on waters and atmosphere, and unpredictable results in respect to weather, climate, and the environment generally. It seems probable that these considerations will have a limiting effect on nuclear fusion use, but will not preclude such use entirely. Admittedly, we are in the realm of rather broad speculation; yet the march of technology is so rapid that this prospect must be considered.

We have urged, and I would be inclined to emphasize at the risk of prolonging this testimony unduly, that more research and development work needs to be done in the field of solar energy. The development of solar energy in a sunny climate like that of the Pacific Southwest and particularly in the desert country of portions of the Colorado Basin holds great promise. Funds which might otherwise be expended on destructive hydro-power development might better be used in moving forward into the future in search of practical methods for harnessing solar energy.

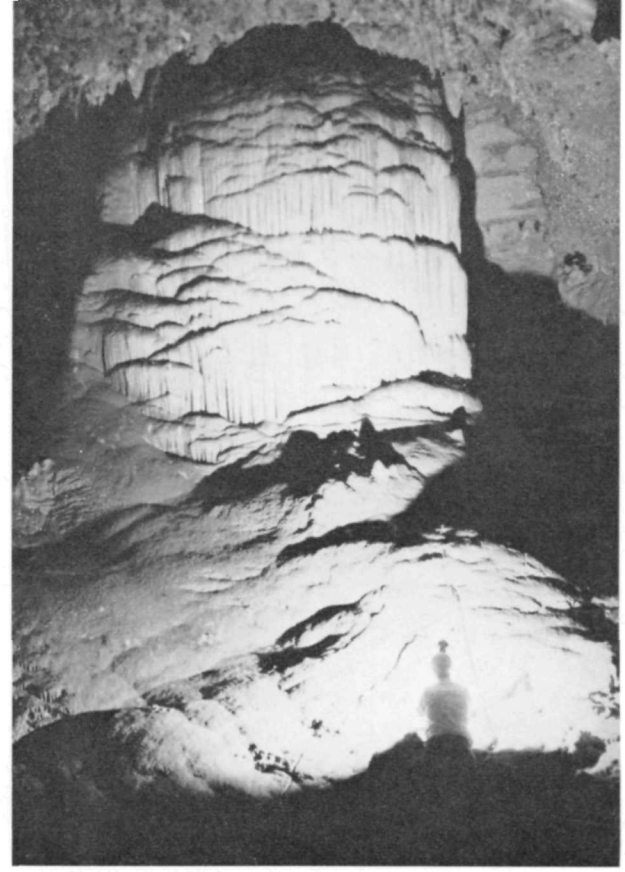
This is a question of the kind of program a truly Great Society would adopt for the Colorado. It seems to many people that a high civilization will set great store by the scenic and recreational values of the canyons between Glen Canyon dam and Lake Mead; the Congress might well recommend to the President that he declare this stretch of the river a national monument, or might itself incorporate it all into Grand Canyon National Park, thus giving it full protection under the National Parks Act, the Federal Power Act, and otherwise. Coal-fired steam plants would then be relied on to provide the electrical energy needed for pumping, both for irrigation and for municipal and industrial purposes, as far as this portion of the river is concerned; such surplus coal capacity as might be required, or such nuclear capacity, would be provided for peaking purposes; if this were considered too costly, which seems doubtful, the hydro-power potentials of Glen Canyon, Hoover Dam, and other existing hydro-power structures in the Basin, could be devoted more completely to peaking purposes, and the base load could be picked up by thermal plants.

We would expect nuclear energy to produce additional prime power at costs at least as low as coal-fired thermal plants, and perhaps even to produce peaking power more inexpensively; moreover, fission plants could pump desalted water from the Pacific and from the Gulf of California into both southern California and central Arizona. Quarrels about the division of water between the two states would thus be decreased. In due course, if the promise of nuclear fusion is fulfilled, and the problem of heat is not insurmountable, newly manufactured water will be available, and abundant power can be tapped.

The notion that more and more water should be brought south from northern California into southern California and even exported to Arizona becomes less and less attractive as those potentialities unfold. There has even been a threat to the Columbia River Basin with covetous eyes appraising the enormous water resources of the Pacific Northwest; such notions are also probably unrealistic in the long perspective.

In our judgment, the questions raised by the Bureau of the Budget with respect to Bridge Canyon are equally applicable to Marble Canyon dam. Both structures would contribute energy to the network, and it would be difficult to identify and earmark separate supplies. Neither project can be justified for base load purposes; it is highly questionable whether they are needed or can be justified for peaking power. This last question is the most important one for this Subcommittee, as for the Bureau of the Budget, and it needs much more thorough investigation than it has had thus far. The 4- to 5-year moratorium suggested by the Bureau for Bridge Canyon should be imposed on Marble Canyon as well, because the situations are similar. Bridge Canyon could not be built without Congressional authorization, in view of the strictures of the Federal Power Act prohibiting the Federal Power Commission from licensing projects constructed for reservoirs in national parks; this restriction applies to Grand Canyon National Monument. In the case of Marble Canyon, however, there is no such protection; Congress has properly imposed a moratorium on the issuance of licenses at these points by the Federal Power Commission pending a preliminary examination of the problem; this safeguard should be continued pending decision by Congress itself as to its course of action at both of these sites; that is, we suggest that you might wish to propose a moratorium on the issuance of any licenses at either Marble or Bridge Canyon for hydro-power construction until Congress itself has acted either to authorize construction, or, as appears to be the sounder policy, to give permanent protection to the entire Colorado in this area as a national monument, or, indeed, as a national park.

