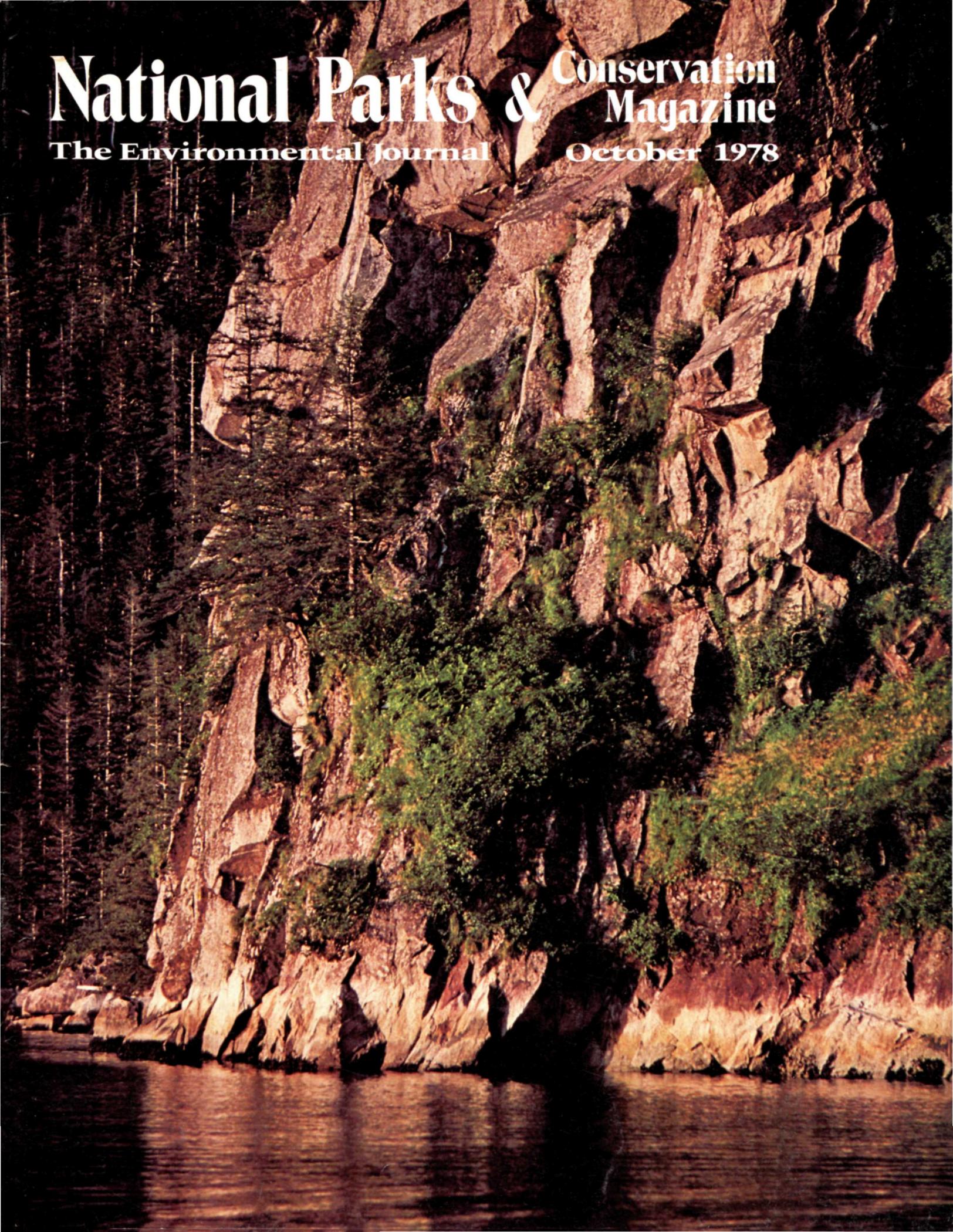


National Parks & Conservation Magazine

The Environmental Journal

October 1978



The Energy Challenge

ONCE AGAIN, all through the summer, the Abomination of Air-pollution stood in the market-places of our cities.

The miasma hung over the entire eastern seaboard, choking the cities, darkening the suburbs, reaching out in a blue veil across the countryside, blocking the long views from the mountain tops.

In the rest of the country it was no different: Chicago, Saint Louis, Denver (once proud of its clean air, clear skies, long vistas), Salt Lake—all of them smothered in smog.

And on the West Coast, the same: people who could afford it began moving out of Los Angeles; the fumes reached out toward Sequoia-Kings Canyon and Yosemite National Parks, and no area-classification schemes could stop them.

As a nation, we waited in panting cars at urban traffic lights, bowled along interstate highways, emitting vast clouds of poison gas. The incidence of emphysema and lung cancer rose. As a nation, we rested supinely, did nothing substantial about it.

ALL THROUGH the summer, as month after month, and year after year before, but increasingly, the supertankers plied the seas, bearing enormous cargoes of black gold to supply the refineries and fuel the automobiles of America.

The oil imports, surpassing metal ores and tropical foodstuffs, though paid for in part by exports of the products of farm and field (and surprisingly little by manufactured commodities), brought ponderous trade deficits, and the value of the dollar fell heavily in foreign trade.

The OPEC countries bought into America lavishly with their profits, buying up banks, corporations, real estate: a supine nation may be conquered by economics without force of arms.

Our enterprising friends, the Japanese, bought into the West Coast in like manner, stripped the Alaskan forests, stood ready to take Alyeska's Alaskan oil surpluses off our hands at suitably low prices.

IN TANDEM with our overseas extravagance, inflation rose again into the double-digits; domestic investment, the Gross National Product, and employment all faltered.

Our diplomatic efforts abroad on a dozen fronts were impaired by a widening conviction in the capitals of the world that America was losing its grip on its business affairs.

Our strategic situation in the mid-East hung perilously on the goodwill of the major OPEC nations. We were in no position to resist a tightening of the screws on oil prices, nor on the defense of Israel.

Our military security was more and more gravely imperiled. Tanks, planes, warships still run mainly on gasoline and oil. Otherwise always jealous for national security, we turned our faces away from this gravest of dangers.

Our self-styled oil experts debated whether the crisis would come in the mid-eighties or the mid-nineties, and whether it would be a crisis of price or supply. Apparently, if the risk were not clear and present, we thought we might drift along for a while.

WE PLUNGED toward coal as a substitute fuel, prepared to rip up the earth and to send men back into perilous underground work. We played with notions of transcontinental slurry lines, enormously costly, wasteful of water. We tinkered with plans to stimulate the domestic production of more oil and gas at mounting prices, a temporary expedient.

We pushed ahead with nuclear ventures. We had not found, have not found, and predictably will not find, a solution for the disposal of long-lived radioactive wastes. Lake bottoms at places have been lined with plutonium, poisoned for hundreds of thousands of years. Deadly leakage has developed from the Hanford tanks and elsewhere. Huge trucks bearing the label "radioactive" cruise our highways, disaster eventually inevitable.

The contradiction between nuclear development at home and nuclear restraints abroad confuses foreign policy. Rightly, the President for a time opposed the breeder reactor. Reporters have welcomed advances toward fusion; but as contrasted with fission, fusion would be only relatively free from the disposal problem; the vast eruptions of heat it would produce might alter weather patterns drastically with unpredictable results. We tend toward euphoria, toward hubris, when we contemplate technology.

The limiting factor in nuclear power may well be

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FRONT COVER: Fjord wall, Kenai, by Boyd Norton

BACK COVER: Bunchberry, Kenai, by Boyd Norton

The proposed Kenai Fjords National Park in Alaska would provide dramatic vistas of sheer cliffs and towering mountain peaks alternately revealed and concealed by sun and mist. Here lacy waterfalls link glaciers to the sea; and, in places where spruce and hemlock have gained a foothold on the lower slopes, plants like the bunchberry flourish in the moist forest. (See page 4.)

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Three Hole Arch in Aialik Bay, a landmark of the Kenai coast

M. WOODBRIDGE WILLIAMS, NPS



Kenai's rugged cliffs and mist-shrouded fjords combine in a panorama of unparalleled wilderness and beauty.

M. WOODBRIDGE WILLIAMS, NPS

Kenai Fjords: DYNAMIC FRONTIER

The fjords and glaciers of proposed Kenai Fjords National Park in Alaska bear dramatic witness to the powerful forces still shaping the earth's crust

by DONALD S. FOLLOWS

ROCKING GENTLY to the rhythm of the flooding tide, our sloop lies idle near the dark bastion in Aialik Bay, Alaska, known as Three Hole Point. Water churns at the base of the sea arches that give this place its name. High above us a bald eagle lifts silently from its perch on a spruce snag. The narrow windows of Three Hole Arch frame vistas of the Kenai Mountains, rising sheer from the sea and bearing on their shoulders the vast Harding Ice Field.

Reflections of forested slopes and rock monoliths shimmer across

the water in the warm light of the waning sun. Against the shadows of approaching evening, a pulsating flight of black-legged kittiwakes heads south toward island sanctuaries. The shrill cry of a black oystercatcher pacing the rocks nearby rises above the sound of the tide. The cool air smells fresh and sweet.

Spilling from the edges of glaciers thousands of feet up the mountainsides, snow waters splash and tumble in milky cascades down rocky slopes to the sea, forming lacy patterns on the slate-gray cliff walls.

WE FIND IT almost impossible to believe that this tranquil scene was created by some of nature's most violent forces, forces that could erupt again at any time. For the Kenai Peninsula's southern coast and offshore islands lie within the famous "Ring of Fire."

The "Ring of Fire" is a seismic belt that encircles the Pacific Ocean, defining the margins of the Pacific Plate. As the earth's great plates slide under one another, they generate tremendous heat and pressure—tremendous enough to produce volcanoes, earthquakes,

and tidal waves; to inject molten rock into solid rock; and to reshape coastlines. Geologists believe that in the Gulf of Alaska the Pacific Plate is slowly grinding beneath Alaska's continental margin.

The North Pacific rim of the "Ring of Fire" has remained throughout much of geologic time a land of mountain building, and it has attracted the major sequence of glaciation in Alaska. This part of Alaska is still covered with ice and snow. The lofty mountains thrust warm, moist air from the Gulf of Alaska into elevations high enough to condense water vapor

into snowfall. On the upper reaches of the Harding Ice Field this snowfall may reach more than four hundred inches a year—far more than can melt away in that short time.

Heaped on the crest of the southern Kenai Range, the snows of the thousand-square-mile Harding Ice Field system compact into glaciers that ooze into more than thirty valleys radiating from a central blanket of perpetual ice. Far below the vast white wilderness of the ice field, fjords—deep, flooded valleys carved by long-since-melted glaciers—extend seaward;

the troughs even stretch underwater for miles into the Gulf of Alaska.

THE DEEP-WATER coast of the Kenai Fjords has been shaped by at least two dynamic processes—glacial advance and geologic subsidence. From Port Dick to Resurrection Bay, the southeastern coast of the Kenai Peninsula continues to slide into the ocean, sometimes—as during the earthquake of 1964—as much as seven feet in a few moments.

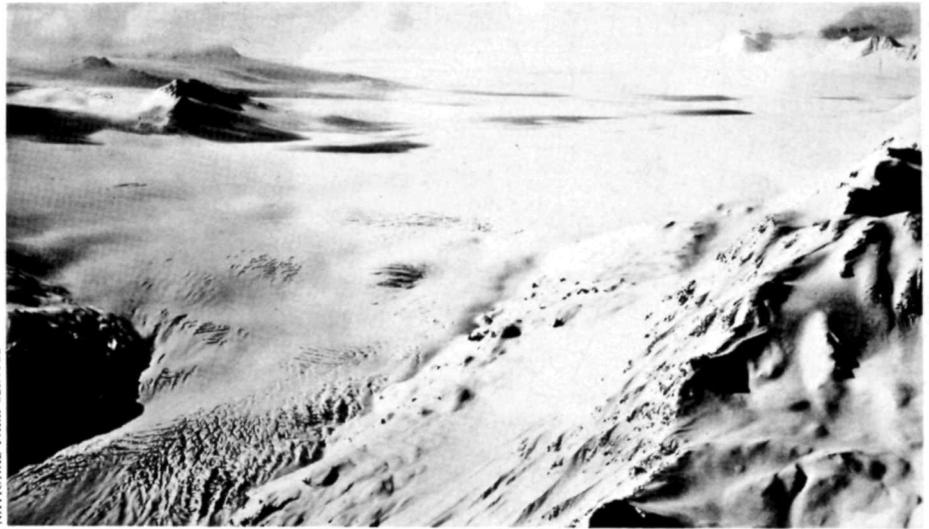
Standing in the snows of the Harding Ice Field nearly a mile

above the sea, one can see that the peaks and ridges of the mountains do seem to be sinking. The ridges thin toward their seaward ends to form narrow peninsulas. After dipping beneath the water, they reappear as sea stacks and lone sentinel rocks far out to sea. Numerous scalloped bays in the islands and peninsulas are actually glacial cirques carved by ancient glaciers high on the mountainsides. The fact that the floors of some cirques are now three hundred feet underwater is evidence that the coastline is subsiding.

