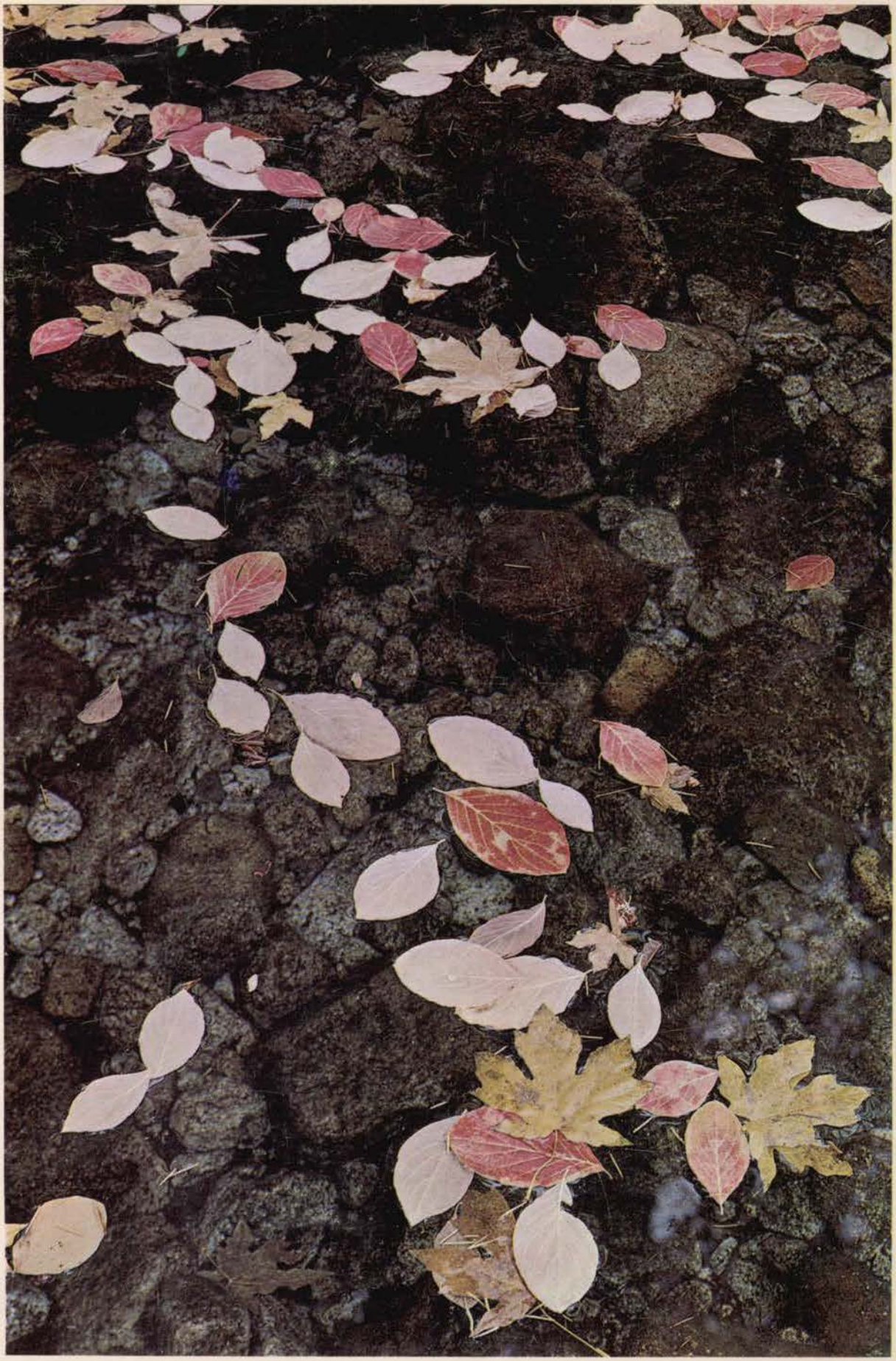

by Richard Kauffman, from Gentle Wilderness

Sierra Club Bulletin

December 1964

The Critics and—

our Fall 1964 publication *Gentle Wilderness:* THE SIERRA NEVADA

William Hogan in *The San Francisco Chronicle*

"The kind of photographic essay on this region you might expect the Sierra Club to produce. It is a portfolio of superb color photographs by the veteran mountaineer Richard Kauffman played against the words of John Muir. This is an opulent job of bookmaking that compares favorably with the Sierra Club's other major book of the season, over which we sounded huzzahs in this space last week, 'Time and the River Flowing: Grand Canyon.' This is a book made with loving care and with vast respect for the regions it investigates—lowlands, foothills, the middle ranges on up to the highest Sierra. Visual Muir, all of it."

Tom Yarbrough in *The St. Louis Post-Dispatch*

"This book would stand on the pictures alone—stunning depiction of breathtaking mountain scenery—but very nearly as attractive as the photographs is the text of Muir . . . Muir's lines serve as somewhat poetic outlines for the pictures. He not only enjoyed the grandeur of the great temples of the forest and the churning of glassy streams, and lakes and meadows in their prime, but he had the talent to tell others about his enjoyment. He started with pure enthusiasm and multiplied it over and over. The quality comes through . . .

"The Sierra Club has an ax to grind, a purpose quite easy to understand for it is simple. This non-profit organization is working to save the last five per cent of the wilderness . . ."

Ferol Egan in *The Oakland Tribune*

"In the latest Sierra Club Exhibit Format publications, readers are once again given the greatest book bargains, the most magnificent invitations to beauty that anyone could desire. . . .

"The result is a bookman's trip through the high country of the Sierra Nevada, a photographer's journey into the wilderness, and a conservationist's view of what must be saved for the generations to come. The major thing to say about this book is that it is not just for nature lovers, it is a book for all lovers of beauty. Muir's text still holds the freshness of a mountain stream, and Kauffman's photographs are exquisite compositions that combine the techniques of painting, printmaking, and photography. Altogether, *Gentle Wilderness* is a remarkable statement of what our wild country means to us.

. . . People everywhere have recently had this to say about Sierra Club books.

Peter Farb in *The New York Times Book Review*

"In the Sierra Club Exhibit Format Series, which began four years ago with Ansel Adams's memorable 'This Is the American Earth,' every sumptuous volume is a monument to the bookmaking art, and they are probably the only books printed in America that meet the exacting standards of European art books. They are also vivid documents that dramatize the need for preservation of the American wilderness. The Sierra Club's position on wilderness is, I think, unassailable. These nine volumes provide a yardstick by which the assaults of blind progress against the remnants of primeval America may be measured."

Wally Trabing in *The Santa Cruz Sentinel*

"Sierra Club members have hit upon a genius of an idea in its current series of oversized books on the areas which they are trying to protect."

Tom Yarbrough in *The St. Louis Post-Dispatch*

"The people concerned with these outsized books seem to be striving for perfection in reproduction of color photographs—and achieving it. Until now American book buyers have looked largely to Switzerland, Germany or Italy for the most superb examples of bookmaking, but in this series the Sierra Club is on even terms with the best and better than most."

Robert Kirsch in *The Los Angeles Times*

"The superb has become the usual in the Sierra Club Exhibit Format Series. And this level of beauty and power is necessary to remind us of the importance of the wild and free land."

Gentle Wilderness: THE SIERRA NEVADA. Photographs by Richard Kauffman; Text from John Muir. 168 pages, 72 color plates. $25.00

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Sierra Club Bulletin

VOLUME 49 DECEMBER 1964 NUMBER 9

To explore, enjoy, and preserve the Sierra Nevada and other scenic resources of the United States and its forests, waters, wildlife, and wilderness; to undertake and to publish scientific, literary, and educational studies concerning them; to educate the people with regard to the national and state forests, parks, monuments, and other natural resources of scenic beauty and to enlist public coöperation in protecting them.

JOHN MUIR, President 1892 to 1914

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EDITED BY DAVID BROWER

Sierra Club Bulletin is published monthly except May, July, and August by the Sierra Cluub, 2061 Center Street, Berkeley 4, California. Annual dues are $9 (first year $14) of which $1 (nonmembers, $5) is for subscription to the *Bulletin.* All communications and contributions should be addressed to Sierra Club, 1050 Mills Tower, San Francisco 4. Copyright 1965 by the Sierra Club.
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By Way of Explanation

Generous though she is (she contributes stock to help finance the club), a reader told us the other day she doesn't read the *Bulletin* any more because it is too depressing: there falls the redwood, there drowns the canyon, there spreads the pesticide, and there's no fun any more.

The real depression is ours; we must sift through a dozen things going wrong for every one we fit to print, then sift the letters asking why we don't print more.

Can we accomplish anything, we asked, if we don't engage you members in it? Why not select just a few subjects to be depressed about? Call the problems opportunities, if you will. Pick some to keep posted on and help fix, and pass the rest by. Look at the photographs of good country instead.

* * * * *

To help we're making the photographs bigger. The whole Annual is bigger for 1964, the same size as the monthly. As we wrote the Publications Committee September 5, we are now completing seven years of monthly bulletins in the format chosen to do a better job with photographs—upon which the club has always relied heavily. This followed the earlier logical step when we changed the old bimonthly to a monthly so that we could talk more with all the members and when we changed to coated paper so as to use photographs every month. We changed frequency and stock in the thirties and the format in 1957.

Now is the time, we feel, to have the annual conform so as to improve the dynamics of the photographs, allow more leeway for design, bind uniformly with the other issues, take maximum advantage of a nearly $100,000 investment by bookbuyers in color separations made for our books, and attract more subscribers and advertisers (of our own choosing).

Further, copies of the annual can be hardbound for bookstore sale; one set of periodic title-page, contents, and index will serve all numbers; and the present separateness of content—the monthly being newsier and more advocative, the annual having more lasting, monographic material—can be retained, yet without our being Procustean about it all.

Ansel Adams made the proposal initially, hoping that we could come up with a more exciting *Bulletin* more likely to reach out beyond the ranks of the saved. We have people inside to save too, and more excitement might help. We hoped to change in 1963, but weren't quite ready. Now is the good time: the index through 1963 is being completed and can wind up the old nonconforming format, which will still have a place of honor in libraries. Our run is now substantial—about 25,000—and we have the means, the name, the urge, and the need to get the *Sierra Club Bulletin* out much farther if enough of the club's good work is to be done in time.

Far from dropping the Annual (as we suggested a while back with tongue in cheek) we are lifting it. Strangely enough, you get more text per dollar. This issue also gives you an *SCB* version of *Wild Cascades* color, lithographed by Barnes Pres in New York, at the lowest conceivable cost—because it is from our forthcoming book—in time to herald the last chance for a North Cascades National Park.

In photographic retrospect you'll find the last chapter of *This Is the American Earth* adapted to our format—the most moving chapter from what many call our most moving book. You may remember Dave Garroway's doing the entire chapter on television in his Today Show. (Incidentally, the *SCB* carries the chapter in the size we would like to see used for a paperback edition of the book.)

This issue merely suggests the possibilities the new format has for photographs, drawings and paintings, type, binding, and subject matter. Comment is invited.

* * * * *

As for what this *SCB* is doing and the authors who help do it:

Loren Eiseley ("The Illusion of the Two Cultures"), anthropologist, Provost of the University of Pennsylvania, is author of several books we quote in our own books; he wrote *The Immense Journey, The Firmament of Time, The Mind as Nature,* and *Darwin's Century*. In our business, we can well aspire to Professor Eiseley's perspective.

Professor Alden H. Miller, Director of Museum of Vertebrate Zoölogy, University of California, Berkeley, supervised the condor study sponsored by the National Audubon Society and financed by the National Geographic Society. The condors can use help—ours.

Norman B. Livermore, Jr., far better known to Sierra travelers as Ike Livermore, is a packer at heart but is Vice-President of Pacific Lumber Company (an enlightened operator in the redwoods) for all that. What he tells us about William E. Colby begins to say what we want to hear a great deal more of in the Colby Memorial Issue, the 1965 Annual. Who should contribute to it?

Clinton P. Anderson, Senator from New Mexico for 16 years, Secretary of Agriculture in the Truman Administration, former reporter and editor and insurance man, resident of Albuquerque, tells quite a bit of his own story in a statement he graciously delivered at the request of Elmo Robinson to the most impressive conference a new chapter of the club ever brought off. There would be no Wilderness Bill had it not been for Senator Anderson, and we wish Howard Zahniser were here to explain why.

Daniel B. Luten, whom *SCB* readers have encountered before, took leave from Shell Development Corporation to help General MacArthur reorient Japan toward its war-torn resources and never got over what happens to resources whenever man thinks they are unlimited. Dr. Luten retired early from Shell to work in conservation, and is a lecturer in Geography at the University of California, Berkeley. His article is from the forthcoming book about the 1964 Conference on Northwest Wilderness of the FWOC (the club will help distribute the book).

Members who recall **Phillip Berry** as climbing guide and High Trip cook only yesterday will be pleased to see how much he has contributed, in an earlier *SCB* article and this one, to orderly reform in forest practices in California. Forest malpractice is emerging as a major contributor to the tragic floods on Northern California's coast, especially in the redwood country. An attorney in Oakland, Phil Berry is deeply interested in our safety program, represented us in the defense of Bodega Head, and serves on the Bay Chapter's Executive Committee.

Wm. Bridge Cook has written about soil before for *SCB* readers and we hope will write much more about the earth's thin skin —which so few people, since the dramatic presentations of Hugh Bennett and Walter Lowermilk, have thought enough about, considering their total dependence upon it. We will imagine that Bridge Cooke must have thought deeply about soil when long ago he had a lot of it to look at as custodian of our Shasta Alpine Lodge; he now lives in Cincinnati, where we must assume there isn't much soil to look at.

George Marshall, who has served many years on the Council of the Wilderness Society, part of this time as managing editor of *The Living Wilderness,* came to know Howard Zahniser exceedingly well; he tells some of his impressions in a brief appreciation of a man the Sierra Club is deeply indebted to and misses very much. Mr. Marshall, an officer of the club and its Publications Committee, also served as editor of *Arctic Wilderness,* by his brother, the late Robert Marshall, founder of The Wilderness Society.

Professor Richard C. Bradley is one of several Sierra Club Bradleys, many of them professors, all of them sons of Professor Bradley (former president Harold), himself the son of Professor Bradley (former *SCB* editor Cornelius Beach), for whom Center Basin's Mount Bradley is named. None has revealed more of the Bureau of Reclamation's propensity for error than our present author, now one of the three Bradley sons living in Colorado, but the one who teaches physics. Is this all clear?

The photographers' work is bringing kudos to the club from all over, as the inside cover quotes show. Thanks to our books and tens of thousands of nonmember buyers of them, we could afford to run the photographs here for all members, nearly 20,000 of whom have joined since *This is the American Earth* first appeared. By the way, we're always looking for more photographs, which may appear first in the *SCB* or first in the books, serving the same purpose either way.

The editor has other duties too, all stemming from his having joined the club as a rock climber in 1933 and having served on various kinds of committees and outings since then. Back in 1935 he was allowed to serve on the club's Editorial Board by Francis P. Farquhar, who more than anyone else has been the coach of this issue's perpetrator.—D.B.

Organic wholeness, Robinson Jeffers thought, was the answer: man in an intact environment, not man apart from that. An anthropologist who knew Jeffers and his country, and one of America's foremost writers and creative scientists, looks into the schism which institutionalized science often forces between man and the only land he has evolved to live with.

The Illusion of the Two Cultures

By Loren Eiseley

Not long ago an English scientist, Sir Eric Ashby, remarked that "To train young people in the dialectic between orthodoxy and dissent is the unique contribution which universities make to society." I am sure that Sir Eric meant by this remark that nowhere but in universities are the young given the opportunity to absorb past tradition and at the same time to experience the impact of new ideas—in the sense of a constant dialogue between past and present—lived in every hour of the students' existence. This dialogue, ideally, should lead to a great winnowing and sifting of experience and to a heightened consciousness of self which, in turn, should lead on to greater sensitivity and perception on the part of the individual.