THE BUREAU of the Budget made one further excellent recommendation, that a Water Policy Commission be established composed of persons from outside the Government, to review our entire national policy with respect to water resources; the Bureau may have had reclamation problems very much in mind. Many people feel that a review of this nature, and a commission of this kind, are long overdue. Should we be subsidizing irrigation, as a nation, at a time when the Department of Agriculture is trying to retire many millions of acres of crop lands from production? Should we be shifting agricultural production in, let us say, cotton, from the Southeast to the Southwest, with the aid of reclamation subsidies? Should we be pressing for the development of every last kilowatt of hydroelectric power for peaking purposes or should we set higher store by the remaining scenic resources of our western canyons, and of our eastern river valleys, for that matter? Should the least-cost criterion retain its present high priority in the evaluation of specific projects, or should important ecological, social, and cultural values be given greater weight? The same question should be asked about the entire cost-benefit approach; should we not give much more consideration to both monetary and non-monetary intangibles? Should not the programming of water development projects be subordinated to either an interdepartmental commission or a White House level agency, or, better, to a commission composed of policy-minded persons, rather than operating agencies? These river basin planning problems are not primarily engineering problems, and therein lies the source of many of our mistakes; they are problems in economics, sociology, and indeed, in political philosophy, in the sense of the study of social values and objectives. These present hearings, and this Subcommittee and Committee, might well be an excellent time and excellent agencies to initiate an inquiry into a problem like the continued subsidy of reclamation. In addition, the Budget Bureau's proposal for a comprehensive commission to review other broad aspects of national water policy might well be given favorable consideration. ◆ ◆ ◆



The Pillar of the Constitution, one of the world's awe-inspiring cave formations, in southern Indiana's Wyandotte Cave. Since its discovery some 150 years ago, Wyandotte Cave has been severely vandalized.

Photograph by the author

Conservation and American Caves

By William R. Halliday

NEATLY TUCKED AWAY BENEATH the placid, timeless green countryside of southern Indiana is one of America's greatest caverns: Wyandotte Cave. Half a continent away in the midst of the Nevada desert is a far smaller cavern, Lehman Cave. The volume of individual chambers and the total length of Wyandotte Cave are five to ten times those of Lehman Cave. Yet to the acute conservationist, each symbolizes one fork of the crossroads which now faces the caves of the United States.

Pioneers who followed Indian trails deep into Wyandotte Cave more than 150 years ago found it a long, impressively spacious single corridor. Here and there the going was rough; low squeezes, steep muddy slopes, great tricky rockpiles. At intervals, gigantic chambers interrupted the corridor. Along the way were fantastic cottony patches of epsom-salts crystals and just enough stalactites and stalagmites and stony "waterfalls" to bring focal beauty to the awesome cave. Far back, perched atop an impressive underground mountain, torchlight revealed a stupendous white column, big as a cabin and surpassed by few similar formations in the world—the Pillar of the Constitution. Nearby were lesser accretions of great beauty.

At first complaining neighbors led Wyandotte's owners to consider the cave only a nuisance. Cows, it seems, were always getting into trouble in its cool, inviting entrance section. Eventually the Indiana State Legislature passed a law forcing its owners to build a cattleproof wall in the cave. But over the years, increasing numbers of curious Hoosiers probed its hidden places. Following the example of the Indians, who had quarried away part of the beautiful flowstone base of the Pillar of the Constitution, most visitors brought out a souvenir or two—or a goodly load.

And why should they not? No one had ever told them otherwise.

Soon, however, the glistening beauty of the cave had faded. Stalactites were rare indeed. In addition, many visitors inscribed their names, while torch-smoke further disfigured the walls.

Eventually, one of these early spelunkers forced his way through a small hole about 250 yards inside the entrance. Beyond was several times as much cave as was already known; nothing to compare with the Pillar, but a really extraordinary, if rather barren cave. The owners came to realize that something important lay beneath their land, and began a program of explora-

National Park Service photograph

Above, shields or palettes in Lehman Cave, Nevada, a unit of the national park system. Below, at the left, a similar formation in Wyandotte Cave, for comparison. The photograph at lower right, taken behind the Pillar of the Constitution in Wyandotte Cave, illustrates another type of vandalism, the recording of one's initials or affiliations on rock faces.

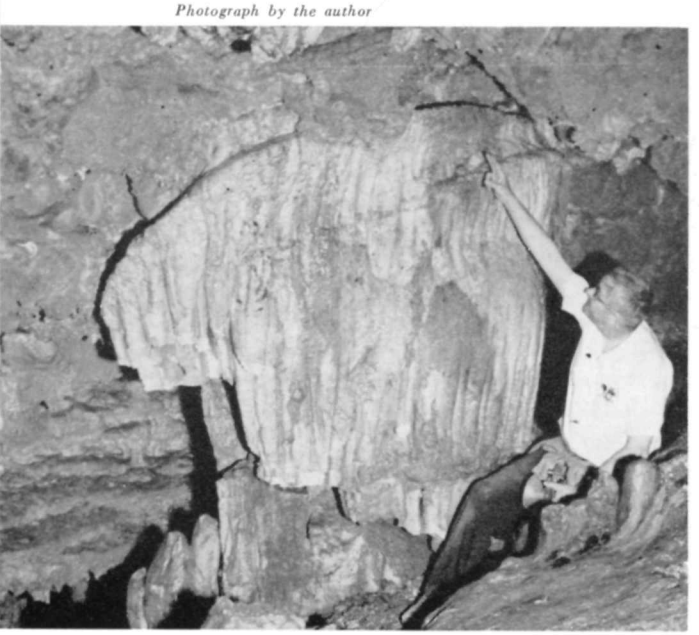
Dr. Halliday, a heart specialist by profession, is Director of the Western Speleological Survey. He is the author of "Depths of the Earth," to be published soon by Harper & Row.

tion and excavation which has continued intermittently to the present day.

For almost a hundred years, tourist groups have been guided to the greatest splendors—but until fragile sections of intricate beauty were discovered twenty-five years ago, the old traditions continued strong. Odd inscriptions and thousands of names deface the ransacked walls of the Old Cave. Wyandotte is still a great cave—a splendid wilderness cave without lights or developed trails—but it could have been so much more than that.

LATE IN THE 19TH CENTURY, AB Lehman found his way into the intricate Nevada cavern which today bears his name. Inside was a fairyland of intimate chambers bedecked with large and small stalactites and stalagmites, and a profusion of curious, shield-like formations with graceful draperies pendant from their margins. Souvenir-hunters hauled out what they fancied, but the Lehman ranch was far from civilization and the cave suffered but little. In time, word of its beauty reached the Department of the Interior, and Lehman Cave was proclaimed a national monument years before paved roads brought hordes of the curious. Today, Lehman Cave stands virtually intact, and an outstanding interpretive program recently developed by the National Park Service adds much to the visitor's delight and edification.