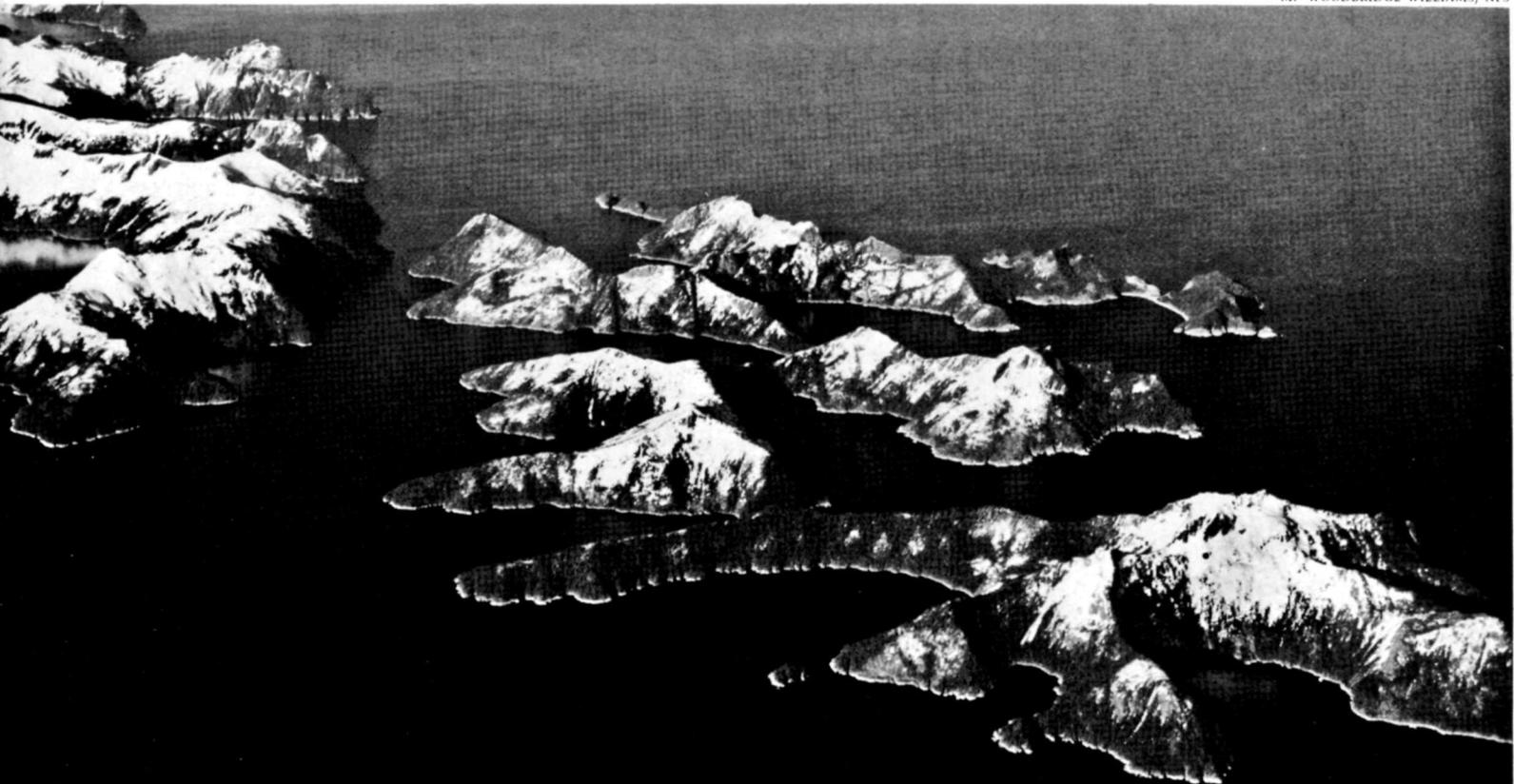
Within the fjords, a magnificent

On the more than one-thousand-square-mile expanse of the Harding Ice Field, which crowns the Kenai Mountains, only the highest mountaintops stand out above the deep snow as isolated peaks, or nunataks. As the southern coast of the Kenai Peninsula has slowly slipped into the sea, other mountain peaks and ridges have become offshore islands, their glacial cirques now scalloped bays (below).

NATIONAL PARK SERVICE



M. WOODBRIDGE WILLIAMS, NPS



vista rises from sea level thousands of feet straight up to snow-clad peaks. Rock fins, sea arches, caves, and cliffs are here constantly re-shaped by the explosive energy of incoming tides.

The rugged vertical stretch between ice field and sea is softened in places by a narrow band of green where spruce and hemlock rise to four hundred feet above sea level. Ferns, red-berried elder, wild cucumber, and false hellebore flourish under the trees in the warm, moist, rising air currents that will condense into snow above. Here forest predators roam—black bear, wolverine, pine marten, and fox.

Shaggy mountain goats climb the barren slopes above treeline. From offshore come the shrill cries of circling seabirds. Below them, seals, sea lions, and sea otters bask and plunge in the fertile sea.

AMONG THE FIRST adventurers into Alaska's wild and unknown coastal waters were Russian and Aleut fur hunters making systematic sweeps down the coast in search of sea otters. Neither native occupants nor

hardships could deflect the hunters from their course past the Aleutian Islands and around to the Gulf of Alaska. By the end of the eighteenth century, therefore, the sea otter already seemed doomed. In 1835, in a letter to the Russian-American Company, Alexander Baranov—who, as manager of the trading monopoly, was the first governor of Alaska—wrote: "Close to Kodiak Island and in the Kenai Inlet [Cook Inlet] the sea otter is completely extinct, and I had to sail with all our forces to Chugach Bay where there are enough of these animals." Fortunately, Baranov did not find all the sea otters; several hundred still occupy Kenai's southern coast.

As early as 1795 Baranov had established a small shipyard in Resurrection Bay, the largest of the fjords at Kenai. There, at an unknown site, the first ship was built in northwest America. Christened the *Phoenix*, the ship was soon loaded and on its way to Russia with furs.

It was not until a century later that the members of the 1899 Harriman Expedition, traveling mostly by steamship, recorded the scenic

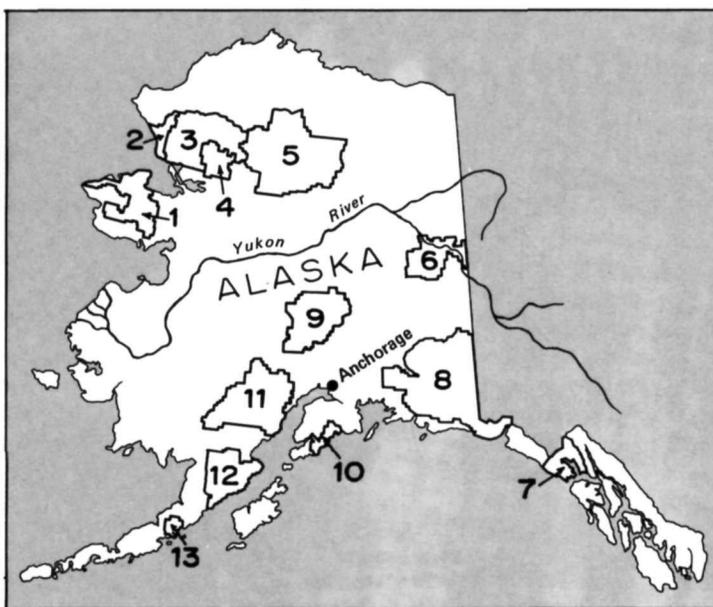
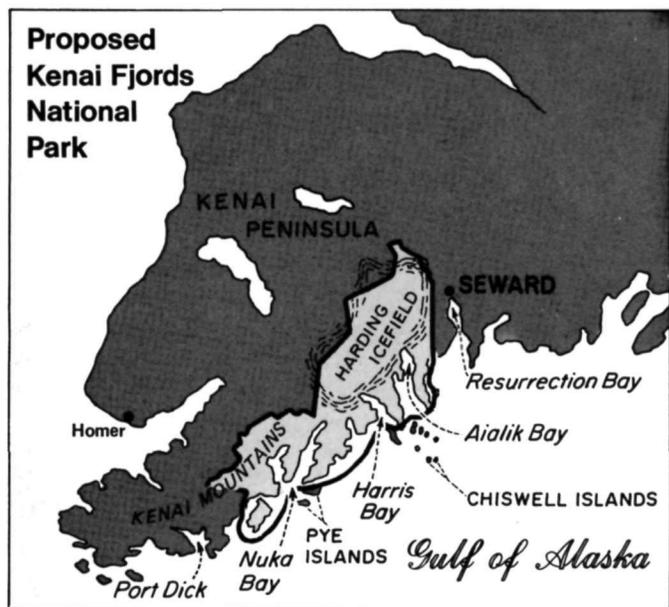
attractions of Alaska's thousands of miles of coastline. Indeed, the expedition's geographer, Henry Gannett, has since become one of the most quoted proponents of Alaskan coastal scenery. In 1901 he predicted that on the basis of its coastline alone Alaska's future wealth would be found in tourism:

The Alaska coast is to become the show-place of the earth, and pilgrims, not only from the United States, but from far beyond the seas, will throng in endless processions to see it. Its grandeur is more valuable than the gold or the fish or the timber, for it will never be exhausted.

But the next visitors to the Kenai Coast were not seeking its wealth of scenery. They were looking for gold. Because the northern Kenai Peninsula had its own minor gold rush around the same time as that in the Klondike, geologists set out to systematically explore the Kenai Mountains for minerals. In 1909 two government geologists—U. S. Grant and D. F. Higgins—made their way in a small boat along the southern shoreline of the Kenai Peninsula, stopping to investigate prospects and to map the geological formations along the way. Although they found few mineral

NATIONAL PARK SYSTEM PROPOSALS IN ALASKA

- | | | |
|---|---|---------------------------------|
| 1. Bering Land Bridge National Preserve | 6. Yukon-Charley Rivers National Preserve | 10. Kenai Fjords National Park |
| 2. Cape Krusenstern National Monument | 7. Glacier Bay National Park | 11. Lake Clark National Park |
| 3. Noatak National Preserve | 8. Wrangell-St. Elias National Park | 12. Katmai National Park |
| 4. Kobuk Valley National Park | 9. Mount McKinley National Park | 13. Aniakchak National Monument |
| 5. Gates of the Arctic National Park | | |



MAPS BY JAMES F. O'BRIEN

prospects, their mapping project contributed to the knowledge of the fjords.

The team also mapped and photographed the fronts of the major glaciers so that fluctuations could be studied. Although no one returned to study the glaciers at the time, their positions did appear on the 1915 topographical map that was one product of this expedition.

In its introduction, the Grant-Higgins report of 1913 gave the first published account of Kenai's geology and scenery and expressed the hope that it might attract "attention to some of the most magnificent American scenery that is now accessible to the tourist and nature lover."

Despite this hope and the fact that Kenai lies only a few hours from the populous city of Anchorage, the wild and uninhabited fjords region is still virtually un-

known territory. This oversight will likely change somewhat, however, because a portion of this spectacular sweep of sea, cliff, mountain, and snow has been proposed for preservation as Kenai Fjords National Park.

A THIN MIST curls down from the snowy slopes high on the mountain. The blue-white border of the ice field is in shadow now, and the cold-air drainage from the ice field reminds us that evening is upon us. We head our sloop to a cuplike cove to shelter from the incoming swells.

The day before, we had sailed past the Chiswell Islands to observe seabirds and marine mammals. Birds and mammals seek out these small islands because the fracturing nature of their granite produces ledges ideally suited to wildlife. This coastline also marks

a zone of ocean upwelling that brings nutrients to the surface. It is little wonder, therefore, that these islands are preferred sites for nesting seabirds and for sea lion rookeries.

As we rounded a point, we heard the deep-throated warnings of Stellar sea lion bulls. A small vanguard of younger lions slipped into the water and formed a thin line between our boat and the basking harems. More curious than alarmed, the furry fleet patrolled slowly in front of smooth shelves where numerous sea lions basked.

The large bulls shifted weight on their undersized flippers and nipped playfully at nearby members of the harem. Others lay out flat to take full advantage of the sunlight. Rough battle scars showed on their light brown coats. One old bull had a large patch of hide completely missing from the

middle of his back. Perhaps he had barely escaped the jagged teeth of his prime enemy, the killer whale.

A small pup at the water's edge was trying to test the wave swashes without getting too wet. A large wave overran its normal boundary and sent the pup washing up the sloping rock face. He had enough of that for his liking and headed back to his mother.

After spring blooms of plankton fill the ocean currents, seabirds congregate around the sea stacks and islands of the Chiswell group. From late May until mid-July, birds that spend the remainder of the year at sea return to these isles by the tens of thousands to breed and rear their young.

Deeper in the fjords, life is less full and dramatic, although harbor seals prefer the more sheltered fjord inlets and the ice floes near the glacial fronts. Concentrations

of seals occur near Aialik Bay and Northwestern and McCarty glaciers. At Aialik Glacier several hundred seals often can be seen sunning themselves on icy-blue floes. They drift back and forth with the daily changing of the tides.