Our lives are the creation of memory and the accompanying power to extend ourselves outward into ideas and relive them. The finest intellect is that which employs an invisible web of gossamer running into the past as well as across the minds of living men, and which constantly responds to the vibrations transmitted through these tenuous lines of sympathy. It would be contrary to fact, however, to assume that our universities always perform this unique function of which Sir Eric speaks, with either grace or perfection; in fact our investment in man, it has been justly remarked, is deteriorating even as the financial investment in science grows.

Over thirty years ago, George Santayana had already sensed this trend. He commented, in a now forgotten essay, that one of the strangest consequences of modern science was that as the visible wealth of nature was more and more transferred and abstracted, the mind seemed to lose courage and to become ashamed of its own fertility. "The hard-pressed natural man will not indulge his imagination," continued Santayana, "unless it poses for truth; and being half-aware of this imposition, he is more troubled at the thought of being deceived than at the fact of being mechanized or being bored; and he would wish to escape imagination altogether."

"Man would wish to escape imagination altogether." I repeat that last phrase, for it defines a peculiar aberration of the human mind found on both sides of that bipolar division between the humanities and the sciences, which C. P. Snow has popularized under the title of the two cultures. The idea is not solely a product of this age. It was already emerging with the science of the seventeenth century; one finds it in Bacon. One finds the fear of it faintly foreshadowed in Thoreau. Thomas Huxley lent it weight when he referred contemptuously to the "caterwauling of poets."

Ironically, professional scientists berated the early evolutionists such as Lamarck and Chambers for overindulgence in the imagination. Almost eighty years ago John Burroughs observed that some of the animus once directed by science toward dogmatic theology seemed in his day increasingly to be vented upon the literary naturalist. In the early 1900's a quarrel over "nature faking" raised a confused din in America and aroused W. H. Hudson to some dry and pungent comment upon the failure to distinguish the purposes of science from those of literature. I know of at least one scholar who, venturing to develop some personal ideas in an essay for the layman, was characterized by a reviewer in a leading professional journal as a worthless writer, although, as it chanced, the work under discussion had received several awards in literature, one of them international in scope. More recently, some scholars not indifferent to humanistic values have exhorted poets to leave their personal songs in order to portray the beauty and symmetry of molecular structures.

Now some very fine verse has been written on scientific subjects, but, I fear, very little under the dictate of scientists as such. Rather there is evident here, precisely that restriction of imagination against which Santayana inveighed; namely, an attempt to constrain literature itself to the delineation of objective or empiric truth, and to dismiss the whole domain of value, which after all constitutes the very nature of man, as without significance and beneath contempt.

Unconsciously, the human realm is denied in favor of the world of pure technics. Man, the tool user, grows convinced that he is himself only useful as a tool, that fertility except in the use of the scientific imagination is wasteful and without purpose, even, in some indefinable way, sinful. I was reading J. R. R. Tolkien's great symbolic trilogy, *The Fellowship of the Ring,* a few months ago, when a young scientist of my acquaintance paused

and looked over my shoulder. After a little casual interchange the man departed leaving an accusing remark hovering in the air between us. "I wouldn't waste my time with a man who writes fairy stories." He might as well have added, "or with a man who reads them."

As I went back to my book I wondered vaguely in what leafless landscape one grew up without Hans Christian Andersen, or Dunsany, or even Jules Verne. There lingered about the young man's words a puritanism which seemed the more remarkable because, as nearly as I could discover, it was unmotivated by any sectarian religiosity unless a total dedication to science brings to some minds a similar authoritarian desire to shackle the human imagination. After all, it is this impossible, fertile world of our imagination which gave birth to liberty in the midst of oppression, and which persists in seeking until what is sought is seen. Against such invisible and fearful powers, there can be found in all ages and in all institutions—even the institutions of professional learning—the humorless man with the sneer, or if the sneer does not suffice, then the torch, for the bright unperishing letters of the human dream.

One can contrast this recalcitrant attitude with an 1890 reminiscence from that great Egyptologist, Sir Flinders Petrie, which steals over into the realm of pure literature. It was written, in unconscious symbolism, from a tomb:

"I here live, and do not scramble to fit myself to the requirements of others. In a narrow tomb, with the figure of Néfermaat standing on each side of me—as he has stood through all that we know as human history—I have just room for my bed, and a row of good reading in which I can take pleasure after dinner. Behind me is that Great Peace, the Desert. It is an entity—a power—just as much as the sea is. No wonder men fled to it from the turmoil of the ancient world."

It may now reasonably be asked why one who has similarly, if less dramatically, spent his life among the stones and broken shards of the remote past should be writing here about matters involving literature and science. It was while considering this with humility and trepidation that my eye fell upon a stone in my office. I am sure that professional journalists must recall times when an approaching deadline has keyed all their senses and led them to glance wildly around in the hope that something might leap out at them from the most prosaic surroundings. At all events my eyes fell upon this stone.

Now the store antedated anything that the historians would call art; it had been shaped many hundreds of thousands of years ago by men whose faces would frighten us if they sat among us today. Out of old habit, since I like the feel of worked flint, I picked it up and hefted it as I groped for words over this difficult matter of the growing rift between science and art. Certainly the stone was of no help to me; it was a utilitarian thing which had cracked marrow bones, if not heads, in the remote dim morning of the human species. It was nothing if not practical. It was, in fact, an extremely early example of the empirical tradition which has led on to modern science.

The mind which had shaped this artifact knew its precise purpose. It had found out by experimental observation, that the stone was tougher, sharper, more enduring than the hand which wielded it. The creature's mind had solved the question of the best form of the implement and how it could be manipulated most effectively. In its day and time this hand ax was as grand an intellectual achievement as a rocket.

As a scientist my admiration went out to that unidentified workman. How he must have labored to understand the forces involved in the fracturing of flint, and all that involved practical survival in his world. My uncalloused twentieth-century hand caressed the yellow stone lovingly. It was then that I made a remarkable discovery.

Art in Stone

In the mind of this gross-featured, early exponent of the practical approach to nature—the technician, the no-nonsense practitioner of survival—two forces had met and merged. There had not been room in his short and desperate life for the delicate and supercilious separation of the arts from the sciences. There did not exist then the refined distinctions set up between the scholarly percipience of reality and what has sometimes been called the vaporings of the artistic imagination.

As I clasped and unclasped the stone, running my fingers down its edges, I began to perceive the ghostly emanations from a long-vanished mind, the kind of mind which, once having shaped an object of any sort, leaves an individual trace behind it which speaks to others across the barriers of time and language. It was not the practical experimental aspect of this mind that startled me, but rather that the fellow had wasted time.

In an incalculably brutish and dangerous world he had both shaped an instrument of practical application and then, with a virtuoso's elegance, proceeded to embellish his product. He had not been content to produce a plain, utilitarian implement. In some wistful, inarticulate way, in the grip of the dim aesthetic feelings which are one of the marks of man—or perhaps I should say, some men—this archaic creature had lingered over his handiwork.

One could still feel him crouching among the stones on a long-vanished river bar, turning the thing over in his hands, feeling its polished surface, striking, here and there, just one more blow that no longer had usefulness as its criterion. He had, like myself, enjoyed the texture of the stone. With skills lost to me, he had gone on flaking the implement with an eye to beauty until it had be-

come a kind of rough jewel, equivalent in its day, to the carved and gold inlaid pommel of the iron dagger placed on Tutankhamen's tomb.*

All the later history of man contains these impractical exertions expended upon a great diversity of objects, and, with literacy, breaking even into printed dreams. Today's secular disruption between the creative aspect of art and that of science is a barbarism that would have brought lifted eyebrows in a Cro-Magnon cave. It is a product of high technical specialization, the deliberate blunting of wonder, and the equally deliberate suppression of a phase of our humanity in the name of an authoritarian institution: science, which has taken on, in our time, curious puritanical overtones. Many scientists seem unaware of the historical reasons for this development, or the fact that the creative aspect of art is not so remote from that of science as may seem, at first glance, to be the case.

I am not so foolish as to categorize individual scholars or scientists. I am, however, about to remark on the nature of science as an institution. Like all such structures it is apt to reveal certain behavioral rigidities and conformities which increase with age. It is no longer the domain of the amateur, though some of its greatest discoverers could be so defined. It is now a professional body, and with professionalism there tends to emerge a greater emphasis upon a coherent system of regulations. The deviant is more sharply treated, and the young tend to imitate their successful elders. In short, an "Establishment"—a trade union—has appeared.

Similar tendencies can be observed among those of the humanities concerned with the professional analysis and interpretation of the works of the creative artist. Here too, a similar rigidity and exclusiveness make their appearance. It is not that in the case of both the sciences and the humanities standards are out of place. What I am briefly cautioning against is that too frequently they afford an excuse for stifling original thought, or constricting much latent creativity within traditional molds.

Such molds are always useful to the mediocre conformist who instinctively castigates and rejects what he cannot imitate. Tradition, the continuity of learning, are, it is true, enormously important to the learned disciplines. What we must realize as scientists is that the particular institution we inhabit has its own irrational accretions and authoritarian dogmas which can be as unpleasant as some of those encountered in sectarian circles—particularly so since they are frequently unconsciously held and surrounded by an impenetrable wall of self-righteousness brought about because science is regarded as totally empiric and open-minded by tradition.

This type of professionalism, as I shall label it, in order to distinguish it from what is best in both the sciences and the humanities, is characterized by two assumptions: that the accretions of fact are cumulative and lead to progress, whereas the insights of art are, at best, singular, and lead nowhere, or, when introduced into the realm of science, produce obscurity and confusion. The convenient label "mystic" is, in our day, readily applied to men who pause for simple wonder, or who encounter along the borders of the known, that "awful power" which Wordsworth characterized as the human imagination. It can, he says, rise suddenly from the mind's abyss and enwrap the solitary traveler like a mist.

We do not like mists in this era, and the word *imagination* is less and less used. We like, instead, a clear road, and we abhor solitary traveling. Indeed one of our great scientific historians remarked not long ago that the literary naturalist was obsolescent if not completely outmoded. I suppose he meant that with our penetration into the biophysical realm, life, like matter, would become increasingly represented by abstract symbols. To many it must appear that the more we can dissect life into its elements, the closer we are getting to its ultimate resolution. While I have some reservations on this score, they are not important. Rather, I should like to look at the symbols which in the one case, denote science and, in the other constitute those vaporings and cloud wraiths that are the abomination, so it is said, of the true scientist, but are the delight of the poet and literary artist.

Creation in Science

Creation in science demands a high level of imaginative insight and intuitive perception. I believe no one would deny this, even though it exists in varying degrees, just as it does, similarly, among writers, musicians, or artists. The scientist's achievement, however, is quantitatively transmissible. From a single point his discovery is verifiable by other men who may then, on the basis of corresponding data, accept the innovation and elaborate upon it in the cumulative fashion which is one of the great triumphs of science.

Artistic creation, on the other hand, is unique. It cannot be twice discovered as, say, natural selection was discovered. It may be imitated stylistically, in a genre, a school, but, save for a few items of technique, it is not cumulative. A successful work of art may set up reverberations and is, in this, just as transmissible as science, but there is a qualitative character about it. Each reverberation in another mind is unique. As the French novelist François Mauriac has remarked, each great novel is a separate and distinct world operating under its own laws with a flora and

* Such an implement, so the Lowie Museum exhibit, "Man, the Inventor," explained to viewers in Berkeley, served man for some three hundred thousand years as his most advanced tool —and without appreciable effect upon his environment. What modern tool, one might ask, can the environment survive for even three hundred years?—D.B.

fauna totally its own. There is communication, or the work is a failure, but the communication releases our own visions, touches some highly personal chord in our own experience.

The symbols used by the great artist are a key releasing our humanity from the solitary tower of the self. "Man," says Lewis Mumford, "is first and foremost the self-fabricating animal." I will merely add that the artist plays an enormous role in this act of self-creation. It is he who touches the hidden strings of pity, who searches our hearts, who makes us sensitive to beauty, who asks questions about fate and destiny. Such questions, though they lurk always around the corners of the external universe which is the peculiar province of science, the rigors of the scientific method do not enable us to pursue directly.

And yet I wonder.

It is surely possible to observe that it is the successful analogy or symbol which frequently allows the scientist to leap from a generalization in one field of thought to a triumphant achievement in another. For example, Progressionism in a spiritual sense later became the model contributing to the discovery of organic evolution. Such analogies genuinely resemble the figures and enchantments of great literature, whose meanings similarly can never be totally grasped because of their endless power to ramify in the individual mind.

John Donne, in the seventeenth century, gave powerful expression to a feeling applicable as much to science as to literature when he said devoutly of certain Biblical passages: "The literall sense is alwayes to be preserved; but the literall sense is not alwayes to be discerned; for the literall sense is not alwayes that which the very letter and grammar of the place presents."—A figurative sense, he argues cogently, can sometimes be the most "literall intention of the Holy Ghost."

It is here that the scientist and artist sometimes meet in uneasy opposition, or at least along lines of tension. The scientist's attitude is sometimes, I suspect, that embodied in Samuel Johnson's remark that, wherever there is mystery, roguery is not far off.

Yet surely it was not roguery when Sir Charles Lyell glimpsed in a few fossil prints of raindrops the persistence of the world's natural forces through the incredible, mysterious aeons of geologic time. The fossils were a symbol of a vast hitherto unglimpsed order. They are, in Donne's sense, both literal and symbolic. As fossils they merely denote evidence of rain in a past era. Figuratively they are more. To the perceptive intelligence they afford the hint of lengthened natural order, just as the eyes of ancient trilobites tell us similarly of the unchanging laws of light. Equally, the educated mind may discern in a scratched pebble the retreating shadow of vast ages of ice and gloom. In Donne's archaic phraseology these objects would bespeak the principal intention of the Divine Being, that is, of order beyond our power to grasp.

Such images drawn from the world of science are every bit as powerful as great literary symbolism and equally as demanding upon the individual imagination of the scientist who would fully grasp the extension of meaning which is involved. It is, in fact, one and the same creative act in both domains.

Indeed evolution itself has become such a figurative symbol, as has also the hypothesis of the expanding universe. The laboratory worker may think of these concepts in a totally empirical fashion as subject to proof or disproof by the experimental method. Like Freud's doctrine of the subconscious, however, such ideas frequently escape from the professional scientist into the public domain. There they may undergo further individual transformation and embellishment. Whether the scholar approves or not, such hypotheses are now as free to evolve as the creations of art in the mind of the individual. All the resulting enrichment and confusion will bear about it something suggestive of the world of artistic endeavor.

As figurative insights into the nature of things, such embracing conceptions may become grotesquely distorted or glow with added philosophical wisdom. As is true of the trilobite eye or the fossil raindrop, there lurk behind the visible evidence vast shadows no longer quite of that world which we term natural. Like the words in Donne's Bible enormous implications have transcended the literal expression of the thought. Reality itself has been superseded by a greater reality. As Donne himself asserted, "The substance of the truth is in the great images which lie behind."

It is because these two types of creation—the artistic and the scientific—have sprung from the same being and have their points of contact even in division, that I have the temerity to assert that, in a sense, the two cultures are an illusion, that they are a product of unreasoning fear, professionalism, and misunderstanding. Because of the emphasis upon science in our society, much has been said about the necessity of educating the layman and even the professional student of the humanities upon the ways and the achievements of science. I admit that a barrier exists, but I am also concerned to express the view that there persists in the domain of science itself, an occasional marked intolerance of those of its own membership who venture to pursue the way of letters. As I have previously remarked, this intolerance can the more successfully clothe itself in seeming objectivity because of the supposed open nature of the scientific society. It is not remarkable that this trait is sometimes more manifest in the younger and less secure disciplines.