Photograph by the author



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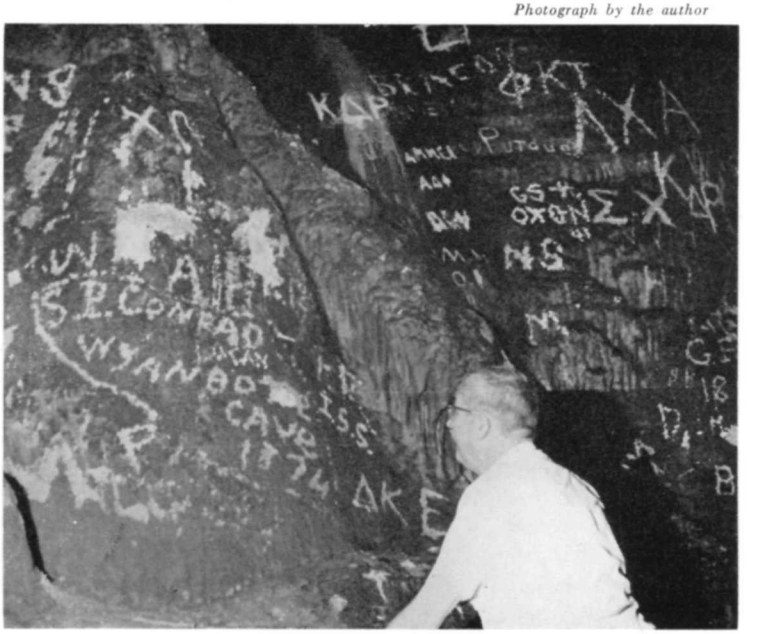

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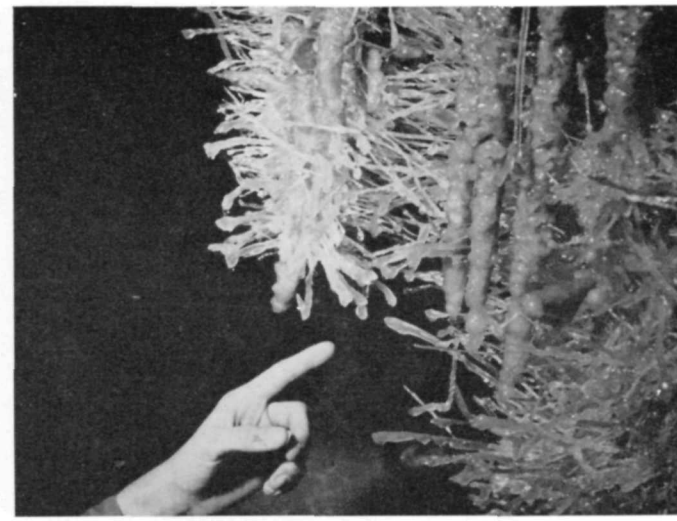


Photograph by the author

At left, a scene of delicate beauty within Carlsbad Caverns, which have been preserved in public ownership as a unit of the National Park system. At the right, a different kind of fragile beauty preserved in the privately owned and operated Cavern of Sonora in Texas.

Not all caves under the jurisdiction of the National Park Service are as well protected and interpreted as Lehman Cave. Actions of important sections of the Service have long revealed a lack of understanding of the significant cultural values of caves, although this tendency is hardly limited to the National Park Service. Second-rate caves like Shoshone Cavern in Wyoming have been included in the national park system (although later excluded) and exceptional caverns rejected by uninformed examiners. Jewel Cave was almost dropped from the system just when it was proving far more significant than nearby, better-publicized Wind Cave. Acceleration of improvements is overdue even at such splendid National Park Service caves as Carlsbad Caverns, Timpanogos Cave and Mammoth Cave.

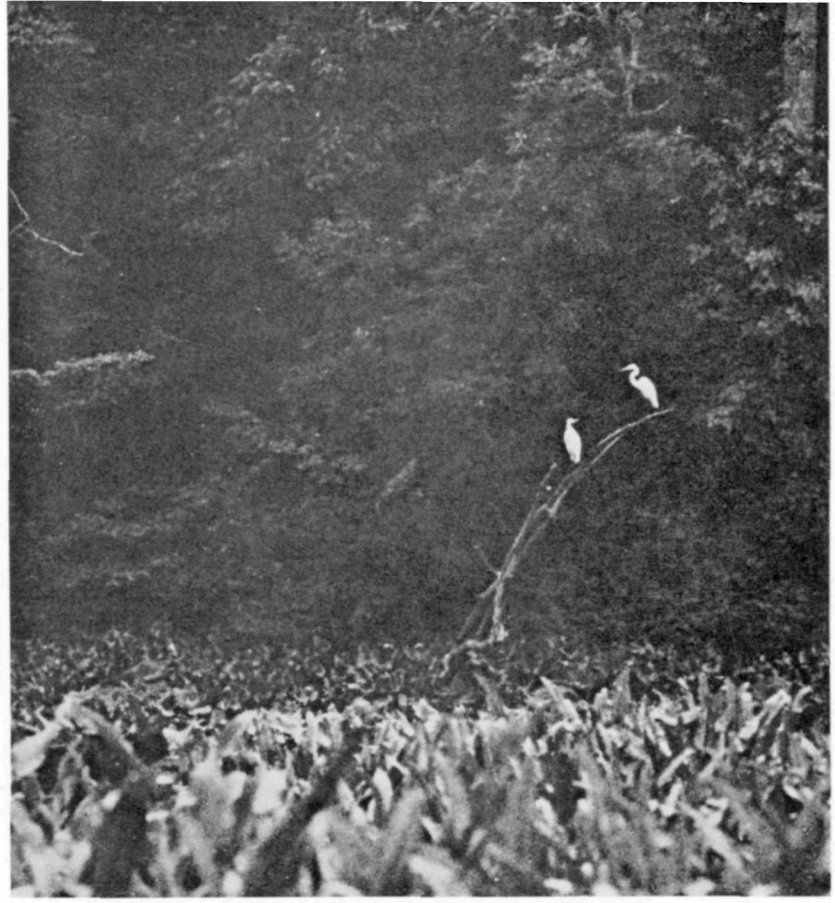
It should not be inferred that all caves outside the national park system are, or inevitably will become, gutted hulks of no consequence. Texas' private Cavern of Sonora is perhaps America's most beautiful; I am still amazed at the superb commercialization achieved here. Dozens of other fine commercial caves are similarly protected to the utmost ability of their proud owners. Many a non-commercial cave, unprotected by anything except nature, repays struggling spelunkers with vistas of unearthly beauty; but others have been defaced more severely than Wyandotte.