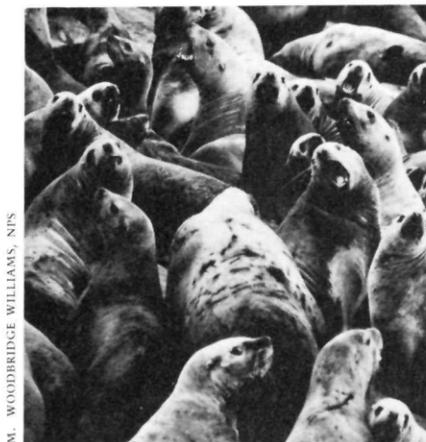
BEFORE GOING BELOW for the night, I wove to the harbor seal that has been watching our anchored silhouette. The seal lifts slightly with head tilted back, then drops straight down beneath the sea. He does not make a single ripple as he disappears. In the morning he will be there again with the marbled murrelets, pigeon guillemots, and one immature gull that have adopted our ship.

Perhaps someday the headlands and trackless rock piles we had sailed among during our voyage also will drop below the lowest

tides to join the underwater world about which we could only wonder. Beneath the Kenai seas the rocks would assume a new dimension. Boulders that once knew black bears would then harbor starfish and limpets.

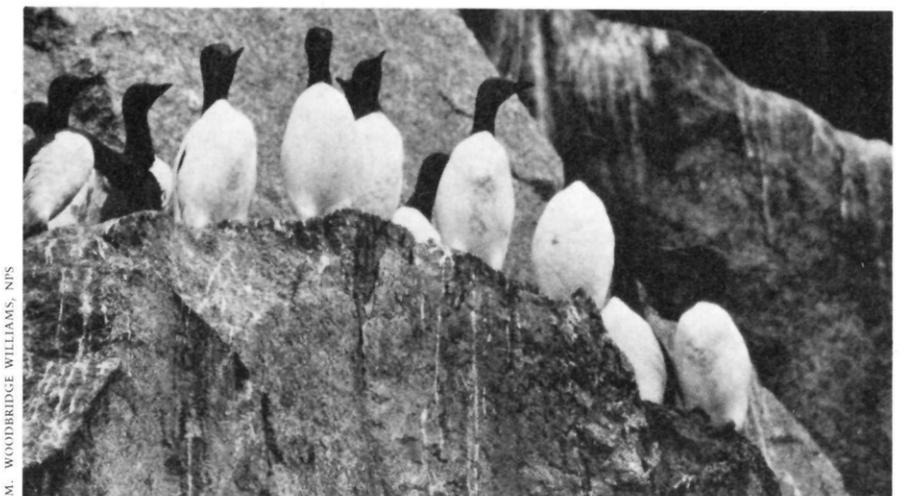
For Kenai is a world in flux. Geologic forces are still shaping its fjord coastline. The proposed Kenai Fjords National Park, therefore, not only would preserve scenery of timeless natural grandeur, but also would display a portion of the living earth in the continuing process of growth and change. ■

Having completed twenty-five seasons of various visitor services within eleven units of the National Park System, Don Follows is collecting research data as the planner-geologist for the proposed Kenai Fjords National Park, and is the interpretive planner for all proposed national park lands in Alaska.



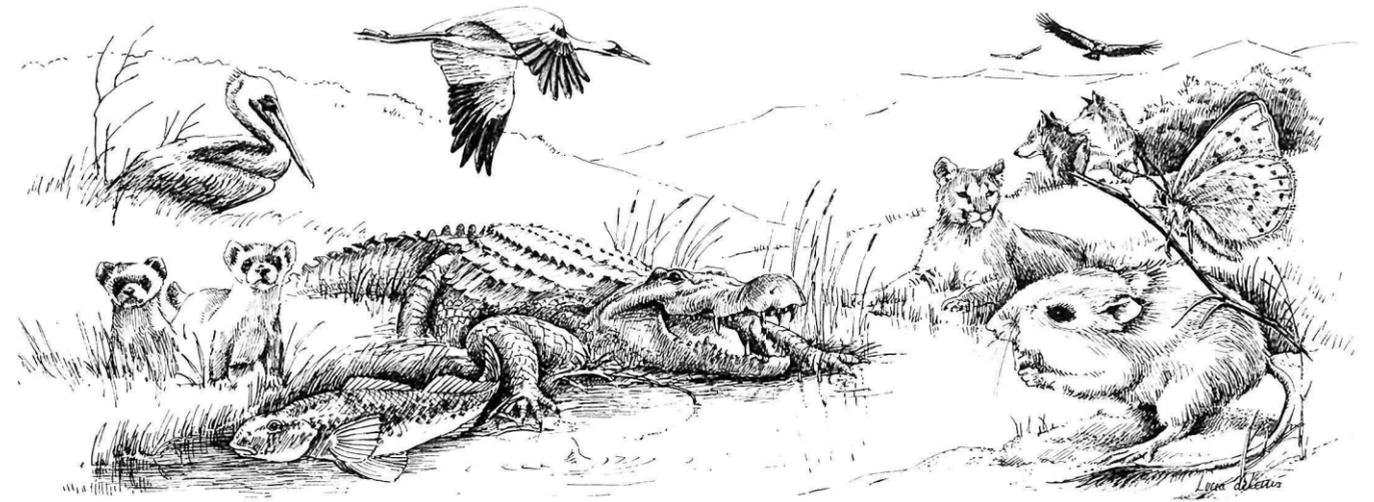
M. WOODBRIDGE WILLIAMS, NPS

In offshore rookeries old sea lion bulls, the battle scars of many seasons on their backs, keep watch over basking harems. Unusually rich in fish and plankton, Kenai's waters provide abundant food for birds and sea mammals; and each spring common murrets and hundreds of thousands of other sea birds return to the islands' rocky ledges to nest and rear their young.



M. WOODBRIDGE WILLIAMS, NPS

Reasons for saving endangered species range from the utilitarian and economic to the philosophical and esthetic



WHAT GOOD ARE ENDANGERED

On Esthetics and Honor

by HENRY MITCHELL

A CIVILIZED MAN never knows when he may be called on to defend the citadel, so to speak, against the next charge of the barbarians with their odd cries and stone hatchets.

So it is not one day too soon for us to contemplate Miss Furbish's lousewort and what it means to this nation and how we must order ourselves in the struggle.

Miss Furbish's lousewort, as everyone will soon become aware, is a rare plant facing extinction along the banks of the St. John River in Maine. There seem to be perhaps 800 individual plants in the world, and most of them would be lost if nothing were done to protect them from the projected ruin of their natural home.

Two dams are proposed there that would obliterate Miss Furbish's lousewort's habitat.

The law of this republic forbids the use of government money for any project that would grievously damage a plant so rare as this lousewort.

But there is good news today. The Army Corps of Engineers (the dam or the goddam people, depending on your point of view)

themselves discovered the existence of this rarity in their path. They themselves called attention to it, and asked the Fish and Wildlife Service (guardian of threatened louseworts) how to proceed.

This is one of the most complex situations that has come before the government in administering its laws on endangered life. Through a miracle, you might almost say, it seems probable that the Engineers will be able to save the lousewort, through propagation and transplanting to another site, short of a constitutional crisis.

Mind you, it is one thing to talk about "another site" and quite something else to find a site and establish a rare plant there so that it continues to breed.

It is enormously important, though, that the Engineers faced the problem straight, without subterfuge and lies, and the guardians of endangered life are little less than thrilled at this example of cooperation in fulfilling the law.

As things stand now, the Engineers commit themselves to finding the means to preserve the lousewort in another location. The enforcers of the law will study the solution that the Engineers find, and if all goes well, as it is expected to, there will be no objection to the dams on behalf of the lousewort.

So far, so good.

Unfortunately, the know-nothings and rooty-toot lunkheads of the continent—a species in no danger of extinction—have seized on the delightful name of the plant to make sport of the law.

We may hear much from them in the months ahead.

They are sure to point out this plant is not very handsome and has no known economic, medicinal or especially esthetic use. It could vanish completely and we would not be the poorer.

Just yesterday I noticed one of those he-man type articles on the editorial page of *The Wall Street Journal* saying, in effect, we have lost our minds in American law.

Snail darters, Miss Furbish's lousewort, anopheles mosquitoes and diamondback rattlers (it goes on) could vanish utterly and the "average voter" would say good riddance.

It is possible that the average voter would in fact say good riddance, if he relied only on a press that said the whole business of endangered species is a bucket of nonsense.

But the average voter is also the average American, and is quite capable of giving attention to something he formerly paid no attention to, and is quite capable of changing his mind on Vietnam,

Continued on page 12

SPECIES ANYWAY?

On Taxes and Lettuce

by DAVID EHRENFELD

WHAT GOOD are the snail darter, the little fish that stopped the big dam, and the furbish lousewort, the snapdragon relative that is slowing down Maine's Dickey-Lincoln power project?

You can't eat them, smoke them, or wear them, and it is farfetched to hope that they will ever help cure cancer, heart disease or stroke.

Much as I have traveled, I can find only two things that darters and louseworts are good for: First, they provide amusement for God, which is why they exist, and second, they help to hold down taxes and the price of lettuce. The first reason is the more important one, but of course it is the second that really captures our attention.

We can appreciate the material value of snail darters only if we understand what has happened to pork barrel in the past few decades. For pork barrel, like so many other good things, has failed to change with the times. We are still relying on large-scale construction projects to return money and jobs to the home districts of influential members of Congress, despite the fact that there are hardly any big proj-

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ects left whose benefits come even close to meeting the costs.

A prime example is the interstate highway system. Interstates have helped to ruin the nation's major form of cheap transportation, the railroads. The staggering cost of patching up the decaying pavements is now falling on the states, just at the time when their tax-levying powers are being limited by the public. There is the incalculable price of air pollution. And our growing dependence on the long-haul trucking of fruits and vegetables from a few pork-barrel-irrigated areas in the South and West has all but wrecked our local farm-to-market systems, with their inexpensive, fresh produce.

Dams, canals and other water projects are as bad. There just isn't much water left in the United States that is worth fooling with. An Alabama Department of Conservation report on five stream-channelization projects showed that in four of them the Federal Government could have purchased the entire flood plain at less than the construction costs, or could have invested these monies at 5 percent interest to more than repay the annual flood damage.

Tellico Dam, in Tennessee, of snail darter fame, has never offered any known benefits of significance other than temporary construction

jobs, but if its flood gates are ever closed it will inundate the dark, rich, deep soils of 15,000 acres of some of the best virgin agricultural land left on earth. Fifteen thousand acres can grow a lot of lettuce.

What we desperately need is the political imagination to redesign the pork barrel to suit modern needs. Even in New York, which ought to be able to do better, all we can come up with is an alb-tross like the Westway (and not even an endangered species of cockroach to stop it). Why not pork barrel for low-red-tape grants and loans for small business and small farms? Pork barrel to provide maintenance, repair, and even dismantling funds for the boondoggles of the past? Pork barrel to replant our much-needed tree belts in the drought-prone states, long-neglected in the interests of agribusiness "efficiency"? Pork barrel to give some real money to the arts? Pork barrel to move people out of flood plains, and pork barrel to preserve historic sites? Pork barrel for local family-health clinics?

Isn't it time we learned to subsidize projects that don't drain away the country's lifeblood?

In the meantime, we are protected from some of our folly, for a little while longer, by the snail

Continued on page 12

Mitchell—Continued

Watergate, snail darters and louseworts.

This may be the place to mourn that four-letter Anglo-Saxon words are now so unfamiliar that "wort" is commonly mispronounced. It is like all those other words spelled with an "o" and pronounced with an "u." (Work, word, worth, whorl, worm, world and so on.) It has been in the language for only 1,100 years—too new for us to have the hang of it.

A wort is a plant.

There are many sorts of louseworts (the name, by the way, was given by shepherds who noticed that fields where this plant grew were the same fields in which their sheep had lice. It is likely that all their pastures had louseworts, or else that all their sheep had lice, no matter what the pasture; but shepherds are always looking about for something to blame their vermin on).

Many louseworts are common. You could build a dam and never give them a thought. It is just Miss Furbish's lousewort (*Pedicurlaris furbishiae*) that is endangered.

Why, one might ask, should there be any effort to preserve a plant with no known use beyond the production of infant louseworts?

There are several answers:

1. Our own vast ignorance of this lousewort is no guarantee that it has no "value." The rubber tree only recently came into practical economic use. The penicillin mold was not much esteemed on cantaloupes and its remarkable properties were long unknown.

2. Apart from important human uses that might be disclosed in the future, a plant of no known use to us might be of considerable use to some other creature. If there are only 800 of these louseworts, it is hardly going to turn out that the snail darter, say, desperately requires them for food. But the principle is sound, that life does not exist in a vacuum (except in the immediate vicinity of some typewriters) and what affects the plankton eventually affects the osprey.

3. Even if the plant is of no use to man or beast, there is the esthetic question of the richness and variety of the natural world. Who would want a world without tigers and rattlesnakes, lambs and leopards, Wall Street Journals and Hustlers?

As individuals we may find it possible to live out our lives in such biological and horticultural and faunal slums as downtown Manhattan, but even there the normal heart rejoices to think of wolves and quetzals flourishing in the great world, if not in the restricted prison in which some men are content to live their poor lives.

4. There is the matter of genes. They can combine and segregate in astounding ways. What the lousewort's genes may be worth, a million years from now, we have no way of knowing, but we do at least have the sense to know that once lost there is no way to recreate this stuff of life. If it is argued that men will no longer walk the earth then, that is beside the point.

5. Finally, there is the matter of human honor. Whether it is honorable to bang through the world oblivious to every thing and every creature that does not seem immediately useful for our advancement in our own poor notions (notions all too likely to change as we increase in wisdom) of what "advancement" is.