There was a time, not too many centuries ago, when to be active in scientific investigation was to invite suspicion. Thus it may be that there now lingers among us, even in the triumph of the experimental method, a kind of vague fear of that other artistic world of deep emotion, of strange

symbols, lest it seize upon us or distort the hard-won objectivity of our thinking—lest it corrupt, in other words, that crystalline and icy objectivity which, in our scientific guise, we erect as a model of conduct. This model, incidentally, if pursued to its absurd conclusion, would lead to a world in which the computer would determine all aspects of our existence; one in which the bomb would be as welcome as the discoveries of the physician.

A Simple Sense of Wonder

Happily, the very great in science, or even those unique scientist-artists such as Leonardo, who foreran the emergence of science as an institution, have been singularly free from this folly. Darwin decried it even as he recognized that he had paid a certain price in concentrated specialization for his achievement. Einstein, it is well known, retained a simple sense of wonder; Newton felt like a child playing with pretty shells on a beach. All show a deep humility and an emotional hunger which is the prerogative of the artist. It is with the lesser men, with the institutionalization of method, with the appearance of dogma and mapped-out territories that an unpleasant suggestion of fenced preserves begins to dominate the university atmosphere.

As a scientist, I can say that I have observed it in my own and others' specialties. I have had occasion, also, to observe its effects in the humanities. It is not science *per se;* it is, instead, in both regions of thought, the narrow professionalism which is also plainly evident in the trade union. There can be small men in science just as there are small men in government, or business. In fact it is one of the disadvantages of big science, just as it is of big government, that the availability of huge sums attracts a swarm of elbowing and contentious men to whom great dreams are less than protected hunting preserves.

The sociology of science deserves at least equal consideration with the biographies of the great scientists, for powerful and changing forces are at work upon science, the institution, as contrasted with science as a dream and an ideal of the individual. Like other aspects of society, it is a construct of men, and is subject, like other social structures, to human pressures and inescapable distortions.

Let me give you an illustration. Even in learned journals, clashes occasionally occur between those who would regard biology as a separate and distinct domain of inquiry and the reductionists who, by contrast, perceive in the living organism only a vaster and more random chemistry. Understandably, the concern of the reductionists is with the immediate. Thomas Hobbes was expressing a similar point of view when he castigated poets as "working on mean minds with words and distinctions that of themselves signifie nothing, but betray (by their obscurity) that there walketh . . . another kingdome, as it were a kingdome of fayries in the dark." I myself have been similarly criticized for speaking of a nature "beyond the nature that we know."

Yet consider for a moment this dark, impossible realm of Fayrie. Man is not totally compounded of the nature we profess to understand. He contains, instead, a lurking unknown future, just as the man-apes of the Pliocene contained in embryo the future that surrounds us now. The world of human culture itself was an unpredictable fairy world until, in some Pre-Ice-Age meadow, the first meaningful sounds in all the world broke through the jungle babble of the past, the nature, until that moment, "known."

It is fascinating to observe that, in the very dawn of science, Bacon, the spokesman for the empirical approach to nature, shared with Shakespeare, the poet, a recognition of the creativeness which adds to nature, and which emerges from nature as "an art which nature makes." Neither the great scholar nor the great poet had renounced the kingdome of Fayrie. They had realized what Bergson was later to express so effectively, that life inserts a vast "indetermination into matter." It is, in a sense, an intrusion from a realm which can never be completely subject to prophetic analysis by science. The novelties of evolution emerge; they cannot be predicted. They haunt, until their arrival, a world of unimaginable possibilities behind the living screen of events, as these last exist to the observer confined to a single point on the time scale.

Oddly enough, much of the confusion that surrounded my phrase, "a nature beyond the nature that we know," resolves itself into pure semantics. I might have pointed out what must be obvious even to the most dedicated scientific mind that the nature which we know has been many times reinterpreted in human thinking, and that the hard, substantial matter of the nineteenth century has already vanished into a dark, bodiless void, a web of "events" in space-time. This is a realm, I venture to assert, as weird as any we have tried, in the past, to exorcise by the brave use of seeming solid words. Yet some minds exhibit an almost instinctive hostility toward the mere attempt to wonder, or to ask what lies below that microcosmic world out of which emerge the particles which compose our bodies, and which now take on this wraithlike quality.

Is there something here we fear to face, except when clothed in safely sterilized professional speech? Have we grown reluctant in this age of power to admit mystery and beauty into our thoughts, or to learn where power ceases? I referred a few moments ago to one of our own forebears on a gravel bar, thumbing a pebble. If, after the ages of building and destroying, if after the measuring of light-years, and the powers probed at the atom's heart, if after the last iron is rust-eaten and the last glass lies shattered in the streets, a man, some savage, some remnant of what once we were, pauses on his way to the tribal drinking place and feels rising from within his soul the inexplicable mist of terror and beauty that is evoked from old ruins—even the ruins of the greatest city in the world—then, I say, all will still be well with man.

And if that savage can pluck a stone from the gravel because it shone like crystal when the water rushed over it, and hold it against the sunset, he will be as we were in the beginning, whole—as we were when we were children, before we began to split the knowledge from the dream. All talk of the two cultures is an illusion; it is the pebble which tells man's story. Upon it is written man's two faces, the artistic and the practical. They are expressed upon one stone over which a hand once closed, no less firm because the mind behind it was submerged in light and shadow and deep wonder.

Today we hold a stone, the heavy stone of power. We must perceive beyond it, however, by the aid of the artistic imagination, those humane insights and understandings which alone can lighten our burden and enable us to shape ourselves, rather than the stone, into the forms which great art has anticipated.

This address was delivered October 29, 1963 in The Rockefeller Institute at a symposium inaugurating The Richard Prentice Ettinger Program for Creative Writing, of which Doctor Eiseley is Director. *Copyright 1964 by The American Scholar and reproduced with permission.*

Wild Voice

A flicker call bestirred our sheltered hearth.
It halted us, mid-thought, as on that day
It froze our steps a wilderness away.
In that far solitude the untamed earth
Was transfixed, too;—attuned in radiant birth
Of wonderment where primal fears held sway.
Now, long-remembering, our hearts assay
Wild vigilance at one bird's cry of mirth.

Across what ravaged hills; down what dead streams;
Above what asphalt plain has this bird flown?
He perched, a transient, on our window tree
His sharp call echoed as it were a dream
Of racial venturing our souls have known
In some lost wildness of eternity.

Ardis M. Walker

Five near-vacuums in the works of men of good will were pointed out to the Eighth Wilderness Conference. The editor thinks they still need filling and calls for help.

The Irreplaceables, Foundations, and Conventional Heresy

I TEND to become silent before practical men, and to forget that it is to the impractical men that we owe most of what is worthwhile in the real improvement of man's lot. As Disraeli said, "A practical man is the man you can count upon to perpetuate the errors of his ancestors."

Reserving the Irreplaceables is something at which practical men are not succeeding nearly well enough. The most important of the irreplaceables is wilderness, with wildness itself a close second. We are losing both at an appalling rate, busying ourselves with saving fragments while the entities vanish. We read that magnificently amorphous cliché "The greatest good for the greatest number" backwards—and end up with programs in which the greatest number can wipe out the greatest good, in which progress is measured by the number of things it wipes out which made life most worthwhile, by the numbers of things we collect rather than the number we understand, and by the number of acres added to the tax rolls but lost to society.

One of these days I should like not to be so dire, but the time hasn't come yet. We just had a billboard at the west end of the Bay Bridge bragging about the speed with which California is outstripping New York. It worked out neatly because the California number went up every 50 seconds, while they let the New York population stay put. The *Chronicle* has wisely called, editorially, for a wake in memory of the California lost under this new bigness. I'll have more to say about that growth in a moment, but want first to say more about why I must be dire.

I am failing as a parent when I send my children down from our Berkeley hilltop day after day into a darkening sea of smog. I feel no parental pride when I watch the highwaymen assume that A Hill Is to Dig, and obliterate countryside my grandchildren should have known, paving an ever-expanding breeding ground for the smog-bearing traffic that divides and conquers or scatters cities, doing so at a fearful expense while schools can't afford adequate textbooks. I have a strong guilt feeling when we serve these children an ever-increasing potion of chemicals in their food and water and then read, in an American Medical Association publication issued for the waiting rooms of America, a ridiculous attack on Rachel Carson's outstanding contribution, *Silent Spring,* an attack that is largely ecologically illiterate. Happily, where ecology is best understood, Rachel Carson's memory is honored. It is good to hear from the members of the A.M.A. who have ecological consciences, and to know also that Miss Carson so believed in the Sierra Club's understanding that she bequeathed nearly half her estate to the club.

I am not being irrelevant in lamenting my own failure, because you share it, every single one of you who accedes to what is happening and is too busy to face the cause—the overproduction of people, and that carrot-on-a-stick out front: "Your future is great in a growing America." It is your future *peril* that is great when self-restraint wears out, and the loss of wilderness is one measure of the speed of its wearing out.

Wilderness is where you save it, not where, because it is easier to kill it than to stabilize population, you log wilderness, or pave or dam or subdivide it, or spray it with herbicides and pesticides. Wilderness will not be safe enough until there is a broader appreciation of it, until we learn to extend reverence for life to other life than our own. Our effort to extend this appreciation uncovers several conservation taboos which I'll come to in a moment. I think we shall be only playing with conservation, not practicing it, until we get rid of them. The irreplaceables that are then still left will then be preservable. We need only look around us to know the urgency of Allen Morgan's admonition: "What we save in the next few years is all that will ever be saved."

We aren't saving fast enough. Why? Because most of the nation's conservation effort so far has been short-range. Moreover, the effort has stressed commodity-resource development, which is all well enough, but which is only part of conservation, however wise the use being talked about. For example, notice how the very able group, Resources for the Future, established with a Ford Foundation grant in 1953, has stressed commodity resources in the subject matter of its books and bulletins. The commodity-centered conservation studies often produce a great quantity of data about what is already obvious. An ever-increasing population with an ever-increasing appetite will tax the nonexpanding planet. It doesn't take much imagination to demonstrate that unending growth will do us all in—or do our children and theirs out of the heritage they deserve—and that we can survive without that unending growth and *only* without it.

Do you know of any conservation group that is giving this concept serious consideration? I don't think you do. It is one of the taboos. The diametric opposite of what I have said is heard everywhere. I do not think you can find an agency in government yet willing to question growth. But some growth is bad—for instance, malignant growth.

One way to combat malignancy is to examine for it periodically. I believe there is malignancy in our economy, and that all conservation will fail unless it is checked. We need to get the checking started. Someone (or some foundations) can make an unequaled contribution to mankind by undertaking a series of five neglected projects that seem to be taboo.

1. The first need is to develop *a blueprint for the economics of peaceful stability*. The "vigorous, growing economy" all our leaders keep exhorting us to produce is not possible on an earth of fixed size, and continuing attempts to produce it are *the* basic threat to peace.

The momentum of this happy catch phrase, the charm of it, is so great that it will take a major effort to offset it and to prove that we can live without it. The UN is already showing concern about the question, Can the economy withstand peace? Gerard Piel has tackled it well. The concomitant question is, Can limited resources withstand a constantly increasing expenditure? The answer to the first question is and must be yes, and to the second question, no. Both answers are painfully obvious but universally avoided. There is no better cause than to face them squarely and learn to live with them—or not at all. We must not be lulled by euphoric Jules-Verning. Yet there is a little of this in the news, summed up in the quotation, "Man's power to mold the world to his liking is almost unlimited."

We would do better to heed other philosophy, for example, to remember Loren Eiseley's warning about "the wounded outcry of the human ego as . . . it learns that the world supposedly made for its enjoyment has existed for untold eons entirely indifferent to its coming. The chill vapors of time and space are beginning to filter under the closed door of the human intellect."

Eiseley says elsewhere, ". . . The need is not really for more brains, the need is now for a gentler, a more tolerant people than those who won for us against the ice, the tiger, and the bear. The hand that hefted the axe, out of some old blind allegiance to the past, fondles the machine gun as lovingly. It is a habit man will have to break to survive, but the roots go very deep . . .

"He has always sought mastery over the materials of his environment . . . He holds the heat of suns within his hands and threatens with it both the lives and happiness of his unborn descendants. Man, in the words of one astute biologist, is caught in a physiological trap and faced with the problem of escaping from his own ingenuity."

Paul Sears told us something like this in the Seventh Biennial Wilderness Conference: ". . . as we lengthen and elaborate the chain of technology that intervenes between us and the natural world, we forget that we become steadily more vulnerable to even the slightest failure in that chain."

At the same conference, Joseph Wood Krutch agreed: ". . . It is not a sentimental but a grimly literal fact that unless we share this terrestrial globe with creatures other than ourselves, we shall not be able to live on it for long."

Lewis Mumford adds this insight: "To put all our hope in the improvement of machines is the characteristic inversion and perversion of values of the present age; and that is the reason that our machines threaten us with extinction, since they are now in the hands of deplorably unimproved men."

So we need a blueprint for an economy that will endure in peaceful stability, that will not require the war with environment that leads to war with fellow man. The blueprint will not be easily prepared, nor can we keep all our bad habits and live with it. Neither can we keep our bad habits too long and live at all. If man really learns the importance of living at peace with his environment, wilderness will be safe. So will he.

Which brings us to an old friend, Henry David Thoreau: "What is the use of a house if you haven't got a tolerable planet to put it on?"

2. We also need a *Center for the Advanced Study of Ecosystems*. What I have just said about Technologists who are *trained* does not include the natural scientists who are *educated* and who have a reverence for life and the relationships between different kinds of life. The idea of a Center to study ecosystems comes from Edward H. Graham, of the Soil Conservation Service. He presented the idea three years ago at a Resources for the Future seminar. He is now trying to further it through the International Union for Conservation and its forthcoming 5-year International Biological Program.

Like the Center for the Advanced Study of the Behavioral Sciences at Stanford, this new Center would seek out the best minds in the field and give them a chance to get on record after some long periods of unharrassed thought. This Center needs to find or develop (or both) some Einsteins of biology. There is tragically little known about the speed with which technology is wiping out the world's organic wealth—the variety of interrelated living forms built up through the aeons since life began and, we can be sure, essential to the continuation of life as we know it. But we spend this wealth as a ne'er-do-well spends his inheritance. There seems to be no limit.

As an analogy, I am reminded of the Sierra Club's recent book, "*In Wildness . . .*" Back at the printers we had left-over sheets. We printed 72 plates on five forms, and they did not all come out even, especially after we had rejected plates with flaws. We had as many as 4,000 copies of some of the pages and were down to none on others. We had to face a bitter fact: As soon as we ran out of any one subject, we could assemble no more books.

Have we, as citizens, thought enough about what is

going to happen when we run out of some critical element, one that the fabric of civilization requires? About where and when the Law of the Minimum will be enforced on man?

In *This Is the American Earth* (Sierra Club, 1960) Nancy Newhall says "The crucial resource is man's spirit."

It is certain that he will have little intelligence or spirit if he lacks the living organisms and their fertility that together feed his body. We are mining the world's fertility—and hardly anyone knows it. Note how some chemical industries, in scolding Rachel Carson, keep reciting how many more mouths there will be to feed, and what else but chemical fertilizers and sprays will enable us to produce the necessary food. I know there are many conservationists in the industry but too few have the necessary ecological insight and all are too busy to heed those few.

What really happens when you fertilize with phosphates, for example? What do you do but accelerate the drain on the soil of all the *nonphosphates* in the soil? It is like pumping more and more water out of the ground on the Central Arizona plateau, and driving the water table deeper and deeper—and claiming that thereby you are going to get more crops for the future. All you do, alas, is mine the water, and guarantee that more crops will one day cease growing at all until the water table is recharged, if this can be done.

Similarly, we are mining the forests' fertility, and talking happily of multiple use, one of the less exact concepts, and of sustained yield—without thinking very carefully about just how long such yields can be sustained.

The Center for Advanced Study of Ecosystems would be able to test the claim, "The only solution is to get more out of the existing acres." The Center might well demonstrate that the only solution is to withdraw less from the existing acres—to get man back in balance with his environment. That balance will include wilderness.