THE PAST TWO DECADES HAVE SEEN A tremendous surge of interest in American caves and their exploration and study. With this has come an equal awareness of the surpassing need for cave conservation. This is not a simple problem, for not even the term vandalism is easily defined. Few consider a certain GEORGE WASHINGTON 1748 inscription vandalism, for this is the first authentic date in the mainstream of American caving. Many feel that the extensive Civil War inscriptions in Virginia's Melrose Cavern are history rather than vandalism. I personally see no particular harm in inconspicuously smoking a NSS membership number and date at the end of some really significant exploration (almost all serious cavers in the United States are members of the National Speleological Society), but it has been years since I have done so myself. Cavers who wish the esteem of their fellows today remove their carbide waste and trash in plastic sacks. Similarly, we no longer collect even broken stalactites, for this encourages beginners to break "just one." And when that beginner comes back with ten friends who each break "just one," a fine cave is significantly vandalized. Responsible cavers always attempt to leave a cave in better condition than before, for they see caves as marvelous living museums which reveal to the informed their entire life histories.

But responsible cavers alone cannot solve this entire problem, for most damage to caves comes from informed casual visitors. The help of every conservation-oriented individual is essential, if more and more of our caves are not to go the way of Wyandotte.

Thoughtful conservationists see units of the national park system in much the same "living museum" concept that cavers apply to caves. With the world now beginning to comprehend the cultural value of caves, the future of those within the national park system should be doubly bright: improved interpretive services at such old favorites as Mammoth Cave, and expansion to include exceptional caves of national significance.

Interpretive programs will go far to educate the general public about the value of lesser caves which are outside the national park system. Similar programs by conservation organizations can reach many, many others, and surprisingly little is necessary to deter the average unthinking souvenir hunter. Occasionally legal action is necessary against the psychopath or determined vandal, but fortunately such cases are rare indeed. Thus, with only a little effort, Lehman Cave will typify the future of American caves. Without that small effort, Wyandotte Cave will be the prototype instead. ■



White egrets pause briefly in Kane's Creek on Virginia's Mason Neck. August, 1965.

THE BATTLE AT MASON NECK

ON A SUNNY SPRING MORNING IN 1950, two Virginia ornithologists paddled softly along the Potomac River near Mason Neck, a large undeveloped forest and marshland in the southernmost part of Fairfax County just fifteen miles from the nation's capital. Suddenly one of them sighted a flash of white in the sunshine. Both observers seized their binoculars and identified the object as the white head of a bald eagle, surveying his new domain from atop a tall, dead oak tree. They might well have been enthusiastic, for the huge bird, dark brown with white head and tail when in adult plumage, is classified by the United States Department of the Interior's Committee on Rare and Endangered Wildlife Species as "rare" and "generally decreasing." It was the first time the eagle, this country's national symbol, had been sighted in the immediate vicinity of Washington in recent times.

Mason Neck embraces 8900 acres of quiet marshes laced with shallow creeks, and is bordered by dense forests of oak, maple, and sycamore. Along the winding waterways duck rice, wild oats and cattails grow in profusion. In spring and summer the ponds are dotted with lotus flowers, lily-pads, and water lettuce; across the mile-long expanse of blue water a jagged horizon of trees lines the unspoiled Potomac shore. More than 155 species of birds have been identified on Mason Neck, including sandpipers, hawks, owls, woodpeckers, and a great variety of songbirds. Jackson Abbott, a bald eagle expert for the National Audubon Society, has verified that bald eagles nest in the area; of the 96 successful bald eagle nests reported in the nation by the Bureau of Sport Fisheries and Wildlife in 1965, at least one was on Mason Neck. The Neck is a favorite roosting spot of transient eagles from Canada and Florida, and as many as 37 have been counted in the Neck's Big Marsh in one day. In spring and fall the skies are laced with the flight paths of hundreds of ducks, and in March both the Big Marsh and Kane's Creek are filled with flocks of whistling swans, resting on their journey north. Along the Potomac shores fifty and sixty-foot cliffs are dotted with the homes of the belted kingfisher. White-tailed deer are abundant in every part of the Neck, and in the marshes and creeks a hiker may come across three or four jumbled muskrat houses in one day. Raccoons, shrews, voles, opossums, rabbits, skunks, chipmunks, moles, woodchucks, several species of squirrels, and mice and bats are abundant throughout the entire area, and along the edges of creeks

otters slide and play in the water. In wood and brushland areas red and gray foxes prowl, and weasels have been sighted by naturalists. Mason Neck is also habitat for bobcats, which have been seen briefly as they crossed dirt roads at night. At least ten species of land snakes and many varieties of water snakes inhabit the Neck, and turtles, frogs, and lizards are abundant. More than fourteen species of fish crowd the waters around the Neck, and the scrawny markers of submerged fishnets are a common sight. In August blue crabs are seen by the hundreds.

The wildlife potential of Mason Neck is only one of its prime features. The area is studded with historical landmarks, all of which represent an integral part of the story of the nation's development. Most famous landmark is 200-year-old Gunston Hall, an elaborate Georgian structure built by George Mason. Mason was author of the Virginia Declaration of Rights, later incorporated into the Federal Constitution as the basis for the Bill of Rights. There are at least seven other historic structures on the Neck, several of which belonged to the George Washington family, and others which serve as examples of the American way of life during turbulent revolutionary days.

Since settlement began on Mason Neck, the area has been mainly preserved for its wildlife and recreational values. Over a decade ago the Northern Virginia Regional Planning and Economic Development Commission zoned the Neck for two-acre residential development or open space, park, historic and conservation purposes. It is the only part of Fairfax County still retaining two-acre minimum zoning. This zoning appears on Fairfax County's Master Plan, and on the Northern Virginia Regional Plan for the Year 2000. With presidential support behind the preservation of the Potomac shoreline plus the current push to make the Potomac a model of conservation-minded river-basin planning, proponents of an unspoiled Mason Neck assumed the area was safe from overdevelopment. But shortly after the first bald eagle was sighted there, conservationists were jolted by reports that 1800 acres of prime marshland had been sold to subdividers. At least one eagle nest was located on the land to be developed for high-density uses.