Or whether it is honorable to brood over the treasure of life and sustain and promote it, to shelter and celebrate it.

Give any man the choice and he will choose, despite his moments of insanity and natural aptitude for going bananas now and again—he will prefer the side of grandeur and richness to the narrow rigid keyholes of locked compartments.

Whether life is a rat race or a garland is a matter of some consequence.

What we conclude, on such questions, affects not merely the lousewort, but the respect with which we hold ourselves and the way we go about doing everything we do.

Nobody is likely to argue that all

Ehrenfeld—Continued

darter and the furbish lousewort. But Congress will soon put an end to that. It will gut the Endangered Species Act in the name of unholy progress, and will set up a panel of wise persons to decide which species shall live and which shall die, something that even Noah was not empowered to do—"and every beast after its kind . . . and every creeping thing . . . went in unto Noah into the ark . . ."

So much for God, snail darters, and the price of lettuce. ■

life must be preserved at all costs at all times.

There may even be occasions for fights of one kind or another that do damage of one kind or another.

With the lousewort, we will hear the argument that we have a choice between a few worthless plants and two vitally important electric generating plants. But as it happens in truth, it appears we can have both the lousewort and the electricity, provided we think ahead and do not just sit on our butts making wisecracks about forms of life we know nothing of.

Sooner or later, needless to say, there will be conflicts far harder than the one presented by Miss F's 1.

How we acquit ourselves then depends on how we have trained ourselves. Wars are won, they say, on playing fields at schools.

Whether we come out on the side of life or the side of electric can openers—a choice that goes to the center of what our own lives are worth—defines a great deal in the way we get on with others and the way we get on with ourselves inside our own hearts.

Some say barbarians will win, and it is worth noticing they have already put rattlesnakes on the worthless list, and no doubt tigers, bears, dogs will soon follow.

There have always been savages at the gate. The question is not so much how savages behave as how we do.

The center is going to hold. One more round. ■



Ski Touring Acadia by RUSSELL D. BUTCHER

Acadia National Park offers a completely new perspective to the winter visitor

MAINE'S first big snow storm last December was a real blizzard. By the morning of its second day, a foot of powdery snow decked out the wild forests and gently rounded mountains of Acadia National Park. This was to be my day to discover the exhilaration of cross-country skiing!

I planned to explore the network of carriage roads that begins near the outlet of Jordan Pond and rambles through the park on the east side of Mount Desert Island. The storm had heavily weighted down the symmetrical spruces and firs—neatly framing the roadway. The only sounds were the faintest whisper of the fast-falling flakes, the occasional stirring of a breeze

in the treetops, and a soft crunching as my skis and poles pushed into the snow.

Granted, on this first day I took a few spills—especially on the downhill turns—until I found my balance and rhythm. But for three incomparable hours, the carriage road tempted me on, as it climbed along hillsides, dipped into hidden valleys, and crossed snow-muffled, ice-fringed streams. That day, I discovered an Acadia I had never imagined in all my years of summertime hiking.

Happily for me, the best skiing conditions in recent years occurred in February 1978. For weeks after a big storm on the 7th, the park became a skier's dream. Day after

day of bright sunshine and crisp invigorating air tempted me onto the skis—frequently accompanied by my wife Pam and daughter Wendy. Sometimes we even went exploring more than once a day. We could easily understand why many skiers have boasted that Acadia's carriage roads are America's finest ski touring trails.

WE ENJOYED a few memorable days when no hint of a breeze stirred the air, no sound broke the immense stillness, and not another soul passed us along the way. On other days, the wind swept out of the arctic and funneled savagely through the valleys. Then the forests seemed to come alive,



Cross-country skiers in Acadia National Park (above) approach the north end of Jordan Pond on one of the many carriage roads that lace the park. The panorama (right) from beneath the cliffs of Penobscot Mountain takes in the North Bubble (left) and the South Bubble (right) at Jordan Pond.



swaying like a mighty force leaping up out of the ground. The roar of the wind, as it slammed along the cliffs, sounded like a high-speed freight train, and we wondered how any tree or shrub could remain rooted on those exposed summits.

One frosty morning I watched the sun rise out of a misty sea and flood the mountains with a soft pink light that magically evolved to pure white. In late afternoon we saw the last rich glow of sunlight slant across the white surface of Eagle Lake. Cold black shadows slowly reached across the expanse and then inched up the forested west slope of Cadillac Mountain, climaxing in a final blaze of rosy-pink atop the 1,530-foot summit.

Rarely did we see any wildlife on these ski outings, but an abundance of tracks gave proof that many creatures had been foraging under the cover of darkness. Whitetail deer and showshoe hare

were the most common—their familiar tracks criss-crossing the roads with intriguing patterns. One set of tiny tracks must have been made by a young hare—perhaps one born late the previous summer. We often found the snow all trampled down beneath clumps of cedar trees where deer had browsed the lower foliage. And occasionally we came across the tracks of a red fox, raccoon, skunk, red squirrel, mouse, or ruffed grouse.

IN ADDITION to this panoply of sights and sounds, Acadia offers the skier an exciting choice of trails; one popular run meanders up from the gap between Brown and Parkman mountains, and winds through the sheltered little valley above Upper Hadlock Pond. Here, in winter, the park's highest waterfall is a sculptured mass of icicles. Intimate ravines, overshadowed by ancient hemlock

trees, are filled with great drifts of snow. Views occasionally open southward toward the island-dotted Atlantic Ocean.

For a vigorous all-day trek, many skiers begin at the north end of Eagle Lake, swing around by Aunt Betty Pond, and hook into the spectacular 12-mile Around Mountain Loop that encircles Sargent, Parkman, Cedar Swamp, and Penobscot mountains.

One of our favorite short runs leads north beneath the imposing, ice-encrusted granite cliffs of Penobscot. The unobstructed panorama from there takes in the snowy summits of the North and South Bubbles and the larger mass of Pemetic Mountain that hem in the broad, ice-covered expanse of Jordan Pond. We usually met other skiers here, as they, too, paused to admire the winter grandeur. Meetings such as these invariably evoked happy chatter about the

feller donated to Acadia National Park. His great generosity actually accounts for nearly one-third of the park area today and his peaceful woodland roads provide a wealth of easy hiking routes in summer and fall. Certain stretches, such as those around Eagle Lake and Witch Hole Pond, are specifically maintained for bicycling, while others offer excellent horseback riding.

Unfortunately, not all the forty-six miles of carriage roads within the park are open in winter exclusively to cross-country skiing and other quiet sports. While slightly more than thirty miles are currently reserved for skiers, the remaining fifteen miles are open to snowmobilers. If you add these miles to the twenty-five miles of paved Park Loop Road and the Cadillac Mountain spur, and include the entire network of gravel roads to the north and south of Western Mountain on the park's west side, it becomes obvious that the snowmobilers have access to a lion's share of this small national park.

Many of Mount Desert Island's residents and winter visitors are bitterly opposed to the use of these noisy machines anywhere in the park. And with good reason, for nothing is more shattering to the winter peace than the sudden intrusion of a flock of these growling, exhaust-belching monsters—as happened to us on an otherwise magnificent winter day along Ocean Drive's scenic cliffs. Even the distant roar of a single snowmobile, echoing across a valley, can impoverish the quality of park experience for everyone else—for all those who seek quiet refreshment and inspiration in the park. And without doubt, the deer, foxes, and other wildlife must be frightened into the remote enclaves of the mountains by the noise.

However, we can at least be grateful that, in our machine-dominated twentieth century, some of the most scenic stretches of carriage roads in the park—as well as some on adjacent private land—are closed to snowmobiles.

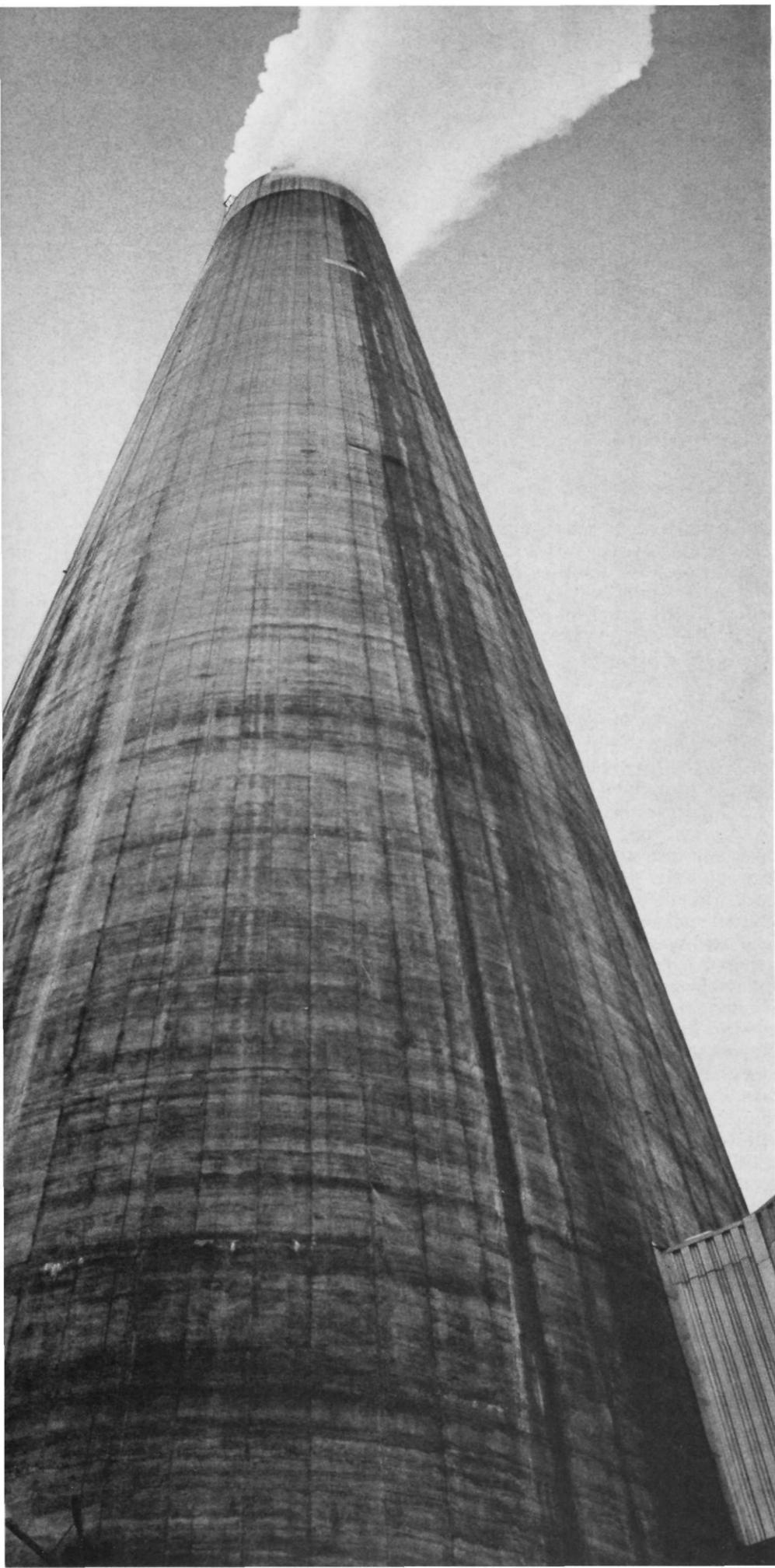
And we can be grateful, too, for what appears to be the start of an

encouraging trend. For the National Park Service reports a very rapid increase in cross-country skiing at Acadia that coincides with a decline in snowmobiling. Skiers used the park an estimated 8,200 times during the winter of 1977–78—an increase of about 2,000 from the previous winter. Snowmobilers, on the other hand, used the park only about 2,600 times—a drop of about 3,400 from the previous year. Perhaps the snowmobile fad has begun to wane. Perhaps we can begin to hope that someday the park's entire road system—or at least all of the carriage roads that were originally intended to be off limits to motorized vehicles—will become tranquil ski trails.

THE HIGH POINT of my own ski tour of Acadia occurred on a crisp mid-February night. A full moon flooded the landscape with its silver light. Alone, I skimmed for hours through the forest and looped through secret valleys. Tree trunks and branches etched their shadow patterns across the snow. High above, the barren, snowy mountain summits and ridges stood out in dazzling contrast to the jet black sky. As I paused now and again to catch my breath on the upgrades, I could hear the wild north wind roaring along the mountainsides.

It was close to midnight, with the temperature hovering near zero and the wind-chill factor pushing it far below that, when I finally rounded the last bend in the road. At the far end of Jordan Pond, the twin humps of the Bubbles—wedged in between higher mountains—seemed to glow with some mystical, liquid light. At that awesome moment, I felt filled, as never before, with the spirit of this Acadian wilderness. ■

For many years a resident of Mount Desert Island, Maine, and a frequent contributor to *National Parks & Conservation Magazine*, Russ Butcher is ideally qualified to be our guide to Acadia in winter. His most recent book, *Field Guide to Acadia National Park, Maine*, was published last year.



MARC LAMBERG

ACID RAIN FALLOUT: Pollution & Politics

Linked to fossil fuel combustion, acid precipitation kills fish and wilderness lake systems, corrodes city buildings, and much more . . .

by JAMES GANNON

THE BIRDS ARE BACK in Hyde Park. That's the good news from London in recent years, and its implications go far beyond a mere ornithological happening. The birds are a sign of London's triumph over its deadly smog, smog that killed 4,000 people in a terrifying four-day inversion twenty-five years ago. Air that can support birds can also support people—and it can help to sweep away the dark memories of the world's worst air pollution disaster.