3. We also need a *Plan for Reinterpretation of Nature* —a conservation-education program, wherever possible avoiding the use of the two uninspiring words, "conservation" and "education." The objective would be to use the best means, with strong emphasis on books and television, to inform the public as quickly as possible of what is learned about peaceful stability and ecosystems.

It would not be easy to find the reinterpreters. Most of the writers and producers have been too susceptible to all the economic and natural-resource clichés. I am confident that we can find the people to build with, and will suggest some names in a moment. They will need to know wilderness.

4. We are in urgent need of a *Crash Program for Reserving the Irreplaceables*. Private philanthropy must be relied upon for revolving funds with which to hold certain key areas, particularly those in which wilderness is paramount and threatened. The success of Parts 1 to 3 will diminish the load on private philanthropy in due course, but there isn't time to wait. The present political climate is promising, but even the most dramatic of programs under the new Land and Water Conservation Fund Act may be far too slow-moving to save what ought to be saved and can be saved.

If we are to have a Northern Cascades National Park that does not have its corridors amputated by needless logging and its Image Lake midriff eviscerated by an open pit mine, someone must buy out certain private interests and rights there and be prepared to give them to the government—provided the government gives the region the protection for the future which national park law can provide. This is but one example of many of the potential parks that can be wrecked by present-day wanton logging in the upstream watersheds. Private funds must get the lands now—within the next few years.

The Land Conservation Fund should produce about $1.5 billion in eight years—an unprecedented gain for its purpose but less than a single year's telephone-company profit and probably not enough to take care of New York State's needs for forest and recreational lands. There are 49 other states. How can we augment this fund or offset the erosion of it we can expect from inflation or hasty development of lands that should be left open?

Excess taking, to use the Franklin D. Roosevelt concept, may be the answer, and the larger foundations may have the only means available in our form of government to exploit the opportunity.

To refresh you: F.D.R. hoped to finance a federal highway program by acquiring substantially more land than needed for right-of-way, and selling the excess back to private owners at the increased value the federally financed highway would itself create in adjoining land. This never quite came off. I imagine that the land hucksters couldn't tolerate the prospect of the federal government's making this kind of profit for the public. *They* wanted the profit, and they could smother the concept.

It would seem comparatively simple for private foundations to undertake a land-reservation program with this self-help provision, solely in the public interest. For example, they could buy up more land around a potential park than would be needed for the park, hold the excess a few years, and then sell it, counting on the inflation of values to be much more rapid than the cost of interest on the investment. Whatever gain they made in the sale would extend the foundation's ability to preserve still more critically needed open space.

Looking backward, imagine how many times Central Park could have paid for itself by now if Olmsted had

persuaded the city of New York to take over, right at the outset, the 109 extra city blocks which constitute its perimeter, and had sold these at a deliberate rate—or even leased them—to accommodate the high-rise apartment buildings that now ring the park. Wouldn't the capital gain be enough by now to buy several Northern Cascades National Parks for New Yorkers of the 21st Century to jet to on long week-ends?

Is this excess-taking concept so logical that it is politically impossible? I refuse to admit it; it is only the people who can make a thing politically impossible, and informed people can find a way to do what they want done. Such people will remember that one of the most important of the irreplaceables is wilderness.

5. Last, or concurrently, we need to build *Careers in Preservation*. We need to balance the "wise-use" graduates with guardians of reserves, and to give status to both kinds of careers, not just the former. We should plan resource-management curricula that inculcate ecological literacy. True education will bring today's children into an adulthood in which they take for granted the things we have been discussing. They should not have to rely upon the private foundation. But it can be the catalyst. It can help restore to the teaching process what mankind used to learn from the land itself when there was still land enough to go around, and less of it paved.

Here the endowing of chairs would be important, and the preparation of texts free as much as possible of the old myths about resources. We would then be on our way toward the understanding of the land mechanism and the land ethic that Aldo Leopold defined—an understanding widely enough held to serve our park superintendents and rangers, our forest chiefs and supervisors, our industrialists who are raw-material developers, our lawmakers, and even the growing number of people who will tie their cars outside and walk back into wilderness.

In all these proposals there may seem to be a breath of heresy. Or there may be only innovation in a world that fears innovation but must have it. If so, it will do the world much good to find out, and it is probably going to take something like a Ford Foundation to finance the asking of questions and digging out of answers.

How much innovation are you interested in? Or are you the normal kind of person who, to quote Dan Luten, would rather die than change his habits? Are you satisfied with the kind of world our generation has made of the world it received, and are you free of concern about present-day direction? Do you believe that man is so all-wise that a few experts among the uninformed many can lead us to a new world which can live without wildness and be braver and better for the deprivation?

Do you assume these questions to be too dire, viewing with alarm too much? Are they extremist?

I can understand it if you think so. They are questions I did not ask until I first began to get a little suspicious of some favorite myths after returning from World War II.

But please don't just assume I am wrong. For the sake of the future, prove me wrong. Gather your own witnesses. For my own part, I list several below, without their leave and with no assurance that they would agree with what I have said. Nevertheless it would be worthwhile to have all of them collaborate on a Do-It-Yourself Think Book. I don't think any of them have reached the comfortable point so aptly described by C. P. Snow, where all their decisions are safely behind them. I'd like to see them attack the five subjects.* Perhaps at a nation-wide conference or on a TV series, all followed by a book—or by five books.

So don't just assume me wrong, but prove it if you can—or else do something about the irreplaceables we have been discussing, and please do it soon, for the fate of wilderness, among other things, rests upon how far you get in tackling these questions.

Aldo Leopold's *Sand County Almanac* has this quotation about you from Edwin Arlington Robinson, and I close with it:

"Whether you will or not
You are a King, Tristram, for you are one
Of the time-sifted few that leave the world,
When they are gone, not the same place it was.
Mark what you leave."

—D.B.

* Suggested witnesses in random order, are:

1. *The Economics of Peaceful Stability*—John Kenneth Galbraith, Lewis Mumford, Dan Luten, E. B. White, Gerard Piel, Alfred Heller, John B. Oakes, Theodore H. Waller, Harrison Brown, Kingsley Davis

2. *Center for Advanced Study of Ecosystems*—Edward H. Graham, F. Fraser Darling, Frank E. Egler, A. Starker Leopold, Robert C. Stebbins, Lowell Sumner, Victor H. Cahalane, Raymond B. Cowles, Stanley Cain, Loren Eiseley

3. *Reintroduction to Nature*—Wallace Stegner, Joseph Wood Krutch, Edwin Way Teale, Ansel Adams, Sigurd Olson, Walt Disney, Paul Brooks, Alfred Knopf, Melville Bell Grosvenor, Eliot Porter

4. *Reserving the Irreplaceables*—Daniel Beard, Laurance Rockefeller, Edward C. Mallinckrodt, Jr., John Olin, Frank Masland, Jr., William H. Whyte, Jr., Martin Litton, Richard H. Pough.

5. *Careers in Preservation*—Gilbert White, Robert Gordon Sproul, Newton B. Drury, Grant McConnell, E. Raymond Hall, John Fischer, Horace Albright, George Marshall, James P. Gilligan, Carl Sauer

A call for help for one of the world's great birds, and a severely endangered species.

The Current Status and Welfare of the California Condor

By Alden H. Miller, Ian I. McMillan, and Eben McMillan

The welfare of the California condor has risen substantially in the conscience of the conservationists of this country and of the world through the general concern for preservation of threatened species and of natural environments. Our return to the study of condors and the watching of these great birds could not help but impress us anew with the majestic sight they present as they move in superbly controlled flight about the beautiful mountains they occupy and the great sweeps of rangeland over which they search for food. We emphatically reaffirm our purpose to preserve this natural and inspiring esthetic resource.

Our goal has been to determine gain or loss in numbers, and particularly the direction and magnitude of the trend. Our further purposes were to study reproductive success, food supply, range utilizations by condors, and the impact of changes in human occupancy of the condor country and of ranching practices. Also, unexpectedly, evidence came to hand, and obviously could not be ignored, about failures to carry out conservation practices.

Estimating of numbers was undertaken in a way to make possible a comparison of our results with Koford's carefully evaluated data of 15 years before. He used several methods, the three most direct and simple were (1) assembling high counts at single stations, (2) simultaneous counts at two stations, and (3) composite counts derived from observations only a few days apart at different stations. Where data from other observers were used, they were carefully screened for verified competence of the observer, documentation entered in written records at the time, and consistency with other records. These led to the conclusion that the population was about 60 in the late 1940's.

In our records of numbers of birds the ten best counts that we regard as reliable range from 19 to 33 whereas Koford's nine ranged from 30 to 43. Three-fourths of Koford's maximal counts fall between 30 and 33 (average 31). Four-fifths of ours fall between 19 and 24 (average 21). The trend of reduction is thus approximately 30 per cent.

Our simultaneous counts of sure totals are 17, 17, and 19, and our composite probable totals are 17, 23, 25, and 25. We will give details on only one each of these by way of example.

On September 12, 1963, Jeff Calhoun saw 9 birds at 10:55 a.m. on Frazier Mountain in Ventura County, and at 2:35 p.m. that day Eben McMillan saw 8 birds at Glennville in northern Kern County, for a total of 17.

In mid-April of 1963, approximately on the 17th, Mr. B. Strathearn counted 22 birds in southern Ventura County; these birds had been concentrating and feeding there for several days. On April 20 on Cholame Flat, at the northern edge of San Luis Obispo County, 130 miles away, 3 condors were seen by Dick Escarcia, indicating a possible total of 25.

As in the earlier study, simultaneous and combined counts do not exceed occasional large single counts. Koford had one simultaneous count of 42 and two composite counts of 34 and 43. Our 25 compared with his 43 indicates a 42 per cent lower level.

Another approach in estimating takes account, as was done 15 years ago, of late summer concentrations of adult condors in areas well removed from known nesting areas, coupled with known or assumed nest attendance by other birds. In the summer of 1963 there were 12 adult condors in the northeast section and 11 adults near Frazier Mountain, probably with little interchange, from which we may postulate a population of non-nesting adults of 20; Koford's comparable figure was 30. If we add 8 other adults that would be staying close to active nests, the total of adults rises to 28. If now, as did Koford, we estimate that immatures and otherwise undetected adults constitute an additional 50 per cent to be figured in the total (we know of 10 different immatures in existence), and thus add 14, we reach a total estimated population of 42.

Thus we have shown that maximal counts indicate a 30 per cent decrease in the condor population; composite counts indicate a 42 per cent decrease; and estimates based on breeding status and age composition of groups reflect a 30 per cent decrease. We arrive then at a general conclusion that there has been a decrease of one-third and that the total population is about 40. The downward trend and the seriousness of the loss in numbers since the 1940's is clear. We believe this loss is not in the slightest overstated.

Reproduction and Survival

We have given particular attention to verifying the presence of young birds in flocks or to those following their parents to feeding places. We have avoided inspection of nests known or suspected of being active. This is because visiting nests threatens survival of eggs and young, even if carefully done, and if a young one is found in a nest, there is no certainty it can be proved to survive the slow nest-leaving process no matter how much it is watched.

Our records of birds seen that were 12 to 15 months old, as judged from their plumage and actions, show that at least 2 young were produced in 1962. Because several observations probably did not involve the same individual, the number may have been 3 or 4. The more limited field work of the summer of 1964 brought out the fact that at least two more were produced in 1963.

We have tabulated the more satisfactory counts of immatures from one to five years old seen at one time which would indicate their abundance relative to adults. These observations suggest that such immatures comprise a third of the population near the Sespe Wildlife Area. The actual size of this age group we have determined from single maximum counts and individual marking features. It totals 10 known young birds. We must in addition suppose that we have missed a few and that the total of birds not yet at breeding age is 11 or 12. All signs are, then, that in the present total condor population of 40 almost one-third are young. This compares fairly closely with the one-quarter to possibly one-third estimated in the 1940's.

This situation and the considerable number of sightings of yearling birds indicates several important things: (1) the potential for replacement and augmentation of the population is still present in the species; (2) condors have been normally successful with their nests, primarily in the protected areas in Los Padres National Forest, in order to have produced these young; (3) the species, despite its low reproductive rate, has the capacity in its present environment to gain in total population, even though this has not resulted; (4) the reason it has lost ground rather than gained in the way that would be anticipated from reproductive success must lie in augmented mortality among free-flying adults and immatures.

In general in any species a relatively high proportion of immatures in the population indicates a balancing high mortality rate if the population total is stable. And if it is declining, as in the condor, the high proportion of immatures is a clear sign of augmentation of mortality. The evidence for production of young condors is then both encouraging and discouraging. It shows we have a degree of viability and production that can lead to success and improvement but that there have been most unfavorable factors causing mortality of free-flying birds in recent years.

Examination of life tables in detail leads us to believe that under these circumstances there is now about a 7½ per cent annual loss of post-nestling condors. This means 3 birds a year. But with a decline in the total over a number of years, we must have been losing, and doubtless still are, more than 3 birds a year.

If for the last 18 years we have lost at least 3 a year, we have lost a total of 54. Discounting about 14 that possibly were superannuated, we have lost 40 (!) condors from post-fledgling mortality other than age. We must have produced 2 a year to balance out at the present population level of 40. Actually, probably somewhat more have been produced, at least recently. If so, this again points to a greater annual loss than 3 a year.

The implications of achieving a reduction in annual loss are very clear. If losses now are 3 or 4 a year and if most of these are attributable to human interference—killing of adults—a reduction of this mortality factor so that we lose only 2 a year would set the course toward a meaningful recovery of the population. Of course, one catastrophic loss such as slaughtering of numbers at a vulnerable feeding or roosting concentration could be the turning point toward quick extinction. The population could quickly pass below some critical level necessary for successful social response, pairing, and group feeding procedures essential to the conduct of a normal nesting cycle.

In the survival and increase of any species, food supply is understood correctly to be of critical importance. While this is clearly true, the limiting factor at given periods in a species' history or at a particular level of numbers in its population may not be food resources at all. Stated simply we have found that there is an abundance of condor food at the present period in the range of the species. It is a complete misconception that artificial feeding and brush burning programs are necessary to provide food for condor survival and improvement. The dangers in such programs are not so much in what they may do that is possibly detrimental to condors but in the diversion of attention from other far more vital factors in condor decline and of facing up to the corrective practices in conservation which they call for.

In our field work we have observed condors feeding or in the immediate vicinity of food on 61 days. And we have almost continuously been surveying grazing practices, range conditions, and deer numbers in relation to the production of condor food. The carcasses of cattle and sheep, especially cattle, continue to be the principal food. Dead deer are an important secondary source and at times carcasses of small mammals are used or even preferred.

The methods of grazing and handling livestock since the 1940's and the disease trends in these herds have not diminished the numbers and availability of dead animals. Increase and spread of deer and seasonal die-off in them in the last decade has further augmented the supply. An estimated 9854 carcasses of livestock and deer are available annually in the foraging range of the condor.

Cattle are particularly available beginning in July as a result of abortions; general calving losses continue until spring. Toxic range forage, including that which causes bloat, produces major losses in both cattle and sheep from February to June. Major sheep losses occur from late winter until May. Deer mortality becomes important in April and extends through the summer and fall with the dry-period die-offs. There is no seasonal period when food is scarce.

Abundant observations show that condors have many simultaneous sources of food and move about readily among them. Great quantities of available food and partly used food are left, the birds going to forage elsewhere. This situation and the fact that condors have successfully raised young in the last five years show that there is no food shortage. The birds are not starving.

Mortality Factors

The greatest losses among condors in recent years have been from illegal shooting. The number of instances of condors shot or being shot at is alarmingly great in terms of the total condor population. We received information on nine cases of persons shooting at condors in the last four years. At least five of these events resulted in dead or injured condors. This must represent but a fraction of the total.