After the initial property sale, conservationists and developers began a concentrated verbal, political, and monetary battle over the fate of Mason Neck. Residential development firms drew up plans for mass, middle-income housing near the banks of the Potomac, and valuable marshland was viewed as a location for several large private sewage treatment plants. A marina for more than 550 small boats was also suggested.

Various Development Schemes

Numerous applications for rezoning of Mason Neck for high density development were filed with Fairfax County. The county Port Committee then submitted plans to create a marine terminal for ocean-going vessels on nearby Belmont Bay, a vast semicircle of dense woodland and natural beaches. The plan is to dredge both the Potomac and Occoquan Creek channels and fill the entire bay with port and heavy industrial facilities. Belmont Bay is a rare clean-water recreational area close to Washington; naturalists estimate that resulting water and air pollution, destruction of the natural scene, erosion and siltation and the damaging effluent from the sewage treatment plants would ruin all water recreation potential and would certainly drive out the eagles, while virtually stripping Mason Neck of its other native wildlife. In addition, the Corps of Engineers has suggested that the plan is "economically unfeasible."

Unprotected by any legally-enforceable ordinances for pollution or siltation control in Fairfax County, and unwilling to lose Mason Neck to overdevelopment, a small but vibrant group of residents banded together early in the past fall to form the Conservation Committee for Mason Neck. From all over Virginia architects, teachers, lawyers, reporters, and naturalists combined their special talents to preserve the Neck. Two attorneys, William R. Durland and E. Charles Majer, were chosen to lead the group; Vice-Chairman Mrs. Elizabeth Hartwell organized an all-important drive to transport county, state, and federal officials to Mason Neck by boat to see for themselves what would be lost if developers were allowed to invade. One of Mrs. Hartwell's interested passengers was Robert M. Paul, Deputy Assistant Secretary of the Interior for Fish and Wildlife and head of a government task force on recreation and beauty. Mr. Paul waded into the Mason Neck marshes, hiked through the woods, and came out exhausted but convinced. Shortly after, at a September meeting of the Interstate Commission on the Potomac River Basin in Winchester, Virginia, Mr. Paul called on Federal task-force leaders to preserve Mason Neck as a wildlife refuge, state park, and parkway. This was one of the stated goals of the Committee.

The suggestion for possible preservation of Mason Neck is, however, only one phase of the battle. Plans made at the Commission meeting must first be reported to Assistant Secretary of the Interior Kenneth Holum, then pass through him to Secretary of the Interior Stewart L. Udall. The President might then hear about the merits of Mason Neck and perhaps ask Congress to appropriate funds for its preservation. During this time sub-dividers will be constantly pressing for rezoning of their areas for high-density and industrial development. To counteract this pressure, the Conservation Committee will be working through the various levels of government to implement their proposals for the Neck. They are presently embarking on a membership campaign and compiling a brochure on the features of Mason Neck. The Committee architects are mapping the area and will use their research as a basis for a plan indicating how the Committee feels the land could best be used; the plan will be presented to the Department of the Interior.

If Mason Neck is finally preserved from overdevelopment and saved for wildlife and land and water recreation purposes, it will serve not only as a natural outdoor sanctuary but as a vibrant and permanent memorial to the force of active citizen participation in the vital field of community greenspace preservation. ■

The information on which this article is based was furnished by Mrs. Elizabeth Hartwell, Vice-Chairman of the Conservation Committee for Mason Neck and a naturalist familiar with that area.

News and Commentary

War on Pollution

The Federal Government has officially launched an all-out war on pollution of the natural environment. To begin with, efforts are now being directed toward cleanup and restoration of the Potomac River, which flows past the Capital City of the nation.

When Theodore Roosevelt was President, the wide Potomac was clean enough for that robust Executive to use for swimming. Today, humans often cannot stroll along its banks without being reminded, by sight or smell, of the misuse heaped on the river since Roosevelt's time. President Johnson has frequently mentioned the plight of the Potomac, and has called it "a river of decaying sewage and rotting algae." Last October, in signing the Water Quality Act into law, the President pledged a cleanup of the river and its reopening for swimming by 1975. "And," he added, "we are going to repeat this effort in lakes and streams and other rivers all across the country."

The President's first step in cleaning up the nation's waterways was to appoint a Federal committee on government beautification efforts, one job of which will be to turn the District of Columbia into the "nation's showcase" of natural beauty. Jewel of the showcase would be the Potomac in the status of a national river, to be beautified and preserved as a "natural beauty and recreation resource for the people of the Great Atlantic Megalopolis that stretches from Boston to Richmond." As a national river, the Potomac's natural environment would be protected by establishment of scenic easements through Federal, State, regional, local and private cooperation. Recreation areas would be set up along the river during and after the period of cleansing.

To prevent misuse of the nation's waterways in general, the new Water Quality Act requires either the States or the Federal Government to set standards of water purity for interstate waterways; the Department of Health, Education and Welfare will enforce its standards. By June 30, 1967, every State must submit its water quality standards, along with a plan for enforcing them. If HEW does not approve the new standards, or if a State fails to submit its plans by the deadline date, the Federal Government may step in and enforce its own rules in the concerned States. In addition, a Water Pollution Control Administration within HEW will authorize Federal grants and Federal-State contracts to improve methods of sewage treatment; an additional $50 millions will be added to annual Federal grants for local treatment plant construction.

Cleaning up the Potomac and the nation's other rivers is only part of the President's many-pronged attack on the nation's esthetic problems. This past fall Secretary of the Interior Udall, with White House approval, designated Pennsylvania Avenue in Washington as a National Historic Site to preserve the national thoroughfare along which the Presidents of the United States have travelled in the ritual following inauguration.

As the Government embarks on major efforts to beautify city, suburb, and countryside, clean up waterways and highways, and halt pollution of the environment, support at all levels of government is needed, as well as that of individual Americans. With such support, we can hope to become "masters of our environment," as the President has put it.

The People's Rivers

"The clear, fresh waters that were our national heritage have become dumping grounds for garbage and filth. They poison our fish, they breed disease, they despoil our landscapes.

No one has a right to use America's rivers and America's waterways that belong to all the people as a sewer. The banks of a river may belong to one man or one industry or one state, but the waters which flow between those banks should belong to all the people.