From Scandinavia the news is bad. Acid rain and snow, a form of pollution unknown twenty-five years ago, have caused massive fish kills in the past two decades. Ironically, England is a major contributor to the Scandinavian pollution. The birds live in Hyde Park while the fish die across the North Sea in southern Norway and Sweden.

At first glance the trade-off may seem favorable to some observers—even when you count the fish kills in Canada and the United States from North American sources of pollution. No massive toll of human beings of the magnitude that London experienced in 1952 can be remotely linked to acid rain. Not even one human death.

But to a leading American authority on acid rain, Gene E. Likens of Cornell University, the fish kills are a "disaster." Likens, an ecologist, is alarmed by what he perceives to be a threat to the natural life systems.

"One has to be very seriously concerned about this kind of environmental insult on the natural systems," he warned. "There is a

limit to the stress they can withstand. The forests and the lands are life-support systems. Without those life-support systems to cleanse the air and the water, to provide food for us to eat, our health is just as much in jeopardy as if something is affecting us directly."

These are some of the signs of stress that concern Likens:

- Acid rain has wiped out commercial salmon fishing in much of southern Norway and Sweden and has destroyed sport fishing in parts of Scandinavia, eastern Canada, and the northeastern United States.

- Acidic lakes and streams do not simply kill fish; they eliminate other forms of aquatic life—including microscopic forms—and affect larger animals that feed on fish.

- In waters where the fish are not all gone the acidity contributes to higher levels of mercury contamination in the most desirable game fish, and the contamination can be passed on to humans.

- Acid rain may leach nutrients from soils and impede the growth of vegetation, including plants for food and timber; it has done so, at least, in laboratory experiments.

ACIDS DO OCCUR naturally in the atmosphere and have always fallen to earth in precipitation. But nature's marvelous system of checks and balances has neutralized them—until recently. Now the excessive loading of man-made acids on vulnerable land surfaces tips the balance against na-

ture. These acids usually originate in the burning of fossil fuel for electricity and other uses and in smelting of ores for industry.

But they don't start out as acids. Sulfur and nitrogen oxides emitted from the stacks are oxidized into the dehydrate of sulfuric and nitric acids. Water in the atmosphere does the rest. Measurements by Likens at the Hubbard Brook Experimental Forest in the White Mountains of New Hampshire confirm the acid components of rainfall to be as much as 65 percent sulfuric and 25 to 30 percent nitric. Other monitoring stations have detected these acids in slightly lesser amounts. Both are highly corrosive acids. They can destroy plant and animal cells—*destroy life*—on contact.

The rainfall is still almost all water. The acids occur only in minute amounts, never in strengths greater than the acids in the human stomach, but often—and here's the danger—in strengths greater than the acids in nature.

ACID RAIN can fall anywhere downwind of urban or industrial pollution. In cities it is simply one more element undermining air quality. It contributes to the corrosion of buildings and monuments and has subtle, long-term effects on human health.

But acid rain is more remarkable for transferring what has been an urban problem to the countryside. You do not expect to find the effects of air pollution in the Canadian wilderness or among the stately mountains of New England

and northern New York—but you find them there now.

The pollutants come from near and far, and they travel in all directions without respect for international boundaries. A report prepared for the Canadian-American International Joint Commission shows that Lake Superior receives significant acid fallout from points as distant and scattered as St. Louis, Cincinnati, Pittsburgh, and Sudbury, Ontario.

The American cities are all more than five hundred miles away from Lake Superior. If conditions are favorable, the pollutants can go that far in a day. They've been known to stay airborne for weeks, although Swedish scientists estimate that the average time aloft is two to four days. There's time, in any case, for pollution originating in North America to travel across thousands of miles of ocean to Sweden and Norway. It is not uncommon for acid rain that falls in Scandinavia to be "made in the U.S.A."

That's a bit startling, but it is consistent with known global transport of atomic and volcanic clouds. Tall industrial smokestacks built in the past quarter century to help clean up cities like London may account, in large measure, for long-range pollution.

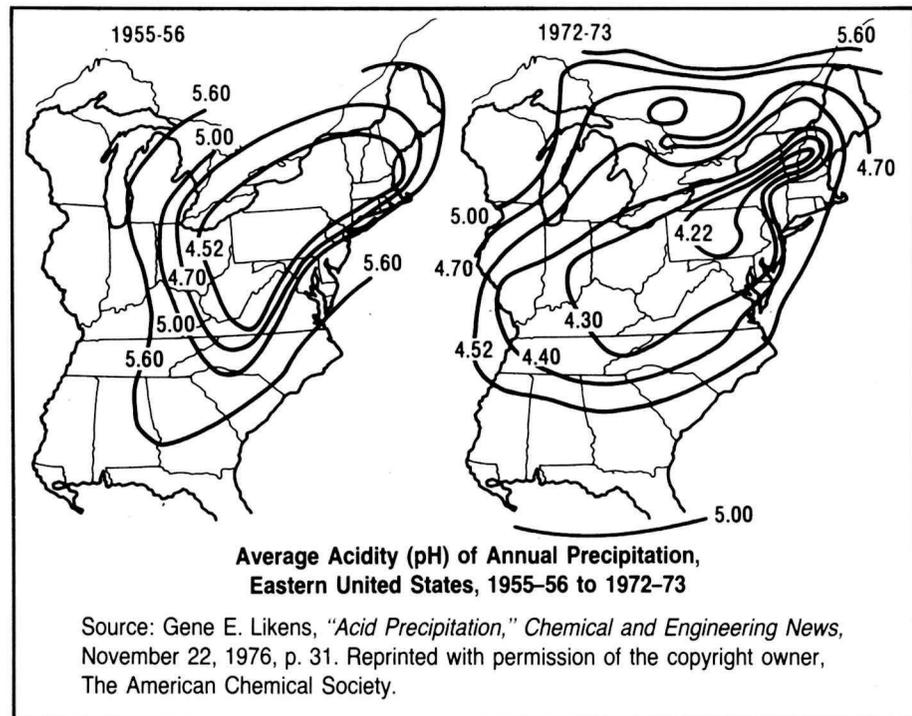
The danger is growing. Acid rain is so widespread today that the average rainfall in the eastern half of the United States and southeastern Canada—regions of heavy industrialization—is about twenty-five times more acidic than it would be if the rain contained

acids from natural sources only. As recently as ten years ago, that sort of acid intensity could be found only in the northeastern states and around the nickel mining center of Sudbury, Ontario. But today there are more than 200 tall stacks in the United States alone, rising 400 to 1,200 feet above power plants and smelters and spewing the sulfur and nitrogen compounds into the atmosphere. The acid rain problem could become even more acute with construction of many more coal-generating facilities.

THE ADMINISTRATION's national energy plan, given to Congress in the fall of 1977, calls for an 80 percent increase in the use of coal for electrical generation. Under a 1977 clean air law, the best available technology will be required for new plants. Right now that means "scrubbers," devices that can trap 90 percent or more of the sulphur dioxide from a plant's flue gas. But a huge environmental battle has been brewing about the pollution controls needed to check the emissions from all these new plants. Meanwhile, there are no significant standards for nitrogen oxides—a huge part of the acid rain problem—and little research on technology to control that pollutant.

THE DANGER from acid rain is greatest in lakes situated in hard-rock areas where the rocks and soils are low in neutralizing chemicals, such as the calcium carbonate in limestone. All soils have these "buffering" chemicals to a greater or lesser degree, but many underlying rock formations do not. Rocks made of granite or lava, for example, simply do not react with acid. So acid rain can gradually, almost imperceptibly, disrupt the surface ecosystem.

The entire Canadian Shield, made of Precambrian rock formed six hundred million to four billion years ago, is vulnerable. It stretches from the Arctic Circle across most of Greenland and the eastern half of Canada into the United States below the Great Lakes. Combined



The symbol pH expresses degree of acidity and alkalinity on a scale running from 0 (totally acid) to 14 (totally alkaline). The midpoint, pH 7, is neutral, neither acid nor alkaline. The scale is logarithmic—each shift of one unit downward means a tenfold increase in acidity. The normal pH value for rain is 5.7. Thus,

with other pockets of hard-rock formations, it adds up to more than a million square miles of acid-sensitive land surface in North America.

Lakes in hard-rock areas, said Likens, are the "clearest and most dramatic example" of acid rain's effects. An acid lake is a death trap for fish. For the newly spawned, should they survive the spawning, it is almost instant death. For older fish, more resistant to the toxic effects of acid, it is a slow and tortured death. However it comes, death is inevitable, for fish and for other forms of life, as the acid level slowly rises.

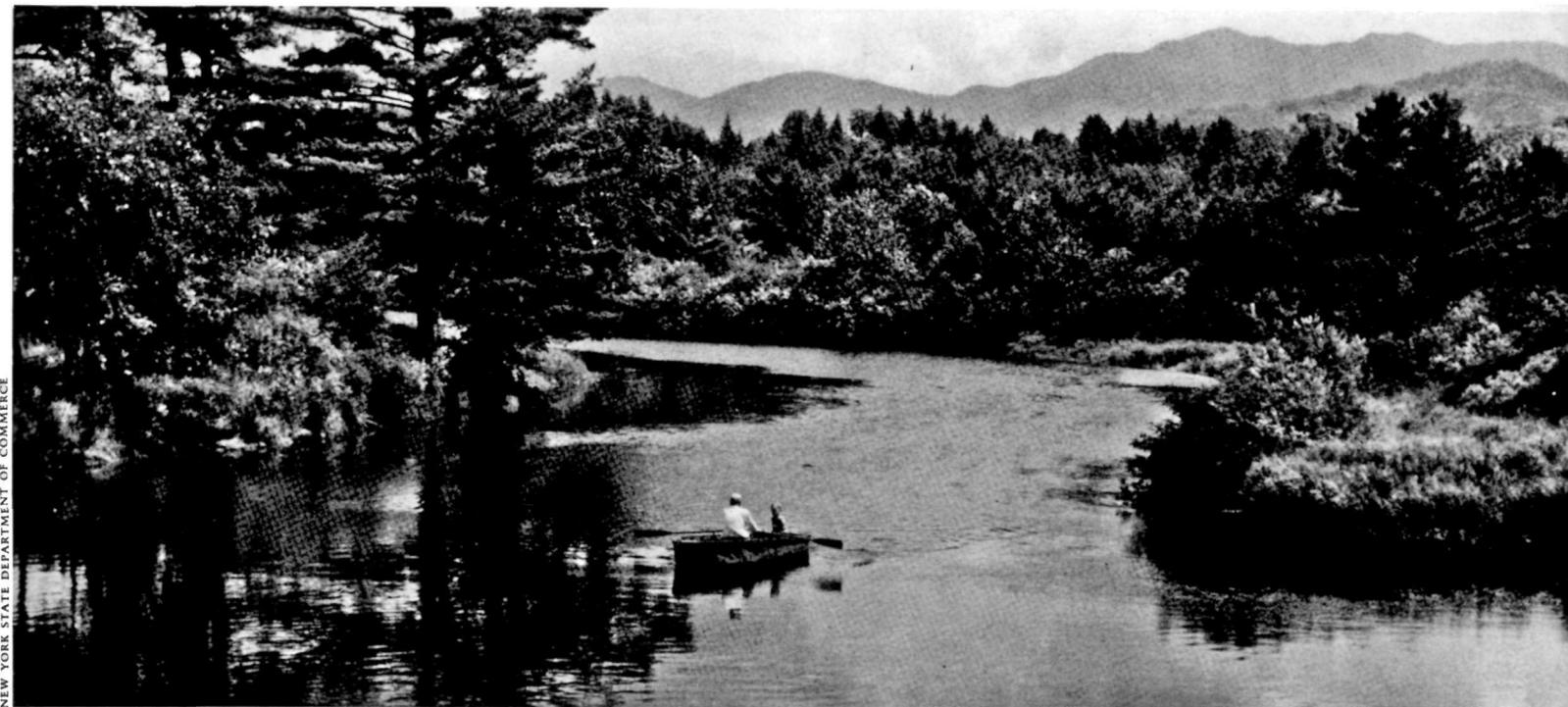
RICHARD J. BEAMISH, a scientist for Environment Canada, has probably spent as much time as anyone in North America studying what acid does to fish. For many years Beamish used the acidic lakes around Sudbury, site of the world's richest nickel deposit and the world's largest single point source of sulfur pollution, as his "laboratory."

Beamish and his colleagues

found that adult fish became emaciated, stunted, and deformed under acid stress. Far more destructive for the fish populations, however, was the failure of female reproduction. "Eggs were developed," Beamish discovered, "but they were never passed from the ovary and fertilized." It made the premature deaths of adult fish a moot point, he theorized, because without the recruitment of new fish into the population, the species is inexorably reduced to zero.

That happened to one species after another in lakes that Beamish studied. Some prime game fish, small mouth bass and walleye, were the first to be eliminated. Northern pike and lake trout were next. Even the most acid-tolerant fish, such as lake herring, perch, and rock bass, eventually succumbed to the lethal acid.