The shooting takes place because of extensive breakdown of law enforcement and lack of education. Condors are especially vulnerable to shooting as they fly over ridges and crests in Los Padres National Forest where thousands of hunters, uninformed and generally unsympathetic to bird preservation and firearms laws, crowd the roads and high camps. The heavy increase in human populations near the range of the condor and the great development of roads, trails, and other types of accessways have materially contributed to this serious loss from wanton shooting.

Losses connected with the use of 1080 poison in rodent control is strongly suspected and there is strong circumstantial evidence for it in some known condor deaths. This is a factor especially in the rangelands in the foothills of the southern and eastern San Joaquin Valley where condors regularly feed. Condors follow poisoning operations there, feeding on the killed rodents. Three condors have died since 1960 in a small area of northern Kern County where rodent poisoning is extensive and at a time when it was being conducted. None of them had been shot. Poisoned grain was reported to be present in at least one of the bodies.

Disturbance of the condor refuges and adjoining buffer areas has been a continual threat to successful nesting and to roosting concentrations. Fire protection systems, road and trail access, and enforcement of closures in the forest areas viewed in their relation to condor welfare have had variable attention and at times quite inadequate support.

The dangers from disturbance of condors by photographers and by low-flying aircraft in and near the refuges continue as a distinct threat.

Other mortality factors are slight at the present time.

Recommendations

The central findings of our present study are, then, that the California condor has seriously lost ground in numbers while at the same time showing a gratifying potential to reproduce itself, at its own deliberate rate. Without the refuges which were set up earlier—the consequence of concerted action by the National Audubon Society and the United States Forest Service, we would probably have seen the condor today on the very brink of extinction if not over it.

We are convinced that the condor can survive. We decry any defeatist attitudes in this regard. But make no mistake, old procedures must be greatly bolstered, new dangers warded off, and new practices vigorously pursued if we are to succeed. We outline here only the highlights of the procedures and do so in general terms.

Enforcement of the laws that protect condors and other large soaring birds with which they may be confused should have high priority. Shooting from roadways, illegal of course, is likewise in need of rigorous control. Every warden of the California Department of Fish and Game and every forest employee in or close to the range of the condor should have specific instructions to place prevention of shooting of condors and other large birds as first concern in his operations. He should attend education and briefing sessions on this matter.

We are further convinced that the National Audubon Society should finance and itself employ a full-time condor warden. His purpose should be not only to engage in law enforcement but to be able continually to move about the condor range, to anticipate and be on hand when there is threat or trouble, and to be in an independent position to detect and report breakdown in the conservation program.

With the heightened interest in the condor and with a larger mass of people in southern California than formerly, educational efforts must become positive, organized, and overt. The former proposals on education were appropriate to the times but nothing was done to implement them. The effort today requires many people. Regional Audubon offices should organize and coordinate. Fish and game and forestry officials must set up their own educational meetings and directives.

Included must be education of the general public. At the local level in communities near the points of condor concentration, effort should be directed toward enhancing local pride and responsibility as sole custodians of a national resource. Tourism and pride of civic leadership in this should be stressed. We believe that people locally can be persuaded that their civic image as well as their commercial welfare will gain significantly by being the focal point of a unique possession of national and world interest. The availability of properly controlled observation areas will need to go hand in hand with this.

On the state and national scene, education of the people of high purpose to the urgency of action and the need of firm policy is called for. As one government official has put the issue, in essence, a threatened species has absolute

priority; the condor must be saved; there is no place else where you can do this than in its natural range in California. The "minority" cannot be overridden in the multiple-use approach and policy on the latter approach must give way.

The Sespe refuge has been and is crucial to the condor's survival, but as a refuge it has been barely enough. We need to hold rigorously what is now set out as protected land and we need to augment it by properly set up, permanent buffer areas and wilderness areas. The access corridors of the refuge were to have limited use; these limitations should be rigorously reaffirmed. To yield and open these corridors to water developments and to through traffic and construction would destroy the efficacy of the refuge.

The buffer and primitive areas should be permanently closed to hunting. Group camps, concessions, and mass recreational facilities in the corridors and in the Agua Blanca and Sweetwater drainages at the northern border of the Sespe refuge should be ruled out; there must be no yielding to development of a dam and a lake in that area.

Firearms closure should be instituted on forest lands in a buffer zone surrounding the refuge and the existing wild areas. This would materially help enforcement officers in checking wanton shooting along the condor flyways. Such sensitive areas exist particularly on fire roads, trails and private land access roads in and about the refuge corridors, Santa Paula Canyon, Hines Peak, the Agua Blanca and Sweetwater drainages, the Sierra Madre Ridge, and Big Pine Mountain.

Independent of the problem of roads close to the refuge is the question of the impact of road placement in other parts of the condor range. We have observed particularly the relation of roads to flyways and roosts on Sierra Madre Ridge and McChesney Mountain and their detrimental effects, potential or actual. As a consequence we recommend generally that new roads opening up sections of the national forest in the range of the condor be so located and designed as to avoid disruption to the safe use of the area by condors.

Research on the impact of 1080 poison needs to be designed and carried out by independent agencies, utilizing turkey vultures. These studies should establish the effects of dosage levels on the general health, immediate and long range, of such vultures. In view of the circumstantial evidence for death of condors by poisoning with 1080, rodent poisoning agencies should be persuaded to reduce or stop poisoning of kangaroo rats in the grazing lands in the principal range of the condor. They should be encouraged to devise different methods and timing of activities to minimize the threat to condors.

These recommendations constitute only a partial list. Many of them are difficult to achieve without dedicated effort. Law enforcement and education are the most important elements, resting critically on the existing refuge system and its enhancement. Will you make that effort?

The Last Chance for a Northern Cascades National Park →

LITTLE KNOWN and weakly protected until now, the scenery of the Northern Cascades of Washington matches the magnificence of that found in any national park. Only a National Park Act can provide the protection this scenery deserves. A park in the Northern Cascades was first proposed in 1906. The area was not studied by the National Park Service, however, until 1937. The Service in its report then said that a national park in the Northern Cascades would "outrank in its scenic, recreational, and wildlife values, any existing national park and any other possibility for such a park within the United States."

The National Park Service, as part of the North Cascade Mountains Study Team, is now studying the North Cascades again. The Study Team report will go to the President, who can ask Congress for a park act. Whether he asks and how Congress responds will depend upon what the American people urge.

Now much of the scenic climax of the Northern Cascades is open to commercial exploitation. Only one-third of the area of national park quality is administratively protected as the Glacier Park Wilderness Area. Most of the remaining two-thirds is open to logging. All the area is open to mining, the narrow valleys to flooding by dams.

Under present law and the policies of the U. S. Forest Service, which administers the area, commercial exploitation usually takes precedence over the protection of scenery. Many large tracts of natural wilderness, such as most of this tract in the Northern Cascades, have not been set aside for protection and have been vanishing at the rate of a million acres a year for the past three decades.

The North Cascades Conservation Council has outlined the area needing national park protection. The Council has submitted the proposal for a North Cascades National Park to federal authorities studying the area. Other outdoor organizations such as The Mountaineers, the Sierra Club, the Federation of Western Outdoor Clubs, the National Parks Association, and the Mazamas support it.

[The foregoing is from the NCCC brochure. The color illustrations are from the forthcoming Sierra Club book, *Wild Cascades: The Lake Chelan–Glacier Peak Parkland,* slightly reduced to fit the *Bulletin's* smaller format.]

Wilderness Alps of Stehekin

NARRATION ADAPTED FROM THE FILM

Entiat River Road near end. John Warth

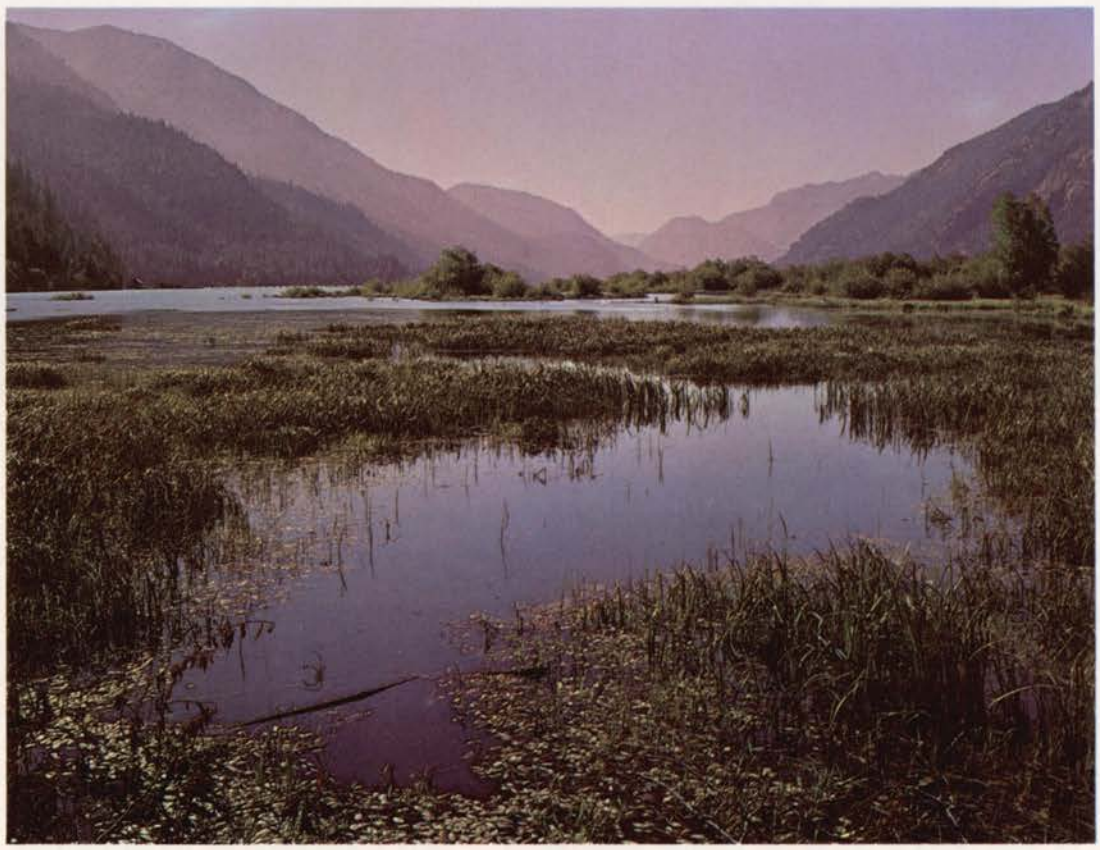
In the Northern Cascades there is alpine wilderness that belongs to our national gallery. Such places are the last of our primeval landscapes, the few surviving samples of a natural world, to walk and rest in, to see, to listen to, to feel the mood of, to comprehend, to care about. There isn't much of it left. What there is is all all men will ever have, and all their children. It is only as safe as people, knowing about it, want it to be.

But do enough people know about it? We didn't, and went in to look it over. We had heard about the region, and about a conflict between those who wanted to use raw materials and those who wanted to preserve natural beauty. We weren't prepared for what began to unfold—an amazing wilderness of rugged alps built in grand scale, unique, unsurpassed anywhere in the United States.

There are many entryways. In Stehekin the road starts at a handsome lakeshore and deadends in paradise. It connects with no highways and doesn't compete with any. The few cars on it know each other by their first names. It is seldom far from the river, and if you stop for a close look, no horn blows behind you. Great trees tower over the road. Flowers and grass grow alongside it and between the wheeltracks. It's bumpy enough to slow you down to *see* the roadside. It doesn't cut in and shoulder its way through. It treads softly, in no hurry to someplace else; it's there already.

Suiattle River Valley from Miners Ridge. Philip Hyde

Head of Lake Chelan. Philip Hyde



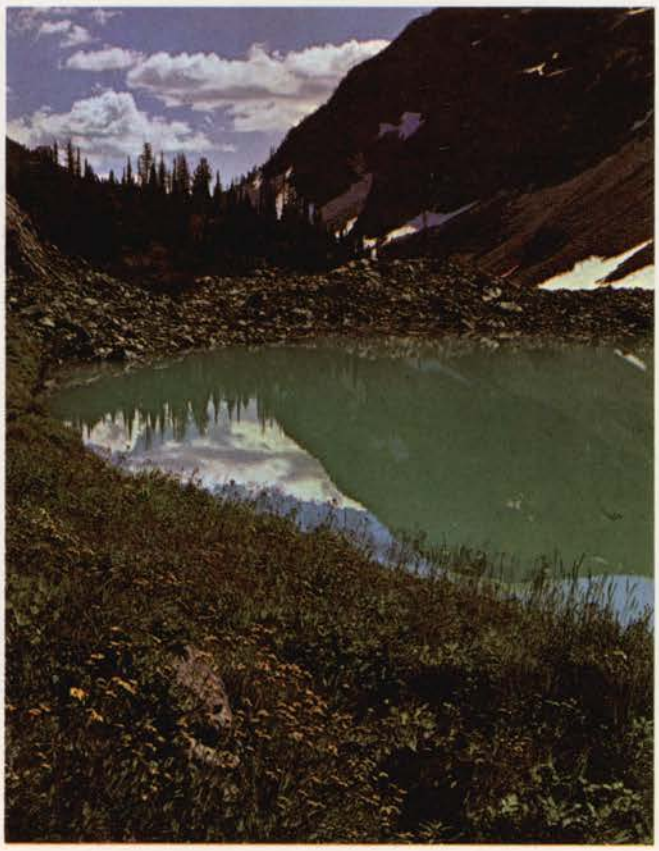
The Northern Cascades country was once, all of it, as wild as the sea—the wild, shining sea, shaping the earth through the ages, never the same, yet not to be changed by man, who long ago learned to accept it for what it is, even as we are now learning not to change some of the wild land, but to keep it natural, to seek from it answers to questions we may yet learn how to ask.

Can we set apart, unmanaged, unspoiled, enough of these places? Can we spare the stillness of a rain forest, where trees can live out their full span and return to the earth they came from? All that lives here repays in full for value received, nourishes as it has been nourished. Scores of centuries built this, a cool green world, hushed as a prayer. Man could wipe it out in a decade. Or consecrate it as a park, not to be impaired, a place where all generations could come to know the dignity of nature.