There is no excuse for a river flowing red with blood from slaughterhouses. There is no excuse for paper mills pouring tons of sulphuric acid into the lakes and the streams of the people of this country. There is no excuse—and we should call a spade a spade—for chemical companies and oil refineries using our major rivers as pipelines for toxic wastes. There is no excuse for communities to use other peoples' rivers as a dump for their raw sewage.

This sort of carelessness and selfishness ought to be stopped; and more, it just must be reversed. And we are going to reverse it."

—Excerpt from the remarks of President Lydon B. Johnson at the signing of the Water Quality Act of 1965, October 2, 1965.

Interior Pesticide Research

Research by Interior Department scientists has revealed that amazingly small amounts of pesticides can kill shrimps, crabs and other aquatic life. One part of DDT in one billion parts of water was found to kill blue crabs in 8 days; one part per billion, the Department says, is the relationship one ounce of chocolate syrup would bear to 10 million gallons of milk.

These and other findings on the dangers of certain chemicals to wildlife are given in the Department's Fish and Wildlife Service 1964 annual report on pesticide research, released during September. Purposes of the continuing study are to determine the kinds and amounts of pesticides that are injurious to fish and wildlife and to assist in discovering ways to achieve pest control with least hazard to fish and wildlife resources. Copies of the report, which is titled *The Effects of Pesticides on Fish and Wildlife*, may be obtained without charge from the Fish and Wildlife Information Office, Interior Department, Washington, D.C. 20240; the publication is Circular 226.

Leonard Hall Honored

The selection of Leonard Hall of Caledonia, Missouri, as winner of that State's 1965 Governor's Conservation Award was announced recently by the Conservation Federation of Missouri. The award places Hall in competition as Missouri's contender for the President's Conservation Award, which will be made in Washington, D.C., during January. Hall, a nationally known conservationist, writer, wildlife photographer and lecturer, is currently chairman of Secretary of the Interior Stewart L. Udall's Advisory Commission for the Ozark National Scenic Riverways; many conservationists feel that the preservation of Missouri's Current and Jacks Fork Rivers as a public scenic riverways was in no small measure due to his untiring personal efforts. Mr. Hall has been a trustee of the National Parks Association for a number of years.

Recreation and Public Lands

At a recent annual meeting of the Society of American Foresters in Detroit, Director Charles H. Stoddard of the Bureau of Land Management pointed out that America's vast Western tracts of arid and desert lands possess a great potential for outdoor recreation despite their

sometimes hostile climates and terrains—that the deserts are "alive with sights and sounds, a new world for the recreationist," populated with plants and animals not well known to most Americans. But the Bureau of Land Management, administrator of some 460 million acres of public lands in the West and Alaska, recognizes that arid lands need to be developed for recreational uses with much care because of their natural fragility, Director Stoddard told the Foresters; care must be exercised in planning trails, roads and camps.

The Bureau of Land Management is currently engaged in an inventory which will identify recreation complexes, areas and sites, the Director said, and it will chart a course for expanded cooperative agreements with other agencies to develop the recreation potential on public lands and waters. Through identification and protection, BLM will seek to preserve scenic, scientific and natural areas throughout the public domain lands under its jurisdiction. The Director told the Foresters that "the interpretation of historic, archeological, geological and ecological values and natural phenomena on public lands is also essential in helping people to understand and appreciate these values. We will use every available method, including roadside exhibits, nature trails, displays, publications and signs, to help make the public more aware of these values."

The Tellico Dam

Many conservationists have felt that the last remaining natural reach of the Little Tennessee River, which flows into

(continued on page 24)

Proposed Apostle Islands National Lakeshore and Plans for Its Development

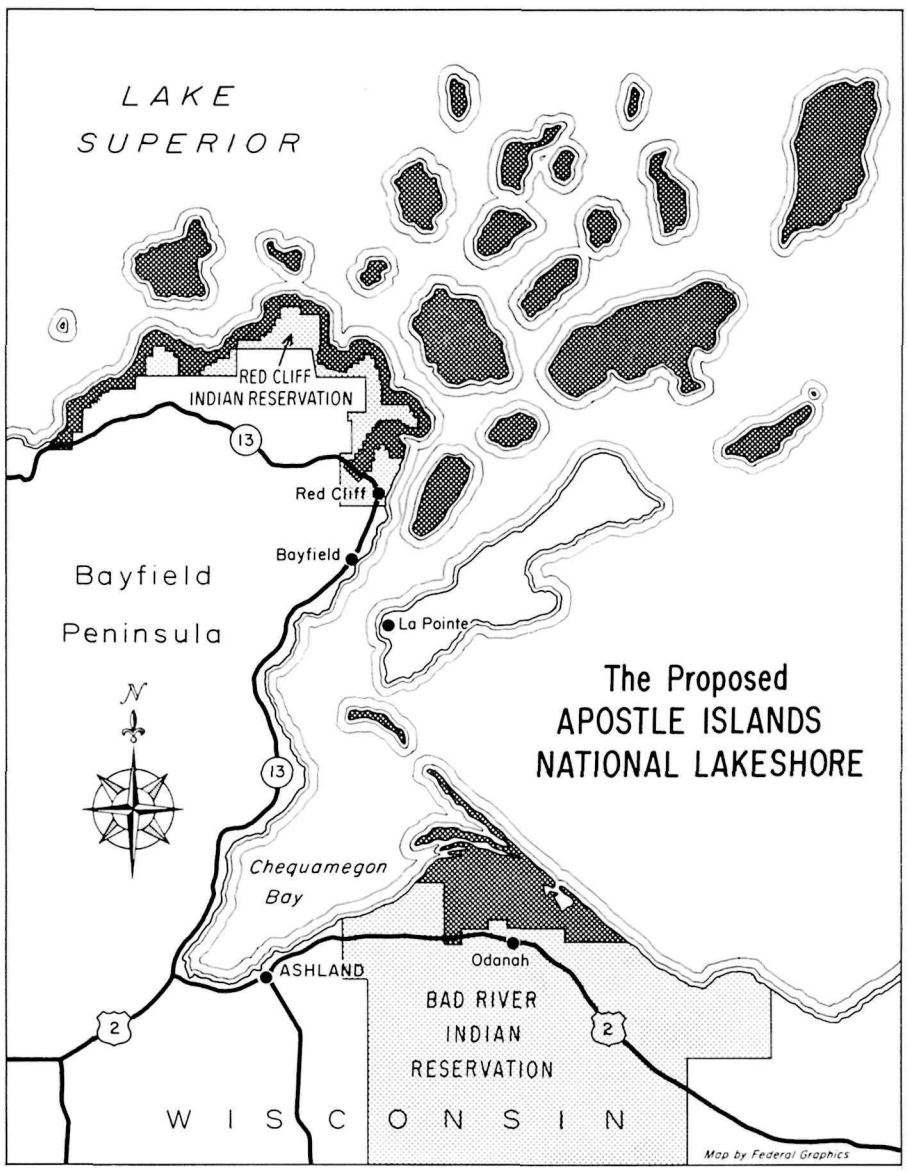
One of last month's newspages carried an item noting the recently published National Park Service proposal for an Apostle Islands National Lakeshore. This month we map the projected 57,511-acre lakeshore, which would be in three units on and adjacent to Wisconsin's Bayfield Peninsula.