Beamish estimated—"conservatively"—that two hundred to four hundred lakes within a fifty-mile radius of the Sudbury smelters have few or no fish remaining. Since the construction of the



NEW YORK STATE DEPARTMENT OF COMMERCE

the reading on the chart (opposite) of pH 4.7 for precipitation in 1972-73 in northern Maine indicates 10 times the acidity of normal rain. Rain of pH 3.7 (not shown), found in some northeastern areas, is 100 times more acid than normal. Areas most affected by acid rain tend to be hard-rock lake systems low in neutralizing chemicals and high-altitude forests and streams—like the Adirondack Mountains of New York (above) and many other forests and parks.

world's tallest smokestack at Sudbury, acid pollution has reached out to Ontario's popular resort areas of Muskoka and Haliburton where the lakes are on the edge of disaster. Pollution made in the United States will undoubtedly share blame for the disaster.

In Scandinavia the problem is even more severe. Lars N. Overrein, director of a comprehensive Norwegian study of acid rain, reported that the "majority of inland waters . . . have completely lost their fish populations." That runs to "thousands of localities."

In New York's Adirondack Mountains the fish are gone from about a hundred lakes and streams at higher elevations; and ecologists fear the loss of "buffering capacity," and ultimately the loss of fish, in the lower valleys.

The spring snow melt, when acid levels can rise precipitously from winter snow accumulations, is the most dangerous time for fish. A late winter thaw in 1975 killed trout by the thousands along the Tovdal River in southern Norway.

FISH ARE NOT the only casualties. Around Sudbury the acid lakes look pure because they are so clear. But that's an illusion. They are clear because, for all practical purposes, they are dead. The organic life has been virtually erased: fish, amphibians, invertebrates—all gone. Plankton, gone. Algae, bacteria, severely reduced or chemically altered. The entire aquatic ecosystem snuffed out—perhaps irrevocably. Beamish said at least one hundred lakes near Sudbury fit this description, and he doubts that they can be restored. When the chain of life is broken like this, the higher animals are also affected. Fish-eating birds and vertebrates have left the lakes.

Parts of the barren landscape around Sudbury will resemble what the earth will be like when life is gone entirely. The vegetation has been destroyed by the direct fallout of sulfur dioxide. But twenty-five miles away the land looks normal—at least to the untrained eye.

It's difficult to tell what happens

to forests and agriculture from acid rain. So many hazards—fungus, insects, bacteria, drought, and other man-made pollutants—can afflict a plant in the natural environment that sulfur dioxide and acid rain are merely additions to a long list. But scientists have clearly shown in laboratory experiments that simulated acid rain, with other negative influences factored out, is destructive to vegetation.

Acid rain has a capacity to "leach out" nutrients that can affect the environment in different ways. Falling directly on plants, it causes leaf lesions, reducing the area for photosynthesis and limiting growth. In the soil it impedes root development.

Swedish scientists predict that acid rain will leach calcium from their nutrient-poor woodland soil, leading to a reduction of forest growth of 10 to 15 percent by the year 2000. If true, that will be a serious economic loss. (The Canadian and American pulp and logging industries, notorious denuders of the landscape, should take note.)

THE LEACHING PROPERTY of acid rain also draws out heavy metals from the earth and atmosphere. Metals such as aluminum, mercury, lead, cadmium, tin, beryllium, and nickel are drawn into the freshwater systems and held in solution by the acid.

One result is another mechanism of fish mortality, this one discovered by Carl L. Schofield, a Cornell biologist, from observations in the Adirondacks. In this case, aluminum combined with nitric acid is the deadly weapon. "We found," said Schofield, "that the aluminum in this situation is very toxic to fish. You get a much higher toxicity for a given level of [acid] than you would otherwise."

Mercury is one of the better known threats to human health. The human race has had quite enough experience with it to hold it in respectful fear. It kills or maims in any form. As methyl mercury, one of its organic forms, it accumulates in fish—a major source of protein for humans.

The worst outbreak of mercury poisoning from fish occurred in the 1950s in Minamata, Japan. More than one hundred people died, and several hundred others suffered symptoms ranging from mild tingling of the skin to reduced motor coordination, retardation, and impaired sight and hearing—effects that are permanent because mercury causes irreversible damage to the cells of the central nervous system.

That tragedy came from the industrial discharge of mercury waste into Minamata Bay, where it contaminated fish and shellfish eaten by local people. Industrial dumping of mercury into Ontario's English/Wabigoon River system and other freshwaters of North America has brought fear and consternation closer to home, especially among native populations who make a steady diet of fish.

The "acid connection" to the mercury contamination of fish is more subtle. It occurs in the same waters vulnerable to human-generated acid pollution: softwater lakes situated on hard rock strata.

Mercury enters the water in a metallic inorganic state, then falls to the bottom sediment where it is converted by microorganisms to an organic form, methyl mercury. Methyl mercury passes easily into the food chain and, because it does not pass easily out, accumulates in fish regularly eaten by humans.

A Swedish scientist, Arne Jerne-lov, has established a clear correlation between the acid levels of lakes and mercury levels of fish—that is, the more acid added to a lake's water, the more mercury in its fish, up to the point where the acid kills the fish outright.

More than 600,000 U.S. citizens go fishing in Ontario each year. Increasingly, they are fishing in troubled waters. They can find out for themselves by writing to Ontario's Ministry of the Environment (the tourist industry won't tell them) for the "Guide to Eating Ontario Sport Fish." Excluding the Great Lakes, 336 lakes and rivers (70 percent of 479 cited) have at least some contaminated fish at levels officially considered unsafe for prolonged human consumption. The highest levels were found in the predator game fish, walleye and northern pike.

But sport fishermen have no cause for alarm, according to John M. Wood, director of the University of Minnesota's Freshwater Biological Institute. "They don't get sufficient exposure to mercury-contaminated fish to really seriously be threatened. You have to have a diet of fish for a significant period of time to be affected."

LIKE THE DIET of the Canadian Indians, for example. They eat fish almost daily in the summer, and they have cause for alarm. In a recent survey by Health and Welfare Canada, 42 percent of 764 Indians tested in Quebec, Ontario, and the Northwest Territories had abnormally elevated blood or hair mercury levels.

It's the Indians trying to live close to nature who are most immediately threatened by acid rain. The threat is magnified at the tiny Ojibway Village on Lac La Croix by



JAMES GANNON

Ojibway Indians on Lac La Croix, Canada, fear that acid rain from a power plant being built near them will harm fish populations and the wilderness upon which they depend. Nearby Quetico Provincial Park, Ontario, and Minnesota's Boundary Waters Canoe Area, just across the border, are also threatened by the plant.

the prospect of an 800-megawatt power plant close to home.

Chief Steve Jourdain wants to keep the ways of his ancestors, but he doesn't mind enjoying the benefits of modern industry. When he clears his beaver traps in winter, he makes the rounds by "ski-doo" (skimobile). Two years ago, he said, his band of two hundred "kicked out" welfare because it "goes against our belief that welfare is a damaging thing."

Now they are trying to live off the wilderness, fishing, hunting, and trapping. Their only outside source of income comes from guiding U.S. fishermen in the summer, and they pick up a few extra dollars from the declining number of pelts they gather in winter. The thought of acid rain has them virtually paralyzed with fear.

Lac La Croix, a softwater lake on the hard-rock Canadian Shield, rests directly on the Canadian-American border. It's adjacent to two wilderness preserves: the Boundary Waters Canoe Area, an official "national wilderness area"

in Minnesota, and the Quetico Provincial Park, a "primitive wilderness" in Ontario.

The Indians live on the Canadian side, and their own provincial government is about to execute the final blow to their tenuous wilderness existence. Ontario Hydro, a crown corporation, plans to build a large coal-fired power plant near Atikokan, only fifty miles from the village. That's why they're afraid, visions of Sudbury keep coming to mind. (To be wholly accurate, Atikokan would not come close to Sudbury in emissions.)

"The economic base of our reservation is the surrounding environment. If that's destroyed, our whole economic base is destroyed," says Chief Jourdain.

He could as easily fear for the present. Things are bad enough without the power plant, just from the effects of a small nearby smelter combined with long-range pollution. A simple test (not scientifically valid) has indicated that already the acid level of the lake is critical for fish survival, and one fish analyzed for mercury was contaminated.

It is hard to see how the new power plant can do other than make it worse. The utility has said it will use low-sulfur coal and claims it will not need expensive scrubbers for sulfur removal. In contrast to the United States, scrubbers are not in use in Canada, but pressure for them may increase with an acceleration in Canadian development. Environmentalists, fearing for the entire surrounding wilderness, have turned the issue into an international controversy that has reached diplomatic levels.

The Atikokan dispute illustrates as well as any one incident can the seeming inflexibility of acid rain politics. Scientists are concerned about the plant's effects but in the absence of a four-star disaster like the London inversion, the kind that inspires mass demand for reform, industries and governments are likely to remain unmoved. It seems Indians cannot even match the political clout of the Tennessee snail darter.

WHETHER INDUSTRY and government are one and the same, as with Ontario Hydro, or separate seems irrelevant. Government agencies, said Frank D'Itri of Michigan State University, who headed a mercury study for the National Academy of Sciences, are "usually useless in solving pollution problems." They act occasionally after the fact to compensate victims, but almost never for prevention.

Yet government agencies spend the taxpayers' money as if their existence depended on it—and perhaps it does. The money, said D'Itri, goes into research for what he calls "technological countermeasures." Precisely that phenomenon today threatens to turn acid rain research into a government-funded growth industry. Projects for liming acid lakes (giant Alka Seltzers) and for developing acid-resistant fish are being undertaken in lieu of any meaningful solution.

Because the use of fossil fuels is the source of the acid rain problem, the obvious solution is to stop using fossil fuels. As utopian as it may sound to those of us accustomed to seeing the world through industrial smoke, that solution is not only plausible; it is inevitable. Fossil fuel reserves will be exhausted, according to current estimates, in about 200 years.

While we bend to the task of finding alternative sources of energy, it matters how we use the remaining fossil fuels—the speed and magnitude of consumption, for example, and whether we extract the sulfur or trap the nitrogen. And it matters how fast we find safe alternatives. Because we have no choice about finding alternatives, why not act sooner rather than later, save what's left of the wilderness, and safeguard our health? ■

James Gannon is a producer for the NBC News TV program, "Weekend." This article is adapted from a film report on acid rain produced for "Weekend" by Gannon and researcher Marc Lamberg.

Message to Members

CLOUD OVER CLEAN AIR REGULATIONS

With the expected proliferation of new coal-fired power plants, strict regulation of sulphur dioxide emissions will be critical to fighting an increase in acid rain. Under the Clean Air Act Amendments of 1977, Congress required use of the best pollution control technology on new and modified sources of emissions. The successful performance of scrubbers in Japan and the judgments of American utilities with good scrubber engineering experience demonstrate that the best technological systems can routinely remove more than 90 percent of the sulphur oxides from a plant's emissions on a daily, cost-effective basis. Utilities and the Department of Energy, however, are pressuring EPA to weaken New Source Performance Standards that the agency must issue under the 1977 law. In November 1977 EPA drafted standards that called for 90 percent removal. But by the time EPA announced its proposed regulations on September 11, 1978, the standard had dropped to an obsolete 85 percent. EPA also is under pressure to change the final regulations so that only partial scrubbing will be required of low-sulphur coals like those in the West. Preferential treatment of western coals would violate the intent of the 1977 law, which seeks to maximize use of locally available coals in the East. Besides disrupting economies in eastern states, allowing partial scrubbing would impede development of new control technologies and undermine the law's requirement for preventing "significant deterioration" of and protecting visibility in clean-air areas like national parks and wildernesses.

The comment period on the proposed regulations ends in mid-November. (EPA will issue final standards early in 1979.) NPCA members can help by immediately writing the Hon. Douglas Costle, Administrator, EPA, 401 M Street, S.W., Washington, D.C. 20460. Call for New Source Performance Standards that fulfill the requirements of the 1977 clean air law by recognizing that the best technological systems remove more than 90 percent of the sulphur oxides *daily* and by requiring full scrubbing for all coals. For more information, write the National Clean Air Coalition-NP, 620 C Street, S.E., Washington, D.C. 20003.

PARK INHOLDINGS

Intense Minority of "Inholders" Attacks NPS Land Acquisition Policy

Real estate sharks cut a path through a rain forest in Olympic National Park, Washington, to make an access road to a new subdivision within the park.

A developer divided his land in the backcountry of Montana's Glacier National Park into 50 x 100 foot parcels and put the plots up "for sale." No water or sewer systems were available; and although there was no possibility of electricity, the developer suggested the Park Service run a cable through a lake to provide it. The village of Wawona now sprawls across 640 acres within Yosemite National Park, California; it spread without any controls on zoning, lot sizes, or planning for water supply and sewage disposal.

Subdivisions and open pit mines, trash dumps and trailer courts—all occur on pockets of privately owned land within the thirty-five older units of the National Park System that the Park Service calls "inholding" areas. Not all inholdings contain such obviously incompatible developments, of course; many are modest homes. But

as visitation to the parks has increased, so has the temptation for some owners to capitalize on tourism.

The longstanding Park Service policy of acquiring inholdings recently came under sharp attack from some individual property owners.

The Park Service held public hearings on its land acquisition policy in five cities during September. The agency is under pressure from the National Park Inholders Association, a new group that has generated some dramatic publicity about "land grabs."