Sulphur Creek Trail near Suiattle Road. John Warth

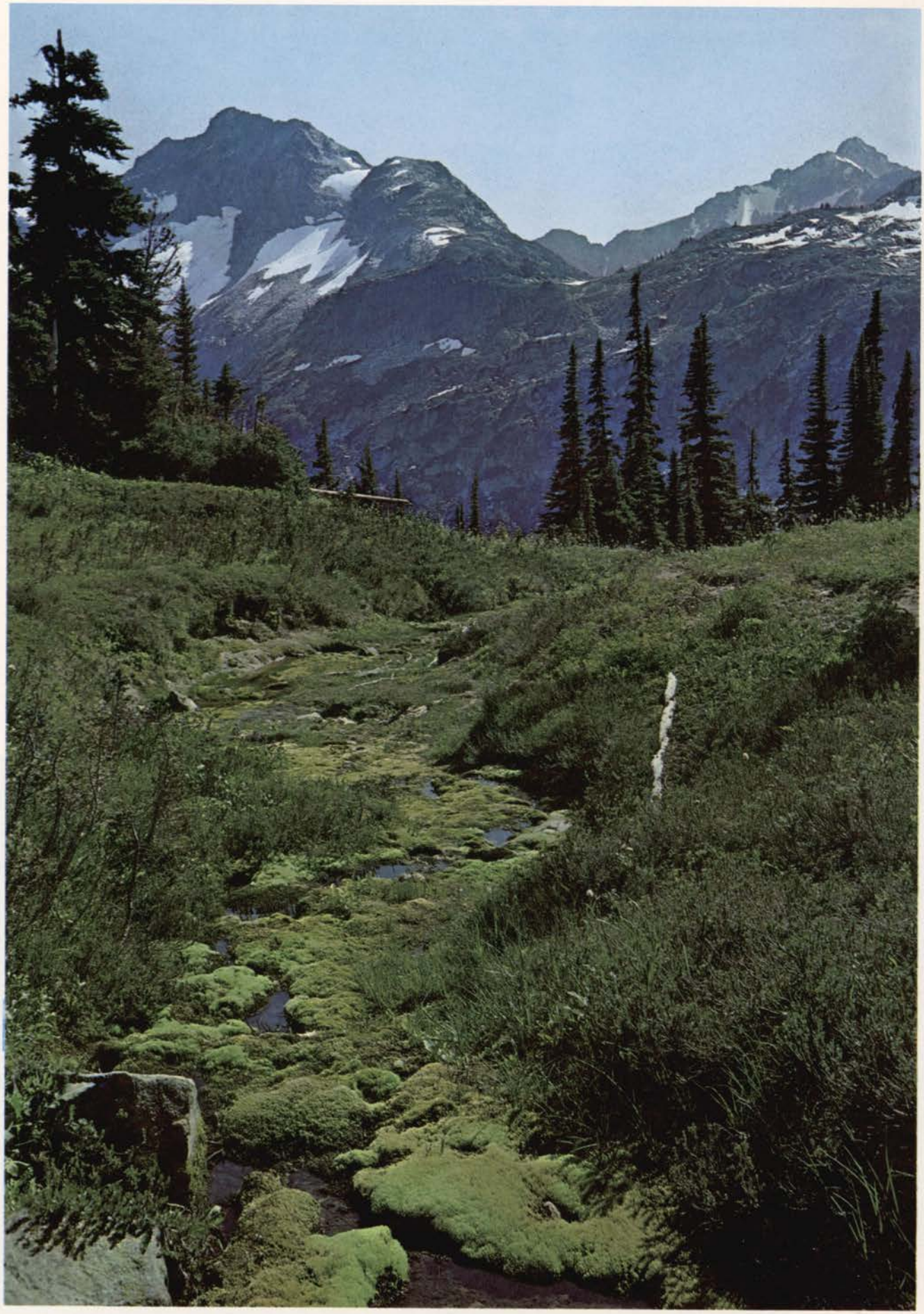
Upper Whitechuck Basin. Philip Hyde

Lake near Heather Pass. Philip Hyde



Our first trip in was a flight—too hurried, too cut off, too unreal for us to feel the country or remember the shape of the waves of the storm-tossed sea of peaks. We knew it was great country, big country. We also saw that its size alone could not protect it. On the west side men were already clearcutting the last virgin forests, getting timber and pulp from forested avenues of approach needed very much as primeval setting and living space to look at and to look from. Crossing Cascade Pass, in the heart of the wilderness, we were but a few minutes from other wild forests, also wanted for their timber, but needed as setting too.

One day we met friends who knew the country we had flown over, to see from a soft cushion, through a window, and far away. They had felt it underfoot. They had spent the time you need to spend, in our speed-shrunk world, when you want to feel the size of space, when you want perspective. You can earn the best of what this country gives, they said, only if you do it yourself. So they walked the trails, and climbed where no trails were, carefully where the tundra was steep; they reaped the special rewards of those who walk where no one has walked before.



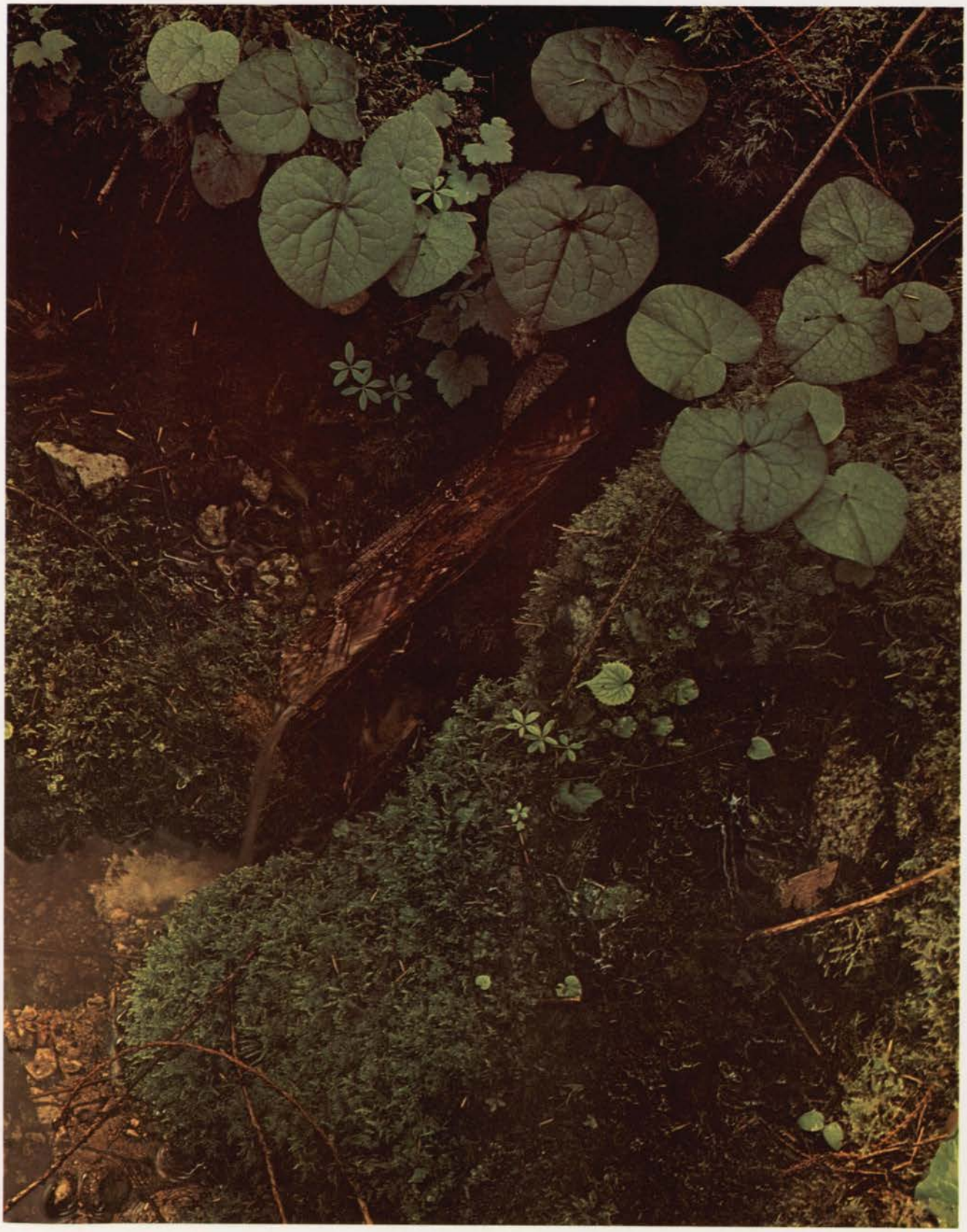
Chiwawa Mountain and meadow above Lyman Lake. Philip Hyde

Ten Peak Range and meadows above Image Lake. Philip Hyde

And so it was that one day our trail climbed grassy canyon-sides to a small shelter in its own private alp below the pass. We only had time that day to explore a lower side trail for a mile or two, to see what a wilderness forest is like when man leaves it to its own wondrous devices. We walked waist-deep in ferns, quietly, looking backward on the eternity that has

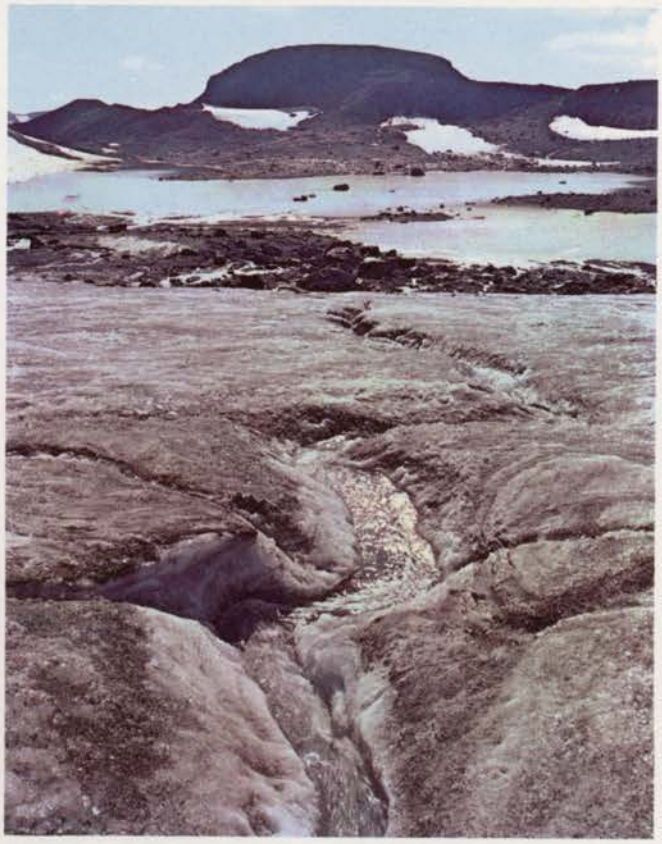
Sierra Club Camp at White Pass, Sloan Peak. Philip Hyde

made this forest what it is. We found the camp a wonderful base for strolls high above the pass, a chance to enjoy the world of tundra and tarns. We had never seen better country to walk in. Everybody explored the alps, poked along the parklike high trails, wandered through the miles of grasslands, let the mountain wind blow away flat-land cares.



Spring part way up Green Mountain. John Warth

(on following page) Slopes of Sahale Arm, near Cascade Pass. Philip Hyde →



Whitechuck Glacier. Philip Hyde

Almost everybody got out on a glacier, too—the Whitechuck Glacier's flat icefield is made to order for beginners. And we kept looking for a hole in the mist through which to glimpse the monarch of this country, Glacier Peak—

Snow tunnel, Washington Pass. Philip Hyde

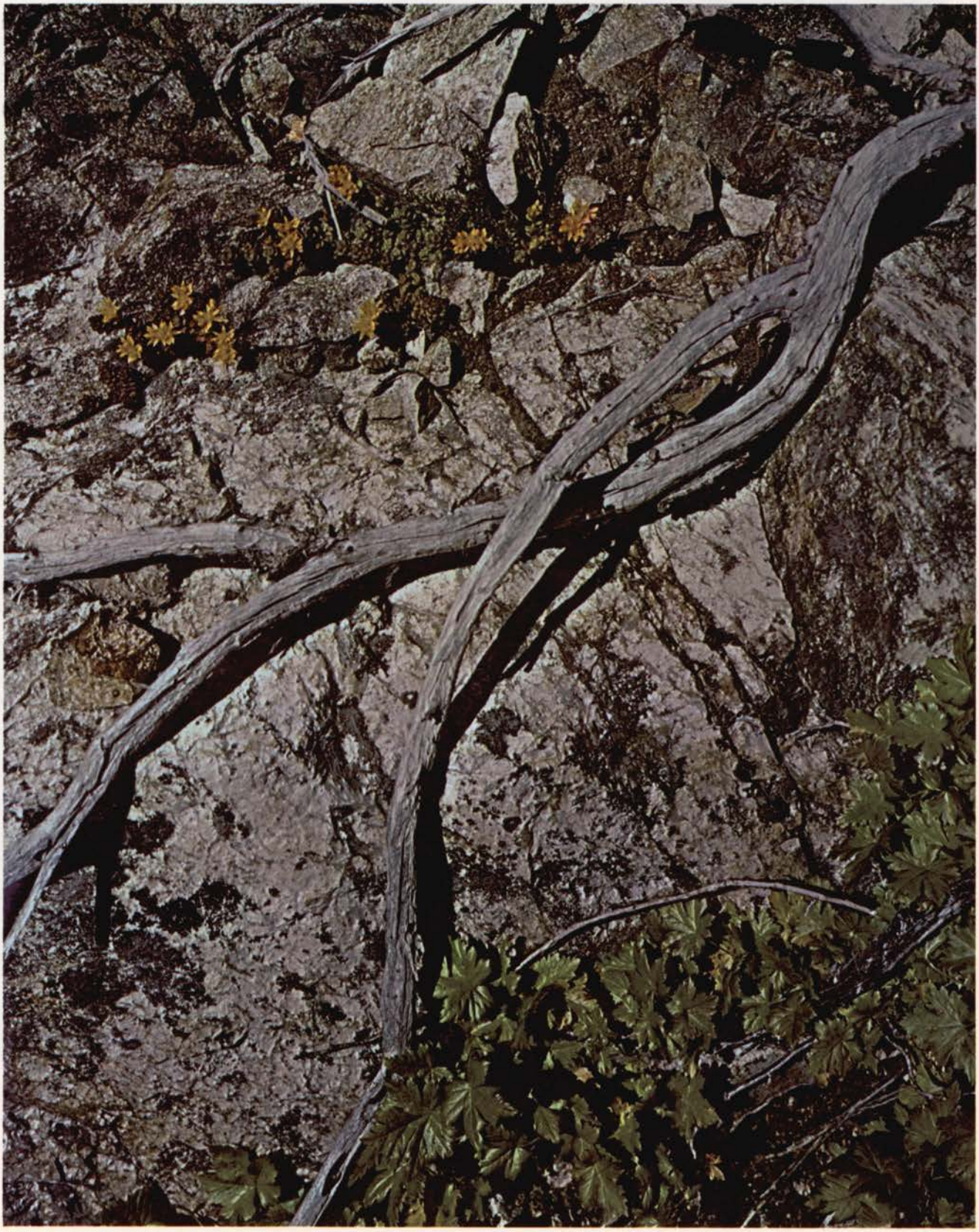
Image Lake and Glacier Peak at sunrise. David R. Simons

the same Glacier Peak we had flown around, and soon would walk around to see from Image Lake, the really classic view in the unspoiled Northern Cascades. Then we watched the cloud cap, the strange lenticular cloud that the wind blows through, leaving the cloud there.