For the 21 beautiful Apostle Islands (there are 22, but one is omitted from the plan because of permanent population and existing network of roads) the Park Service foresees management in a natural condition. Access would be by boat or floatplane, with minimum docking facilities at selected spots; there might be simple campsites on some islands. A ranger station might be built on one of the islands, and a lodge on another.

The Red Cliff Unit at the top of the peninsula, most of which lies within Red Cliff Indian lands, is seen as most heavily developed of the three units. It would provide a site for NPS headquarters, with interpretive center, concessioner operated lodge and restaurant, small-boat marina, tent and trailer campgrounds, and picnic facilities. Through it from end to end would run a 30-mile "scenic drive."

The swampy Kakagon-Bad River Unit is ecologically much more delicate than the Red Cliff Unit, and development would apparently be much lighter. There would, NPS foresees, be an access road with information center and ranger station. There might be parking areas, nature trails, interpretive devices and wildlife observation towers at selected sites along the western edge of the unit, which is for the most part "slough" terrain affording habitat for many mammals, mostly small, and a great wealth of bird life. There might be two primitive campsites in this unit, adjacent to the lakeshore and accessible only by boat.

Heavily shaded portions of the map below outline proposed Apostle Islands National Lakeshore in Wisconsin. The lakeshore would be divided into three units: Apostle Islands, in Lake Michigan; Red Cliff, at the tip of Bayfield Peninsula, and Kakagon-Bad River above Odanah on Route 2.



the big Tennessee from the mountain country of the southern Appalachians of North Carolina and north Georgia, might well be incorporated into the proposed national wild rivers system. On the Little Tennessee there are already four dams; but on the downstream end there are still nearly 34 miles of wild river. The Tennessee Valley Authority has proposed a dam near the mouth of the river —the Tellico dam—which would not only eliminate this last natural stretch but would also flood out much farm, forest, and historic and prehistoric Indian land.

Conservationists have not been alone in viewing the last natural run of the Little Tennessee as worth preserving for its recreational, scenic, historic and prehistoric values. The Tennessee State Planning Commission, for example, has noted that "we need to understand that a river can be developed without being harnessed; that it can be economically beneficial to an area and remain a free-flowing stream."

A study of the potential best use of the Little Tennessee as an economic resource, done by the University of Oklahoma Industrial Development Institute for the Southern Industrial Development Council, concluded that "no strong case can be made" for Tellico dam. "There is no question," the survey said, "that a dam might bring various benefits; but the costs are seen to be extremely high, and the loss of the present resource might very well be still more expensive in the final analysis. Once dammed, [this portion of] the Little Tennessee would be permanently lost."

In any event, there will be no immediate start on the Tellico dam; for an item in the general appropriations bill of 1965 to initiate dam construction was deleted.

AAAS Rampart Discussion

Of special interest to our West Coast readers will be the 1965 annual meeting of the American Association for the Advancement of Science on the University of California campus in Berkeley, December 26 to 31. Among other sessions to deal with man's impact on his environment, "Ecological Considerations of the Rampart Dam" will be the topic of a panel discussion in Room 11 of the University's Wheeler Building at 8 p.m., December 27. As our readers know, the Rampart project looks toward a dam near Rampart on Alaska's Yukon River; it would inundate more than 10,000 square miles of the Yukon and Porcupine River valleys. The project has been viewed unfavorably by conservationists generally and by the U. S. Fish and Wildlife Service in particular as immensely destructive of human habitat and wildlife and other natural values.

Upon query to AAAS, the National Parks Association finds that AAAS will generously permit seriously interested persons to attend one such discussion on the general program without registration; reasonably enough, it prefers that registration be made in the regular manner for attendance at more than one session.

Reviews

THE WOODS AND THE SEA. By Dudley Cammett Lunt, with drawings by Henry B. Kane. 1965. Alfred A. Knopf, New York City. 305 pages. Clothbound, $5.95.

A State-o'-Maine man, with the relish of autumnal perspective, climbs into the attic of his memories: his healthy boyhood in the York County western end of the sawtooth coastline, plodding the sands at Scarborough, following the wake of Thoreau across Moosehead Lake or on the Penobscot and Allagash; not pestering nature with questions but passively letting small adventures flow over him. Lunt had a keen pair of eyes, sometimes helped out with binoculars, and like the old Greeks had the high talent to be astonished.

Our author saw an unusual thing one day when he was ambling along a favorite beach. A small gull—Bonaparte's—flying upwind in a leisurely way suddenly dropped to the water surface and rose with a small fish. As he proceeded on his flight a black-capped tern, moving swiftly downwind, miscalculated his leeway and the two birds collided. Their left wings struck, "and for a moment each was thrown off the even tenor of its flight."

Does such a thing happen often among these expert navigators? Few have ever reported it. The point is, perhaps, that only those worthy to see such events would ever do so. Thoreau, yes. Lunt, once. Just as there can be heroes only where there are people worthy of heroes, as Emerson said.