Actually, as the recently published policy confirms, the NPS inholdings program will continue to be based on a "willing buyer/willing seller concept." The Service will not normally acquire lands until such time as the owners desire to dispose of them, reserving the use of condemnations for cases "where there is a threat of new or expanded incompatible use."

NPS Director William Whalen emphasizes, "We feel a strong obligation to treat the property owners with

fairness and respect while ensuring that the government is not paying prices which are unfair"—to inholders or the public.

It is not surprising that the vast majority of inholders are satisfied with the deals they are getting, NPS reports. If they sell their land, they receive full payment and can choose to stay on for up to twenty-five years or for a lifetime. Their only payment for use of the property consists of a deduction, made at the time of the sale, of one percent of the purchase price for each year. NPS Assistant Director Philip Stewart says one inholder characterized this deal as "having your cake and eating it too." He notes that the Park Service provides many inholders with services like road repairs and trash collection.

A big difference between land acquisitions in these older "inholding" areas and acquisitions in park units established after 1960 is that the Park Service must receive specific permission from both the House and Senate appropriations committees before a given

inholding tract can be condemned. Ironically, as the number of acres of inholdings goes down, the price of the remaining inholdings skyrockets, making conversions to rental properties, improvements, and commercial ventures more lucrative. Improvements along main roads and lakeshores in the parks create scenic intrusions. "Most landowners are cooperative," says one NPS land acquisition specialist, "but you give some guys an inch and they create eyesores."

Subdivisions create major threats. In Grand Teton, for instance, large tracts that once belonged to ranchers and farmers have been subdivided over and over again. The town of Kelly—a hodgepodge of homes and other buildings and a twenty-three-acre trailer court—has been increasingly developed in recent years.

In fact, while the Park Service is criticized on the one side by the National Park Inholders Association for alleged "strong-arm" tactics and over-

Continued on page 28

ASSATEAGUE

"Wildfowling" Museum Would Destroy Waterfowl Habitat

A "wildfowling" museum that would destroy waterfowl habitat is among a number of new development proposals for Assateague Island, one of the few unspoiled barrier islands in the East.

We thought we had won out against development of this national seashore in Maryland and Virginia when Congress amended the National Seashore Act in 1976 to remove provisions for a road running down the length of the island and for commercial exploitation there. We were wrong.

Assateague is a special island and it deserves special protection. In fact, it is the only accessible undeveloped barrier island within a 250-mile radius of one-fifth of the nation's population.

Assateague's 37 miles of beach, marsh, dunes, myrtle thickets, and pine woodlands attract 2 million visitors each year. The popular Chincoteague National Wildlife Refuge at the Virginia end of the national seashore protects wildlife including thousands of ducks, geese, and other birds coming down the Atlantic Flyway. But the

battle to protect the island seems never-ending.

A June 1978 "Assessment of Alternatives, Draft General Management Plan" covering future management of Assateague Island is heavily weighted with development proposals that would threaten this important waterfowl sanctuary and the compelling natural beauty of the island.

The three agencies that administer lands on the island—the National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), and Maryland State Park Service—put together the assessment now under review.

Only maximum public participation by citizens interested in protecting Assateague will save the island from being subjected to the heavy facility construction envisioned in much of the assessment.

Many of the alternative proposals in the document would stimulate an increase in visitation. The "wildfowling" museum, additional parking for more

Continued on page 26

GRAND CANYON

NPCA Observes Park Problems in the Inner Canyon

On a river trip through part of the Grand Canyon with Park Service personnel this past summer, *National Parks & Conservation Magazine* editor Eugenia Connally observed research on feral burros, evidence of destruction of archeological sites, and the difficulty of enforcing the permit system on the Colorado River.

In other parks in the Southwest as well as in the Grand Canyon she saw evidence of continuing underfunding and staff shortages.

Primarily a survey of archeological sites in the Inner Canyon of Grand Canyon National Park, the Colorado River trip had been underway for two weeks before Connally joined it at Havasu Canyon. Park archeologist Dr. Robert Euler systematically compared each site with photographs taken during the 1960s, and professional photographer John Richardson rephotographed each site for the record. Dr.

Euler found several sites along the river that had been dug into illegally or had been damaged by heavy visitation by river parties.

Connally accompanied Euler and his assistants during their survey of rock shelters, mesquite pits, and other sites downriver from Havasu Canyon and observed extensive destruction to an important midden, or refuse dump. Such sites can yield scientists much information about the identity and way of life of the people who used them. Unless vandalism is stopped and the sites are excavated properly, this information will be lost forever.

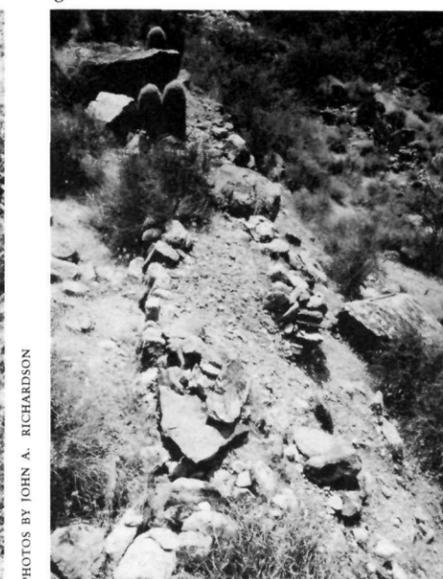
Unfortunately, partly because of lack of funds and partly because of a NPS belief that archeological sites should be preserved—even from archeologists—the Park Service has no plans to excavate any archeological sites in the park, even though irretrievable data are being systematically destroyed.

During the final days of the trip NPS resource management specialists Jim Walters and Norm Henderson immobilized several of the park's wild burros and placed color-coded collars on them. When sightings of these animals are reported later, their locations can be plotted to help researchers trace their movements within the park. This research is being conducted in preparation for the environmental impact statement called for by Secretary of the Interior Andrus in March 1977 when he banned the shooting of burros in national parks.

The National Park Service has been shooting burros in national parks since the 1920s to thin the populations of these feral animals, which even then were overgrazing the parks. Beginning in 1974, the NPS began studies to determine the effects of burro overpopulation in the Grand Canyon.

Continued on page 29

Burros and disturbance of archeological sites are among the Park Service's problems in the Grand Canyon. Below, rangers Hal Grovert and John Thomas (in front, left to right) help resource managers Norm Henderson and Jim Walters (in back, left to right) put a color-coded collar on an immobilized burro. Below right, visitors cleared a trail right through an archeological site.



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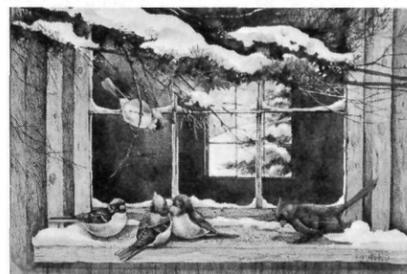
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3120 The Overlook "May the Christmas Spirit remain within your hearts and home throughout the Coming Year" painting by Garé Barks



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4192 "Glory to God in the highest and on earth peace, good will towards men." St. Luke 2:14 "May the Peace and Joy of Christmas be with you through all the Year" color photo by Fletcher Manley



3053 Forest Cathedral "You made outdoors Thy temple, Lord, to fit our simple prayer That Christmas...may touch the hearts of all men everywhere, etc." "Merry Christmas" verse by S. Omar Barker, painting by Garé Barks



1456 "When pine trees bend with heavy snow, And trails are hard to find, The glimmer of a fire's light, Brings memories to mind., etc." "Merry Christmas and a Happy New Year" verse by Malicki, painting by Lee K. Parkinson



1704 Winter Splendor "This brings a prayer at Christmas time, That God will always bless...your home and you, And those you love...with lasting happiness..." painting by Kathryn Williams B.



1142 A Christmas Morning Handout "Never too cold for kindness, Never too deep the snow, To wish you the Merriest Christmas Our good Lord can bestow!" verse by S. Omar Barker, painting by Bernard P. Thomas



3001 "Therefore am I still, A lover of the meadows; and of all that we behold, From this green earth; of all the mighty world, etc." from Wordsworth "Merry Christmas and a Happy New Year" painting by Garé Barks



3118 "...good will towards men." St. Luke 2:14 "May you have the Spirit of Christmas which is Peace, the Gladness of Christmas which is Hope, the Heart of Christmas which is Love" painting by Garé Barks



1436 "In the heart of the wilderness Christmas has come ...Glory to God in the highest, Peace on earth, good will toward men!" "May the Peace and Joy of Christmas be with you through all the Year" painting by Ray Swanson



3041 When Good Friends Gather "May you and yours this Christmas Day and every day this coming year be blessed with health and happiness" painting by Winston Elliott



1151 "...Tis very sweet to look into the fair, And open face of heaven..." from Keats "May every happiness be yours at Christmas and throughout the New Year" painting by Wayne Lowdermilk



3008 The Miracle of Christmas "May the Peace and Joy of Christmas be with you through all the Year" painting by Garé Barks



1485 "Nature is the living, Visible garment of God." from Goethe "May Peace be your Gift at Christmas and your Treasure through all the Year" color photo by Abi Garaman



3121 "It's Christmas again! May yours be a joyful one and your New Year happy!" painting by Elmer Sprunger



3142 Along the Wilderness Trail "May you and yours this Christmas Day and every day this coming year be blessed with health and happiness" painting by Norman Miller



3124 "...Here is continual worship;—Nature, here in the tranquility...Enjoys thy presence." from Bryant "May Peace be your Gift at Christmas and your Treasure through all the Year" painting by Gerald Pettit

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NPCA at work

Assateague—from page 23

than 450 cars, expansion of beach facilities, bus shelters for 2,100 people at the Virginia end of the island, reconstruction of former island settlements, screened and padded boardwalks, and an excessive increase in boat, horse, and bike access—all would heavily tax the resources of the island.

The draft assessment contains three sets of alternatives for all aspects of management of Assateague. Although "Alternative 3" presents the least intensive development, all three alternatives contain both objectionable and unobjectionable proposals; some combination of the sets likely will be used.

The greatest increase in development is focused on Chincoteague National Wildlife Refuge, which FWS is supposed to protect for wildlife. Chincoteague already is one of the top five most heavily visited refuges in the nation, with 1.2 million visitors in 1977. Damage to bird nesting areas and to dunes needed for erosion control is increasing.

Instead of providing ways to ease the environmental impact of such heavy visitor pressure and encouraging activities in keeping with the nature of the refuge, the assessment accepts loss of habitat and "recurring disturbances to wildlife and habitat" as "unavoidable adverse effects."

Many of the environmentally destructive proposals seem designed to provide beach-goers with "something to do," disregarding the fact that the diversity and type of activities already available—from beachcombing and fishing to birdwatching and photography—contribute to the island's popularity.

On the other hand, deliberate alterations of the landscape to include structures such as a museum and a windmill and reconstructions of vanished buildings not only would be unnecessary but also would destroy the special qualities that draw people to the island again and again.

The "waterfowl and wildfowling interpretive facility" is the most controversial proposal. It is included in all three sets of alternatives but in different locations, all of which would

involve destruction of freshwater or salt marsh.

Such a museum is promoted as a way of allowing the visitor to view ducks under water and to learn about sport hunting of waterfowl and waterfowl behavior and management. The huge \$1.6 million project is supported by the refuge manager and some local businessmen. There is, however, also strong local opposition from people concerned about the traffic jams and congestion that already disrupt the



town of Chincoteague—just across a bridge from the wildlife refuge—on many summer weekends.

NPCA and other environmental organizations oppose the museum on Assateague Island because it would needlessly destroy habitat and disrupt wildlife.

At the same time NPCA and other conservationists recommend:

- Instead of construction of the "waterfowling" museum on Assateague Island, locating the complex on the mainland at Wallops Annex on high ground—not marsh—and digging a pool, thereby providing additional habitat instead of destroying marsh.
- Placement of all new administrative offices, staff housing, visitor centers, and auditorium, maintenance, and other buildings *on the mainland*. This action is proposed by the National Park Service but should apply to the refuge as well.
- Implementation of recreational plans for the causeway area (national seashore); launching for canoes and rowboats; facilities for clamming, crabbing, bicycle rental. Development of bicycle trails; on the Virginia side

this should extend just to the beach, not down the "Hook."

- Provision for public transportation to Assateague in peak visitor season at both ends of the island but without unnecessary shelter construction.
- Boardwalks over the dunes and measures to keep the public from walking on the dune grass.
- Maintenance of the north end of island as a natural area, accessible only by boat and foot, but closed to all visitors during bird-nesting season, April 15—August 1.
- Maintenance of parking and camping spaces at current levels, both ends of island, except additional canoe-in and hike-in campsites could be added in Maryland. No overly expensive bathhouses.
- No reconstruction, even partial, of former buildings. Maintenance of old lighthouse for its historical value.
- Protection of all present wildlife habitat in the refuge from encroachment by new buildings, boardwalks, crabbing facilities, or automobile routes.

You Can Help: Send a written statement to the Assateague Planning Team, c/o National Park Service, Denver Service Center, PO Box 25287, Denver, CO 80225. (If you would like more information on the "Assessment of Alternatives," you can obtain a copy from Assateague Island National Seashore, Route 2, Box 294, Berlin, MD 21811; but please don't delay in submitting your comments on the development plans.)