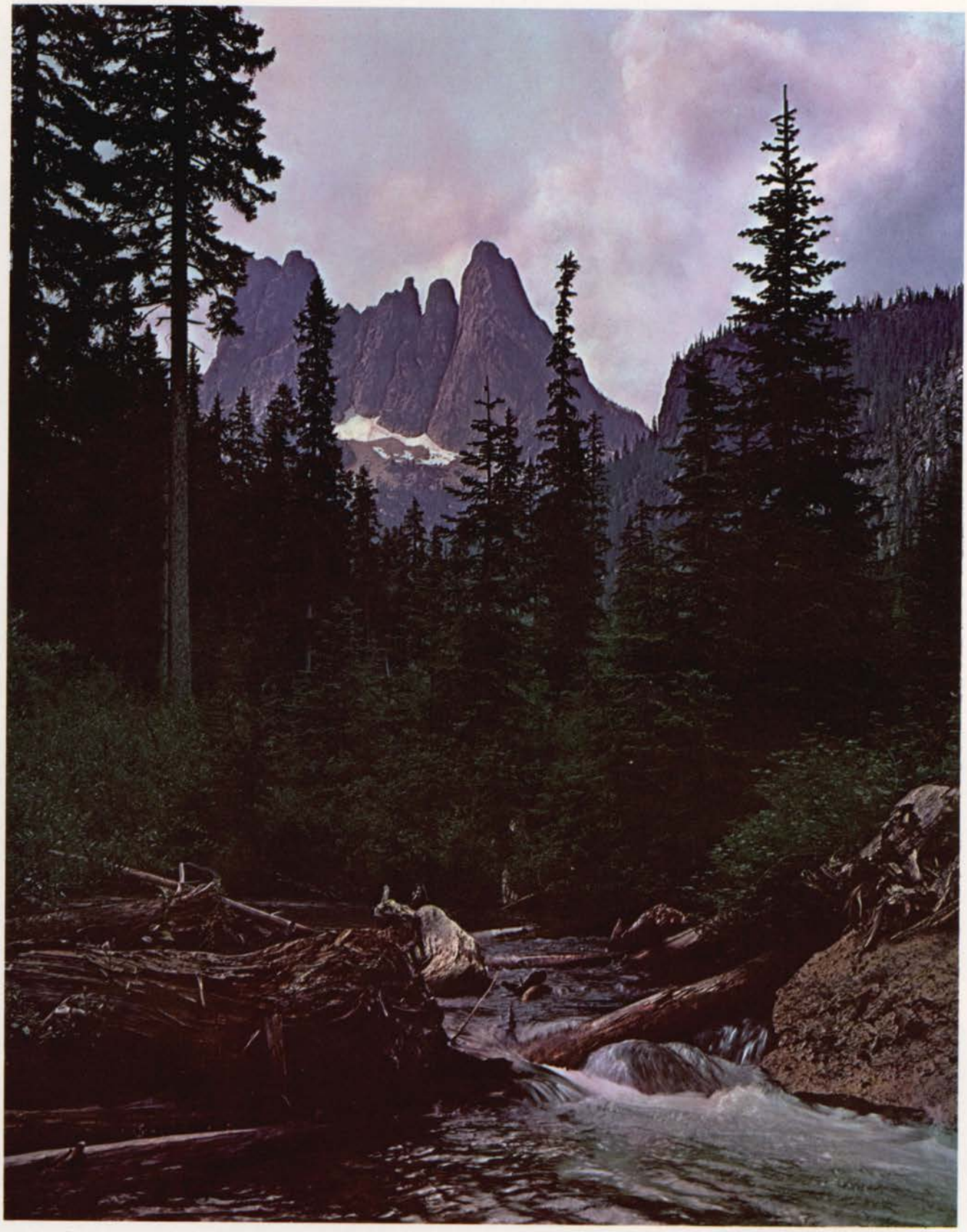
Glacier Peak from ridge above Lake Ann. Philip Hyde

Lake Ann from trail to Heather Pass. Philip Hyde

Everywhere there were wild gardens. And here, deep in the heart of the little-known alps, seemingly remote, we met at noon a friend who had left New York City late the night before, a whole continent away in a prejet era. Our friend had come up one of the west-side avenues into the mountains.



Rock detail, Park Creek Canyon. Philip Hyde



Liberty Bell, Early Winters Creek. Philip Hyde

We remembered our own avenue, up through virgin forest with huge trees, almost a rain forest, still as a cathedral, in it a clear stream from an unscarred watershed, clear in spite of the northern weather. The northern traveler, we now knew, is seldom bored by blue skies. But then, monotonous fair weather can't build mountains like these, and their glaciers and forests and flowers. We liked the way the mountains looked and discovered how to like what made them that way—

—don't scurry for cover and miss the show. Stay out and be part of it! Not on a high peak, of course. But take a walk, down in the sheltered valley. So we walked out into it, heads up, and felt the freshness the rains bring, saw new patterns, smelled the wet leaves, now washed and cool, and we looked up to see the old contest between the crags and the mists. Oh, we got wet and our feet squished a little in our boots. But what never gets wet can never get dry. We got both. We never came back from one of our walks feeling only half alive. I guess the children knew it all the time, and I rediscovered it—epidermis is waterproof and the rain is only water. And that strange tingling—that was just my circulation, circulating. I had almost forgotten the feeling.

But now we were close to the pass, making camp, our own

Sierra Club campfire, Washington Pass. Philip Hyde

mountain world spread out around us, each clump of trees a timberline penthouse, each room perfectly air-conditioned. You can't beat a camp in these timberline gardens, with sunset on the high peaks. Never mind what the cook has mixed up. If it doesn't look too fancy, wait until it gets dark and you won't have to see what you're eating while you trade stories around the campfire far into the night. Then dawn brought a flush to Glacier Peak.

Glacier Peak from Green Mountain. John Warth

The sun would light all this mountain land soon, and we hope it will always reveal wilderness there—in the avenues of unspoiled forest, in the flashing waters of the sidestreams and the river, in the friendly lower gardens and grassy alplands, up at timberline and in tundra, on the glaciers and peaks.

Other people will want to be walking our trails, up where the tree reaches high for the cloud, up where the flower takes the summer wind with beauty, and the summer rain too. They will want to discover for themselves the wildness that the ages have made perfect.

They have a right to discover wild places, I told the children, just as we did—and your children and theirs too. They *can* discover them, but only if we keep some wildness in between the shining seas; only if man remembers, in his rising tide, not to engulf his last islands of wilderness.

(The full 31-minute color-and-sound, award-winning film, "Wilderness Alps of Stehekin," was produced for the Sierra Club in 1958, with editing, commentary, sound, and most of the photography by David Brower. These excerpts are mostly out of sequence and most of the place names have been omitted.)

A principal leader of the Sierra Club from the beginning of the century until his death on November 9, Will Colby accumulated a wealth of Sierra experience which a well-known one-time packer had just begun to tap.

Some High Sierra Recollections by William E. Colby

By Norman B. Livermore, Jr.

What can one say when a great leader is gone? Particularly such a leader as William E. Colby? The universal response has elements of too little and too late in it. We get to know too little of the man, his hopes, his dreams, and inspirations. Too late do we think of doing something about it, collecting, preserving and distilling for future generations the essence of the man's greatness and leadership.

Though I, like most of us, am guilty of the usual dereliction, I did have the good fortune of talking to Will Colby last July about some of his High Trip and High Sierra reminiscences. I had, of course, heard of him long before I was privileged to know him. In my very first summer in the high country, back in 1929, the names Colby Pass, Colby Meadow, Colby Lake, Colby Mountain connoted the very quintessence of the spirit of those high mountain fortresses that I as a young packer longed to know. Then in the years when I was a Sierra Club director and on the Outing Committee, my acquaintance with him made me want to know him better and to learn more of his recollections of John Muir and the High Sierra he knew and loved so well.

The talk I had with him was much too brief. I had promised myself to study old Sierra Club Bulletins so that I could ask specific questions about Sierra trips of long ago. I was too late as well; what I wanted to do is less than half done. But I did get the thrill of an inspirational interview and was amazed at the quick answers and vivid recollections he gave at the age of 89.

While it would take up far more space than we have to record the full interview, the following selected excerpts will, I hope, give some of its flavor.

Recollections of John Muir

Livermore: First, Mr. Colby, I am interested in John Muir's relationship with people. We know about his writings and that he founded the Sierra Club, and so on; but I have heard that he wasn't interested in relations with people. I am thinking, for instance, of such things as talking at a campfire or conviviality in general. Would you care to say anything about this?

Colby: John Muir was very fine in his relationship to people, especially people on the Outings. He was talking to them all the time and discussing his favorite subjects—glaciation in the Sierra, everything connected with the out-of-doors. Instead of being distant, I would say that he was very friendly and easily approached.

He went on four outings. Three of them were our High Trips and one was the first outing in Tuolumne Meadows. On the three High Trips he camped with me. I picked out his campsite always, which was alongside of mine, so I was able to observe him and his relationship with the members of the party. I do not know of anybody who was more easily approached and who responded more easily to the talk and wishes of the members.

Q. About how long did you know him?

A. I first met John Muir in 1900 when I was elected Secretary of the Club and he came down as President to preside at the first meeting. I met him, of course, repeatedly on his trips to San Francisco as President. I, as Secretary, had a great many things in common with him, so he made my office his place of call. He would come to my office, hang his overcoat there, go out and do his business, which was mainly ordering groceries for his home in Alhambra Valley, and then he would come back to the office. We would usually get William Keith, who was a boon companion of John Muir's, and go out to lunch together.

Q. I am thinking specifically of the Hetch Hetchy fight. In the opinion of some the tragic loss of that fight and the sadness over it led to John Muir's death. Is that correct?

A. I am quite sure that it hastened his death. I think that if the Hetch Hetchy fight had not been lost that he might have lived longer.

Q. I have just read that Congressman Kent, who gave Muir Woods as a national monument, did not agree with John Muir; he was in favor of the Raker Act.

A. I think Congressman Kent early favored the Raker Act in spite of the fact that most of his tendencies were toward conservation. In that one respect the San Francisco water supply was paramount in his mind.

Q. One other question on Hetch Hetchy. I remember my father and others saying that in many ways they thought it was more spectacular, more beautiful, more of a jewel perhaps than Yosemite itself. Would you agree?

A. Hetch Hetchy had certain aspects which made it more impressive. It was very much smaller than Yosemite. The walls were not as high and of course it didn't have as many great falls, but the fact that it was more compact—much smaller—made it in many ways more impressive.

High Trips and "The Colby Mile"

Q. The first High Trip you led was *the* very first one?

A. Yes, it was in 1901, the year after I had become Secretary. John Muir was very anxious that the Sierra Club should run trips into the Sierra so that members of the club would appreciate what it was that he was trying to save and I coöperated with him—for all the years from 1900 to the time of his death, Christmas Eve, 1914.

Q. What was the last High Trip that you were actively engaged in?

A. I think it was around 1930.

Q. Could you tell us a little bit about the origin of the phrase "The Colby Mile"?

A. The members of the parties we headed in the Sierra were always worried about the distance they had to walk to get from one camp to another. Usually I tried to minimize this. So it got to be common repute that my miles were very much longer than the ordinary mile. That is the way the "Colby Mile" was always supposed to be a great deal longer than the regular mile.

Q. About the size of the trips, Mr. Colby, could you briefly recall the pattern of the size?

A. The first trip was around 50 people. The second trip was into the Kings River Canyon and Joe LeConte helped run that trip. It was attended by over 200 people and the trips averaged after that a little over 200 . . . there'd be 200 regular members of the party and sometimes it would run up to 250 . . . and one year to 275, including the packers and all the commissary and extra help. But the members themselves averaged around 200.

Q. Would you care to name four or five of your favorite, more beautiful High Sierra wilderness camps, or is this an impossible question?

A. Well, I would have difficulty in differentiating, but one of my favorite camps was in the middle fork of the Kings River where you would look up the canyon at the mountains on the crest of the Sierra, very impressive from that standpoint.

Q. You are thinking of the upper Middle Fork, perhaps around Grouse Meadow or Simpson Meadow?

A. From Simpson Meadow up to the head of the canyon.

Q. From Simpson Meadow on up past the Punch Bowl, Little Pete, and Grouse Meadow?

A. Exactly.

Q. Is that completely superlative in your mind or would you care to name two or three or four other favorite areas of yours in the high country?

A. I feel that the Middle Fork of the Kings, with Mount Woodworth and the high peaks at the head of the canyon there, was the acme of campsites. Of course, Tuolumne Meadows was always a favorite place because the club owned the property at the Soda Springs and many short trips could be taken from there. The Kern River Canyon was also quite a favorite spot. That canyon was so spectacular, with its waterfalls and the scenery surrounding it, with Mount Whitney at the headwaters, that it was also a favorite campsite.

After World War I—A Packers' Strike

Q. Do you recall any packing incidents which you might say might border on insurrection?

A. We had one one year, the year following the first World War, when the packers practically went on a strike and we had to draw on anybody who was familiar with packing to help out. A number of members of the party who had more or less experience with packing pitched in and did the packing. For a while there I remember we ran the pack train without any regular packers.

Q. Would that mean the packers just got on their horses and left the party and quit?

A. Yes, that was it. They just quit entirely and we didn't have any with us.

Q. Whose stock was left? Was that Charlie or Allie Robinson's?

A. The pack stock belonged to the Robinsons and, of course, they didn't participate in the strike.

Q. Every single one of their packers walked off?

A. Yes, practically all of the packers went on a strike.

Q. What was their main complaint? Was it wages, food, or was the weather bad, or were they just a bum batch of packers?

A. They were just restless, the way most of the world was after the war, and just took it out in this manner.

Construction of the John Muir Trail

Q. How about the history of the John Muir Trail? You were Chairman of the State Park Commission at the time that it was named and the $50,000 was voted for it by the State Legislature?

A. No, I don't think I was Chairman at that time. The John Muir Trail came about through a fellow who was a member of the outing party. He went on several trips, as I remember it, and came from Los Angeles. He had a very considerable political standing and he suggested that we spend more money on trail work in the High Sierra. It was his standing as a politician that brought this about. He had great influence with Hiram Johnson. Johnson was Governor at the time and so he persuaded Johnson to sign the bill which appropriated a certain amount of money for the construction of the trail, which later on I suggested be called the John Muir Trail. After we had adopted resolutions in the Sierra Club favoring the spending of this money, John Muir died. When I drew the bill—it was introduced in the Legislature for the spending of this money—it seemed

to me that nothing could be more appropriate than to call it the John Muir Trail.

Q. Do you recall this man's name? You stated he was a great help with Governor Hiram Johnson.

A. Meyer Lissner.

Paying a Packer with Gold

Q. Getting back to packers. Your son Henry reminded me that there was one trip when the packers insisted that you pay them in gold coin.

A. That was in 1904. The head packer and the man who furnished the animals came from Tuolumne, at the end of a little railroad logging road that went up from the valley into the Sierra. We arranged with the logging company to make up a special train and haul in Pullmans, which were occupied by the party on the return to San Francisco and Los Angeles.

Q. And you had trouble in relation to pay?

A. The packer knew that he owed considerable money around Tuolumne and that his money would be attached if he were paid by check. He insisted that he be paid in gold and I had the gold shipped up from San Francisco. It arrived at the express office in Tuolumne and I got it out after the party came back from the High Trip. We had our dinner there before the Pullman train started out. I had this gold in a bag and had difficulty finding the packer who was entitled to it.

Q. He vanished or was in a bar or something?

A. He was in a bar. When I got over to the bar he was having a fight with his uncle. They were finally separated and calmed down. The man who was following him up—the man who really put up the money and arranged for the pack train—he was about as worried as anybody. He managed to get this packer off by himself and calmed down. We went over to the livery stable and I had the gold piled up on the desk. The head packer, who was drunk, lurched over and hit the gold and it fell all over the place. The train was blowing the whistle to get me to come down. They were very anxious to get started off on the way home. So I left him there with the gold all over the floor while I took refuge in the train.

Q. Were these $5 gold pieces mainly or $2.50 or $20?

A. All $20 gold pieces.

Q. Did you get him to sign a chit or something so that you were not involved in the fighting over the gold?

A. No, I would be able to testify that I delivered that amount of gold and I was willing to let it go at that.

Muir Hut and Mountain Supply Points

Q. I have a rather distinct recollection that in about 1941, when I first became a Sierra Club director, we used to have friendly debates in and out of Sierra Club Board meetings on what might be called the degree of purity of use of the high mountains. I believe you stated at that time that though you had had 30 years of High Tripping and liked the unspoiled wilderness as much as the next man, you were not necessarily against some form of crude shelter—you might even prefer such a thing, with the stipulation that there be no mechanical improvements.

A. Well, I don't know about that . . . I don't remember that part of it; but I do remember that I advocated the building of the John Muir Hut on Muir Pass. Was that Muir Pass?

Q. Yes, it was on Muir Pass, right on the very summit.

A. I got the idea before John Muir's death, while we were planning to have the trail built and named for John Muir. George Frederick Schwartz was a member of the club and very devoted to John Muir and he wanted to do something for John Muir and for the John Muir Trail. His idea was to give some money to be used in building the trail. I told him that would be a very poor memorial because the money would just be lost with the rest of the funds used for the building of the trail and there would be nothing definite to show for it. So I suggested to him that a hut be built on Muir Pass where people might take refuge in case of a storm or stay overnight and make it easier for them to climb the mountains around there. He readily accepted the idea. He told me to go ahead with it, so I drew plans from a *National Geographic Magazine* which contained illustrations of the stone huts that were built down at the toe of Italy, where the only building material was stone. I copied one of them, drew a general design for a stone hut, and submitted it to Walter Huber, I think it was. No, it was Mark Whiting, who was in the office of Maybeck; and I drew a design for a stone building and submitted it to them and they put in the architectural details, and it was from that that the Muir Hut was constructed.