Lunt finds the overhauling of these joyous keepsakes of his wilderness days in his beloved Maine to be worth confiding to others; no lecture, no edged moral, just friendly confidences, and narrated with much charm. Is he right? Well, in the Maine dialect there is an affirmative response, not easy for outoutsiders to imitate exactly. Instead of *yes*, or *yeah*, or some other variant, the coastal reply is *a-yer*. To the above question this reviewer says a-yer. —*F. T.*

ANIMALS ON THE MOVE. By Ann and Myron Sutton. Rand McNally & Company, P.O. Box 7600, Chicago 80, Ill. 128 pages. $3.50.

The mystery of animal migration, which is still not fully understood by man, is explored in this well-illustrated book by a husband and wife team who have the ability to turn scientific fact into interesting reading for children. *Animals on the Move* is aimed at interesting nine-to-twelve-year-olds in the patterns and techniques of migration; it also describes the special physical qualities which enable animals to "depart on their travels when they need to, go in the right direction and find the tiniest spot, though it be thousands of miles away in the middle of the widest ocean."

THE CONSERVATION DOCKET

PUBLIC LAWS enacted by the first session of the 89th Congress of special interest to conservationists authorize a number of new Federal preserves. Assateague Island National Seashore (P.L. 89-195) was created off the Maryland-Virginia coast; other major reserves established were the Nez Perce National Historical Park in Idaho (P. L. 89-19); Idaho's Upper Priest Lake National Recreation Area (P. L. 89-39); Agate Fossil Beds National Monument (P. L. 89-33) in Nebraska; the Alibates Flint Quarries and the Texas Panhandle Pueblo Culture National Monument, both in Texas (P. L. 89-154); the Hubbell Trading Post National Historic Site in Arizona (P. L. 89-148); Pecos National Monument in New Mexico (P. L. 89-54); and the Golden Spike National Monument in Utah (P. L. 89-102.) Close to the end of the session the President signed into law two other Federal reservation bills: the Delaware Water Gap National Recreation Area in Pennsylvania and New Jersey (P. L. 89-158); and West Virginia's Spruce Knob-Seneca Rocks National Recreation Area (P. L. 89-207). An act creating the Whiskeytown-Shasta-Trinity National Recreation Area in California is awaiting signature on the President's desk as of this writing (Nov. 1).

Control of water pollution and the development of new techniques for utilization of water received much attention in the first session of the 89th Congress; in all, eleven water conservation bills were enacted into law. Most important of these, to conservationists, probably are the Water Quality Act of 1965 (P.L. 89-234); the Water Resources Planning Act (P.L. 89-80); and the Saline Water Conversion Research Act, (P.L. 89-119).

Other enactments were P.L. 89-272, to control air pollution from motor vehicles; P.L. 89-232, granting authority to the Fish and Wildlife Service to expand its research into the effects of pesticides on fish and wildlife; and P.L. 89-385, a program for highway beautification.

BILLS STILL PENDING in Congress which must await convening of the second session include several large proposed national preserves. One such bill would establish a Gualalupe Mountains National Park in Texas (S. 295); the bill has been passed by the Senate. Other bills passed by the Senate and referred to the House during the first session were: the Saint Croix National Scenic Riverway in Minnesota and Wisconsin (S. 897); Cape Lookout National Seashore (S. 251); Indiana Dunes National Lakeshore (S. 360); Sleeping Bear Dunes National Lakeshore (S. 936); and Big Horn Canyon National Recreation Area in Wyoming and Montana (S. 491).

Hearings were recently held on proposals to establish the Oregon Dunes National Seashore (S. 250); New York's Hudson Highlands National Scenic Riverway (H.R. 3012); the Pictured Rocks National Lakeshore in Michigan (S. 2057), and the Appalachian Trail (S. 622).

CONSERVATION BILLS introduced late in the first session include a proposal to establish a Redwood National Park in California's Humboldt and Del Norte Counties. H.R. 11705, by Rep. John P. Saylor, is almost identical to H.R. 11722, (Burton); H.R. 11726 (Reuss); and H.R. 11723 (Cohelan). The proposed park would set aside 90,000 acres of coast redwood trees, *Sequoia sempervirens*, for public education and enjoyment.

Rep. Morris K. Udall has introduced H.R. 11695 to establish a Sonoran Desert National Park in Arizona; the bill was referred to the House Committee on Interior and Insular Affairs.

HUMANE TREATMENT of animals used in laboratory experiments is the intent of two bills now awaiting further action after preliminary hearings; the bills are H.R. 5647 (Cleveland) and S. 1071 (Clark). They would prevent cruelty to experimental animals, insure adequate facilities for them, and provide for their quick disposal after fatal experiments.

OTHER BILLS of importance to conservationists are S. 2688 (Nelson) to provide for the regulation of surface and strip mining, now before the Senate Subcommittee on Minerals, Materials and Fuels of the Senate Committee on Interior and Insular Affairs; H.R. 4671 (Udall and many other California and Nevada Congressmen) to authorize construction of the Bridge Canyon and Marble Canyon Dams on the lower Colorado River; and H.R. 11656 (St. Onge) to authorize studies to preserve and develop suitable recreational areas on Long Island Sound and its related shorelines.

The above bills, as well as all others still pending in Congress, may be considered when the second session of the 89th Congress convenes on January 10, 1966.

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Entries appearing in *italics* are titles of general articles. The abbreviation (edit.) indicates an editorial, and (fig.) a photograph or other illustration of subject listed. Month of issue is followed by page number.

Authors of Articles Appearing in the Magazines for 1965

Titles of Books Reviewed in the Magazines for 1965

U. S. Fish & Wildlife Service photograph: David B. Marshall

A white pelican nesting colony in Nevada's Anaho Island National Wildlife Refuge.

WHILE THE PRIMARY CONCERN of the National Parks Association turns around the welfare of the great national parks and monuments, the Association is also deeply interested in the many other facets of the American conservation picture. For example, it reports this month by way of the Magazine on some recent difficulties of the national wildlife refuge system, which has been designed for the protection and perpetuation of native animal life of all kinds, with many collateral benefits to humans.

YOU CAN ASSIST your Association in furthering its general conservation effort in any of a number of ways: by raising your membership classification; by helping to secure new members; by remembering the Association in your will; or by contributing to the Association's general funds over and above your regular dues. All dues over and above basic annual dues, and all contributions, are deductible for Federal income taxation, and gifts and bequests are deductible for Federal gift and estate tax purposes.

National Parks Association

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