A final decision on the waterfowling museum will be made by the Department of the Interior, and the recommendations of the planning team will go to Congress. Therefore, it would be helpful for NPCA members to write or send copies of their statements to Hon. Robert Herbst, Assistant Secretary, Department of the Interior, Washington, D.C. 20240; Hon. Henry Jackson, Chairman of the Senate Energy and Natural Resources Subcommittee; Hon. Morris Udall, Chairman of the House Interior Committee; and your own representatives and senators, who can be addressed at U.S. Capitol, Washington, D.C. 20510. ■

ILLEGAL IMMIGRATION

INS Needs Authority to Seize Vehicles

NPCA recently supported legislation to give the Immigration and Naturalization Service (INS) authority for the seizure, forfeiture, and disposition of vehicles used to transport illegal aliens into the United States.

In testimony before the Senate Judiciary Committee, this Association and the Environmental Coalition of North America supported such legislation as one step toward easing the massive influx of illegal immigrants that "dashes all hopes of ever reaching a stable population level" in this nation.

Massive numbers of illegal immigrants are smuggled into the United States by way of cars, trucks, boats, or airplanes.

Unlike other numerous federal agencies, however, the INS currently has no authorization to seize property when it is used in law-breaking operations. Such power would help stem the flow. Out of 9,500 vehicles intercepted

by the INS in a year's time, about 2,000 were repeat vehicles.

A particularly desirable feature of S 3093, NPCA testified, is that the consequences would be suffered by the smuggling operators who exploit the poor: "In their search for profits, they disregard all concerns for the safety of their charges, exploiting them financially and physically, robbing them of basic human dignity by treating them like cattle," NPCA said.

For instance, in Laredo, the INS intercepted a mobile home bound for Chicago into which 118 illegal immigrants had been jammed.

NPCA has called for more comprehensive legislation to deal with the illegal immigration problem. Meanwhile, NPCA has focused public attention on S 3093 and similar House legislation because the bills enjoy broad bipartisan support and would help check the illegal influx. ■



NPCA at work

Inholdings—from page 23

zealous restrictions, the agency also has come under congressional scrutiny for not moving fast enough in acquiring land in areas like Grand Teton.

In 1977 the House Appropriations Committee and Rep. Phillip Burton, chairman of the House Interior subcommittee on national parks, initiated a review of the land acquisition program and inholdings policy. During a visit to Grand Teton, Burton found some eyeopeners: a large amount of new construction—even on previously undeveloped properties. Burton determined that the Park Service was being too lenient in some parks and not exercising its condemnation option enough.

As a result of these congressional inquiries, the Park Service revised its land acquisition policy in 1977 to eliminate ambiguities that it said had been a factor leading to inconsistent implementation of the policy from park to park. This policy, which is the

one that was recently published for review, reflects the intent of Congress that all privately owned land within the System eventually be acquired and shows that subdivisions and developments will be halted by use of condemnations as necessary.

Admittedly, the Park Service's enforcement of its policy has been uneven. In some cases too much development has been permitted and in others minor changes to homes have been refused. Nevertheless, NPCA maintains that the policy itself is fair and should not be weakened.

Unnecessary delays in acquisition will only drive land prices of inholdings higher, experience has demonstrated. At the beginning of fiscal year 1969, when congressional committees approved the NPS "willing buyer/willing seller" program, there were 124,000 acres of inholdings to be acquired at an estimated value of \$115 million. As of September 30, 1976, about 2,100 tracts totaling 36,000 acres remained in the

thirty-five parks with inholdings. (In addition, there are about 30,000 other tracts in newer parks where land acquisition is still underway; more than half the owners hold tracts in Big Cypress National Preserve.)

Although the 36,000 acres of remaining inholdings represent only a third of the original amount, in 1976 the estimated value of these lands—\$106.7 million—was almost the same as when the program began.

The reason for the high cost of the remaining land has been twofold: inflation and the great number of new developments that have taken place on the unimproved lands. Even if the Park Service pursues its tightened policy to check new incompatible developments, inflation will drag on.

One way to ease the problem is proposed in Burton's omnibus parks bill passed by the House in July. The House bill would speed up acquisition by expressing the intent of Congress that all inholdings be acquired within four years with the exceptions of those in Grand Teton, Yosemite, Blue Ridge Parkway, and Olympic—areas where larger costs are involved. At press time, however, a much less comprehensive omnibus bill still was pending on the Senate side; and the fate of the inholdings language was precarious.

NPCA has vigorously supported the land acquisition policy and has opposed efforts of some inholders and land speculators to change the current NPS policy so that they can retain ownership indefinitely or further develop their lands.

Moreover, NPCA has stressed that giving special privileges to some landowners would be unfair to those who already have reached agreement with the Park Service, to the taxpayers who eventually will have to pay a higher price for these lands, and to the millions of citizens who use the parks and would be exposed to further development of inholdings and subsequent degradation of public resources.

You Can Help: Write before October 20 to support the NPS land acquisition policy: Hon. William Whalen, NPS Director, Interior Department, Washington, D.C. 20240. ■

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Grand Canyon—from page 22

The studies found definitive evidence that where wild burros are found they are changing the ecosystem. They compete with the rare native bighorn sheep and destroy habitat of small mammals. Consequently, the Park Service proposed to eliminate burros from the park by shooting them. As a result of public reaction to this plan, however, in March 1977 Secretary of Interior Andrus temporarily banned killing of burros and called for preparation of the environmental impact statement.

Although it is difficult for animal lovers to advocate shooting burros, once they understand the destruction these animals wreak, it is even harder to do *nothing* to prevent them from gradually destroying native wildlife habitat. Connally's observations confirmed for NPCA that shooting is the only feasible method in such rugged and inaccessible territory. Support for the eradication proposal has been increasing as more people have come to understand the problems.

The much-needed and hard-won Wild Free-Roaming Horse and Burro Act of 1971 protects these animals on all public lands except national parks, where the land is supposed to be managed in favor of native wildlife and natural ecosystems. Therefore, even if burros are eliminated from the parks, some seven thousand wild horses and burros will remain on other public lands.

On the river trip Connally saw first-hand the need for strengthened controls on use of the Colorado River when rangers apprehended a group of unauthorized river runners. In order to control numbers of people running the river through the park, in 1973 the Park Service limited the number of visitors on commercial and private trips to the 1972 level of visitation. In addition to limiting use, the permit system enables the Park Service to require demonstration of adequate expertise and equipment before it will issue a permit. But the NPS has had problems with private parties entering the Inner Canyon by side canyons and running the river without permits.

Such violations of park regulations not only lead to overuse of the resource but also could lead to tragedy. In the case Connally observed, the group was not equipped for whitewater travel, with inadequate rafts and life vests and not even a first aid kit along. Unfortunately, without adequate funds the Park Service has been unable to mount frequent enough patrols of the river to enforce regulations in all cases, and to help visitors who need help.

The river management plan the Park Service has proposed would increase the ratio of private to commercial permits and would distribute visits more evenly throughout the year so that fewer people would be on the river at any one time. In addition, by beginning the phaseout of motors in 1980, the Park Service plan would assure visitors a wilderness experience. Visitors should be able to experience the wilderness of the Colorado River without the intrusive noise of motors.

The Department of the Interior is reviewing the river management plan,

DREAM

I dreamed of Time, that perfect clock,
Destroyed by some atomic shock,
And all the universal gears
No longer ticking off the years.
The falling rains in mid-air hung,
The moon and stars no longer swung;
Predatory hawks on high
Stayed fixed against a frozen sky;
Surfs grew silent, winds stood still,
Grass stayed green on every hill;
Loaded guns exploded never,
And deer stayed poised in woods
forever.

The dream was stark, but what seemed
nice

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and the final environmental impact statement will be made public early in 1979. After a thirty-day period for review and final public comment, then, the river management plan will go into effect.

Throughout her trip, Connally observed the effects on the National Park System of insufficient funds and inadequate numbers of personnel, such as no money to excavate archeological sites in the Grand Canyon and a lack of resources to patrol the Colorado River often enough; deteriorating and dangerous trails in Zion; and insufficient campground patrols in Bryce to enforce park regulations.

NPCA has long fought for increased funding and staff for the National Park Service to do its job, and we have been successful in calling attention to the problems and in getting some in-

creases. Obviously, however, there is still much room for improvement. The National Park Service still needs more funds and more people in order to care for the parks and to provide for the safety and education of those who wish to enjoy them.

You Can Help: Motorboat concessioners have been lobbying extensively against the proposed ban on motorized craft and have been urging customers to write their legislators to oppose the ban. But many people have enjoyed oar-powered trips on the Colorado, and many others realize the importance of retaining the wilderness character of the Inner Canyon. Unless the legislators on Capitol Hill hear from people who favor the ban on motors, they may not realize that many people strongly support it.

The draft environmental impact

statement on burro management is expected to be made public this month, and public hearings will probably be scheduled in November.

NPCA members can help safeguard the native wildlife and natural ecosystems that the national parks are intended to protect by writing the Hon. Cecil Andrus (Secretary of Interior, Department of the Interior, Washington, D.C. 20240) and their congressmen and senators (U.S. Capitol, Washington, D.C. 20510). Urge them to adopt the ban on motors on the Colorado River and to abide by existing National Park Service policies regarding feral animals in the national parks.

For copies of the environmental statements on burros and the river management plan, write the Superintendent, Grand Canyon National Park, Box 129, Grand Canyon, AZ 86023. ■

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Continued from page 2

its capital cost. The investment needed to get an adequate nuclear system off the ground may simply be too great. And heavy investments in the atom may exhaust the world's financial and materials resources and foreclose the choice of genuine alternatives.

THAT SUCH alternatives exist cannot be doubted. Fleets of big wind-turbines deployed in the high-wind reaches of the Atlantic off the New England coast could supply all the energy needs of that region. The mathematics of the technology have been public knowledge for forty years. The few pilot projects thus far attempted give no adequate idea of costs once mass production has been achieved.

The investment may well be considerably less than the \$500 per kilowatt normally assumed for nuclear fission. It could start up our steel and aluminum plants at high levels of production and employment again, a perpetuation of jobs for maintenance and replacement from human generation to generation. The money and resources for this solution may not ever be available if we throw them away on nuclear power.

OCEAN THERMAL energy conversion is also available; the elements of the technology are already in existence and pose no problems of protracted and expensive research and development. The system makes use of the differences in temperature between the cold deep waters and the warm upper layers in tropical seas. No fuels and no wastes are involved. As with ocean-based wind-power, large platforms are anchored at sea. The investment will be about the same as for nuclear power, with none of the risks. It will guarantee generous industrial development and employment permanently.

There is but one caveat: the surface temperatures of the tropical seas will fall slightly as cold water is brought up from the depths; this may place a limit on the number of installations; a thorough ecological analysis in advance, and a permanent monitoring system thereafter will be imperative. The Southeast, Gulf, and Southwest coasts will provide easily accessible markets; once pioneered, the system will be applicable throughout the tropical and subtropical zones of the planet.

AND THE ENERGY of the sun can be tapped directly. Small roof installations for space heating will come into use as other energy costs rise. Systems of mirrors, lenses, and collecting towers have been tried out and may prove useful in some places. The

expense and the dangers, not to speak of the further cluttering of the skies, involved in projects for floating collectors in space turn us away from such attempts.

More important, the potentials of the silicon cell, producing electricity directly from sunlight, have been seriously underrated. The notion that a technologically competent industrial society cannot achieve the mass production of such equipment and reduce its cost to practical levels, is ludicrous. That a mass market will be needed to stimulate investment in mass production and distribution is more credible; but the Government can provide or underwrite the market; we ought to get going.

WIND-POWER can be fairly stable in windy regions, of which we have plenty. The on-and-off nature of direct sun-power and of wind-power in other places can be dealt with by using part of the energy in the electrolytic production of hydrogen and oxygen from water. Hydrogen is a clean fuel which burns to water and not to carbon dioxide, making no contribution to the possibly disastrous heating of the atmosphere by CO₂ in the so-called greenhouse effect.

Fuels from ongoing biological sources can also be used. If the saturation of the atmosphere with CO₂ by fossil fuel combustion can be reduced, a build-up from the burning of bio-fuels can doubtless be tolerated, and absorbed without lag by the oceans. While in most cases the waste products of our fields, forests, and even our cities should go back on the land, biomass energy can provide supplemental power if needed. Moreover, liquid fuels to replace gasoline can be obtained in this manner for relatively non-polluting transportation.

Geothermal energy, making use of hot water at considerable depths, and not necessarily the steaming potentials of smaller surface locations, is also a present potential, awaiting serious attention from the industrial and political powers that be. The capital costs, again, may compare favorably with present-day fossil-fuel investments, not to speak of tomorrow's, and with the nuclear approach.

THE HOUR is already late for a fundamental change of course in energy policy: for a shift away from the costly, temporary, and dangerous fossil and nuclear fuels toward the harmless and perpetual energy sources of sun, wind, oceans, and the heat of the earth. The energy problem could be solved permanently in fifteen years if we were to make that decision now. Our economic, ecological, and military security requirements command a reversal. Are we still capable as a nation of saving ourselves?

—Anthony Wayne Smith

ALASKA. Now is our last chance to preserve vast, unspoiled areas for wildlife habitat, wilderness, and new national parks. But forces that would exploit these areas have mounted an intensive and well-financed campaign to hinder preservation. We at NPCA are working hard to save as much of Alaska as we can. And YOU CAN HELP. Your support now could mean the difference between a Last Frontier and a lost frontier.