Q. Was the financing partly by this man Schwartz, partly by the Sierra Club, or did the Forest Service put up the funds? Do you recall?

A. The financing was done entirely by George Frederick Schwartz—and his estate, because he died before the hut was completed and his estate went on and put up the necessary money to complete it. But the Forest Service, because this was in the National Forest at the time, contributed help in supervising the construction [1930].

Q. Was there any talk at that time or after in your experience over the possible placement of other huts along the John Muir Trail?

A. No, not that I recall. There was considerable discussion of this in the late thirties by club directors, particularly by Walter Starr. The general feeling was that the Sierra, being gentler than the Cascades, Rockies, or Appalachians, could probably accommodate travelers well enough without such aids. Their function in extending the season was not fully explored.—Ed.]

Q. One thought that has been expressed fairly recently

is that in certain areas, if there were huts of this or a similar type, it might make possible wider use of the high country by allowing trips say in May and June and in October. Do you have any particular thoughts on this?

A. I should say that a hut strategically placed and concealed from the general view would not be objectionable under such circumstances. I imagine some method will have to be adopted of getting supplies into the high country and distributing them around among those who want to visit the High Sierra.

Q. By supplies, are you thinking perhaps of depots or a crude type of hut where people might obtain provisions?

A. Something on that order, where the country would be least cluttered up with the places where provisions could be obtained.

Grazing and Meadows

Q. On grazing, in recent years there has been an increasing problem. Would you care to make any remarks through your recollections of those 30 years as to the condition of the meadows in the High Country?

A. The grazing always presented a great problem because it affected other people who came into the mountains and who charged the Sierra Club with depleting the meadows and making it difficult to find feed for those who came after them. The Sierra Club was looked upon as a band of locusts that would go through the country and get rid of the feed and make it difficult for others to come in. I always tried to offset this by arguing that the number of people that enjoyed the mountains through the Sierra Club was so large that it more than made up for the fact that the Sierra Club pack trains did eat up a great deal of the grass and other materials the stock lived on. It was always a problem and always will be. [It still is, years after the impact of the club's large trips has been impressively curtailed (three times as many people served per mule/day of grass) and the threat to untraveled wilderness drastically increased (2 per cent of the remaining big national forest wilderness was being lost per year in 1926, and more than 6 per cent in 1960).—Ed.]

Q. Can you think of major changes in specific meadows, say Funston Meadow on the Kern or Simpson Meadow on the Middle Fork of the Kings, or Colby Meadow? Would you say that in your own observation you could note specific declines in the quality of these meadows?

A. No, I don't recall that there was any such decline. You could always observe, of course, after a big party had been through that the feed for the animals was less available, and I have noted that there is a tendency for tree growth to come up in some of the meadows and obliterate the meadows.

Q. But you can't in your experience think of major invasions like this in any of the better known meadows?

A. No, it always has varied, I think, with the place.

High Trip Rain and Snow

Q. I have been particularly fortunate in having relatively few rainy nights in the High Sierra on the good many hundreds I have camped out. Did you notice any particular trend during your thirty years of High Trips?

A. I remember that in the earlier days I always predicted that if we had rain that it would not come at night, and it would not usually last more than a three-day period. But then I found to my great regret that I had to change my mind because on the Middle Fork of the Kings River one year we had eleven days of rain.

Q. Eleven consecutive days?

A. Consecutive days and some nights. Not always at night but during that eleven-day period we had many nights when it rained.

Q. You must have had a pretty bedraggled bunch.

A. It was a very tough experience for all of us. And I always felt under the greatest obligation to Clair S. Tappaan because he had the greatest faculty for reviving spirits and keeping people jollied so that they more or less overlooked these hardships.

Q. To overcome eleven days of downpour it certainly takes a genius. How about snow, Mr. Colby? We have all experienced serious snow troubles occasionally, even changing itineraries of trips. Do you recall any particular snow problems during your thirty High Trips?

A. No, I cannot recall any heavy snowstorms on any of the trips. Sometimes it would snow a little, but it would be one of those fugitive storms you meet occasionally.

Q. I was thinking less of snowstorms than snow on passes—snow banks or snow drifts.

A. Snow on the passes did give us a great deal of trouble and I usually organized a group of hardy individuals—in fact, almost everybody participated—and I remember in one case where we went over a pass and a trail was cut largely with tin cups.

* * *

There have been and there will be other leaders and trips, other songs and campfires, other billycan tea parties and club-cup sherbets, other happy memories of pass and trail. But there will never be another Will Colby. As long as there are mountain trips to be led, wild streams to travel and cross, mountain lakes and meadows to beckon, trails to tread and unspoiled nature to explore, Sierra Club members and the many other thousands his leadership has touched and inspired will revere his name. May "something lost beyond the ranges" still be a clarion call for future wilderness leaders; may the rest of us remember well what he stood for; and may the mountain trails be trod by future generations in essentially the same way they were on that memorable first High Trip he started us on sixty-four years ago!

Friend of Aldo Leopold and of wilderness, an eminent Senator looks back on a great conservation year and on the career that helped make it great—remarks before the Rio Grande Chapter's Natural Area Conference in Santa Fe in November

Changing Public Opinion — As a Legislator Sees It

By CLINTON P. ANDERSON

THE TOPIC suggested for my remarks tonight—"Changing Public Opinion—As A Legislator Sees It"—is not entirely to my liking. In the first place, I am no expert on molding public opinion. In the second, I am not sure I would not prefer to be speaking on "Changing A Legislator—As Public Opinion Sees It."

We may as well begin with a confession: I did not initially seek membership in the Congress, and particularly in the Senate, to provide or push legislation for those who love nature in its various forms. My compelling motive was a healthy desire to bring about a beneficial use of New Mexico's contractual share of the waters of the Colorado River. This was to be accomplished by two goals: one, to create a Navajo Indian irrigation project to provide members of that tribe with productive farms; and two, to authorize construction of a trans-mountain diversion to pour a portion of our Colorado River water into the arid Rio Grande Valley for its farms and cities. With the passing of time and the collaboration of experienced colleagues in the Senate and House, both goals have now been attained; but along the way I have found myself intrigued by side interests alien to my early desires but of such an appealing nature that they commanded more and more of my time until now the side shows have virtually swallowed up the circus.

Ten days after I came to the United States Senate I introduced my first bill. The measure sought to protect from unregulated cutting by miners of the stands of timber along the Aspen Basin Road in the Santa Fe National Forest. I thought it inconsistent with the public interest to permit such depredation of the scenic loveliness for which the road was created. This proposal was opposed by people who wanted to remove gravel along with the trees and by the owner of a shack called by him a restaurant but termed by the artists of Santa Fe as a plain nuisance. I had earlier done newspaper work in Santa Fe and was able to enlist support from its art colony and its chief newspaper. Public opinion was changed, and the bill became law in the summer of 1949. That bill marked the beginning of my legislative involvement in the continuing effort to conserve scenic areas.

Perhaps I should pause here to observe that this experience illustrates what I mean by saying that legislators are more changed by public opinion than public opinion is by legislators. My Aspen bill was well received. People wrote me letters, and I wrote back. I began to know that I had constituents and that they cared for this golden color of aspens on the slopes of the Sangre de Cristo Mountains in October. They did not want ugly signboards to obstruct the view. They cared for little brooks that tumbled along the roadway. They cared that I cared. I would not forget that.

Much later—in fact, only a few years ago—I became concerned with the possible encroachment by a sewage treatment plant of the low-lying hills across from Mount Vernon. The need for the sewage treatment facility was not questioned, but the planners had not considered the total environment and the broader community interest. When the conservation groups alerted the newspapers and some members of the Congress, a solution was found which will give the suburban development the treatment plant, but in a more esthetically unobstructive location. The Department of the Interior went about acquiring a "scenic easement" along the Potomac. The prospects of a wooded shore as it was when Washington lived there was preserved for the hundreds of thousands of persons who visit Mount Vernon each year.

But we do not stop with a narrow strip of land along a stream. We begin to wonder what happens when the City of Washington expands and northern Virginia grows and industry and apartments take over the countryside. What can we do to see that a youth can get close enough to the Potomac River to attempt to throw a silver dollar across it? A President of the United States is reported to have gone from the White House to bathe in the Potomac. Is it clean enough for a successor to try it today? It is not, but it could be made clean again. Who cares anyway?

As a grandfather—five times—I consider an endowment of adequate water, pure air, unscarred forests and mountains, swift streams and rich soil the finest legacy for my grandchildren and their generation and the generations that will follow.

It is increasingly difficult to leave this bequest—despite the gains we have made in recent years. Everywhere across the nation a growing industry and exploding suburbs to serve a growing population contest for remaining open space. The problem of finding a place just for refuse is so acute that the Conference of Mayors is studying how to dispose of old automobiles. Special graveyards may be needed so that roadsides need not be the ugly dumping ground for automobile hulks that they now are. Pollution of streams and underground water is a real danger.

We need to hold onto room to stretch not only our arms and legs, but also our minds and hearts. The prophet Isaiah warned: "Woe unto them that join house to house, that lay field to field, till there be no place that they may be placed alone in the midst of the earth."

Our population to an ever increasing extent has moved from the farms to the cities, from the cities to the suburbs, and developed a network of sprawling metropolitan areas. By the year 2000, it is estimated that there will be 300 million Americans, and most of them will live in cities. There must be green places where the eye can obtain relief from the canyons of the city. I would hate to see the day come when a tree would become as extinct in our cities as the buggy whip. Public opinion grows to sustain me in that conviction.

Thoreau said: "A town is saved not more by the righteous men in it than by the woods . . . that surround it."

The challenge to save the cities and the woods confronts all righteous men.

What the Conservation Congress Achieved

Congress is meeting that challenge. The "open space bill" of Senator Williams, of New Jersey, is an example. The 88th Congress was the "most conservation-minded Congress" in history. The pressure of conservationists, of the Sierra Club, The Wilderness Society, and the Izaak Walton League helped Congress to win that distinction.

One has to look back at least three decades to find a comparable number of conservation and recreation bills approved in one Congress. Even then, it would be difficult to show that the legislation approved possessed as much significance to the nation.

The Congress that adjourned last month gave us the Land and Water Conservation Fund Act that paves the way for acquisition of new land and water areas for public recreation purposes; the Wilderness Act that sets aside in perpetuity a significant acreage for a Wilderness System; the Water Resources Research Act that is aimed at solving our ever increasing water problems; several laws to improve the management of millions of acres of public lands; a Wildlife Refuge Revenue Sharing Act that will accelerate purchase of wetlands to aid waterfowl nesting, resting and feeding; and reclamation construction that will bring about increased opportunities for recreation, fish and wildlife, flood control, and abatement of pollution.

The enacted Water Resources Research Act will advance our understanding of water problems and strengthen Federal, state and local cooperation.

Other accomplishments by the 88th Congress in fields of natural resources, conservation, and recreation include:

Public Law 88-29 which outlines responsibilities of the Bureau of Outdoor Recreation and is regarded as the Bureau's organic act. This law marked the beginning of a new era in government recognition of its responsibilities for effective action in outdoor recreation. Among other authorities, this law authorizes the Secretary of the Interior to maintain a continuing inventory of outdoor recreation needs and resources in the United States; prepare a classification of outdoor recreation resources; and formulate a nationwide outdoor recreation plan.

Fire Island National Seashore in New York, the fourth such seashore since 1961. The 87th Congress established Cape Cod, Padre Island, and Point Reyes.

The Ozark National Scenic Riverways that recognize for the first time in our national park policy the value of a free-flowing, unpolluted river system. In the Missouri Ozark system, 137 miles of the Current and Jacks Forks Rivers will be safeguarded for public use. About 65,000 acres of private land will be included in the Ozark Riverways by purchase or by scenic easement.

Canyon Lands National Park, consisting of 260,000 acres of unspoiled land in Utah, the first National Park created from the original public domain in 35 years.

The Tule Lake-Klamath Act that stabilizes ownership of lands within the Klamath Federal reclamation project in California and Oregon and provides a permanent basis for administration and management of resources within four vital wildlife refuges in the Pacific flyway. It should lay to rest a long-standing controversy between wildlife conservation interests and local irrigation districts.

And Congress authorized a permanent pool of water for recreation purposes at the planned Cochiti Reservoir here in New Mexico.

These are some, but by no means all, of the needed conservation and recreation bills approved by the progressive 88th Congress. A new era in power utilization, transmission and reclamation progress was opened through Congressional approval of the Pacific Northwest–Pacific Southwest Intertie to serve 11 Western states.

Incidentally, it appears that one threat that has loomed large on the conservation horizon will eventually disappear. Your group is constantly worried about the dams built on scenic river canyons to produce hydropower. In the past, these dams needed to be built to give growing parts of the nation essential electricity. But most of the possible dam sites now remaining are inaccessible—or at best, quite difficult to reach—and the power they would yield would therefore be so costly that it could not compare favorably with other sources. Hence, new proposals for dams may be rejected by the Congress because the sale of power will not pay them out, and the irrigators alone cannot assume the heavier burden.

Some persons opposed construction of Glen Canyon dam out of fear that it might harm the natural grandeur of the Colorado River Canyon. But Glen Canyon was built and is generating power at six mills per kilowatt hour. That is almost too high to be competitive. At the new Four Corners' plant in this state, with coal to gen-

erate steam, power is being generated at four mills per kilowatt hour. The Four Corners' plant is located at the minehead, eliminating the need to transport coal which drives up the cost of power generation. It is far cheaper to send kilowatts over the wire than to move coal by rail to generating plants, and new transmission methods permit this. So, the low cost of current from coal may hold in check some hydro-electric projects.

The peaceful atom is also going to be an increasing source of fuel for electricity. We are going to see atomic power become an even cheaper source of electricity than coal. That is already in the cards. If the next five years in nuclear power developments are anything like the last five, atomic reactors will be more and more evident in competitive areas.

Hence, I bring you this word of cheer: Science and technology are not only providing us with more leisure time, but in the near future will help assure the protection of the places of beauty to enjoy these added hours of time outdoors. The task of public opinion is changing there.

Congress also created the Public Land Law Review Commission to study and analyze the many complex public land laws and policies and report to Congress with findings and recommendations by 1969. I am a member of the Commission and intend to devote a good deal of time to its work.

Victory for Wilderness

Passage of the Wilderness Act and the Land and Water Conservation Fund Act were remarkable achievements in the history of conservation.

As most of you know, conservationists worked for some 15 years to save a significant portion of our unspoiled wilderness areas. The bill that emerged and finally was approved by the President was a compromise. It had to be to satisfy the diverse groups interested in it.

What we got we can keep. The bill was not all that most conservationists hoped for, but it was enough to give the American people some assurance there always will be places they can see in the countryside as nature molded it, not as man developed it.

Initially, the Wilderness System starts with 9.1 million acres, but more can be added later, perhaps a large part of 5.4 million acres of national forests, a lesser part of 21 million acres of roadless portions of national parks, and maybe some of 24 million acres now in wildlife refuges.

The initial acreage in the Wilderness System is located primarily in Wyoming, Montana, California, Idaho, New Mexico, Washington, Oregon, Arizona, Colorado, Minnesota and Nevada. But there is a little bit in the East—Linville Gorge and Shining Rock—both within the larger boundaries of Pisgah National Forest in North Carolina's western mountains.

Foresight and a concern for America's natural beauty were evident in the Wilderness Bill. Hunting and fishing will be permitted, but commercial enterprises and permanent roads are taboo.

As members of the Sierra Club can readily testify, seldom has any bill ever had such a long history of controversy with such a sharp line of cleavage between proponents and opponents. It took a lot of work, some yielding, and some stubbornness to get it passed. In the end, reasonable compromises managed to erase most of the differences. Its virtual unanimous approval by the House and Senate speaks well for those who worked so many years for its passage.

Public opinion had to change substantially as the bill moved to final approval. While numerous conservation groups cooperated in promoting the Wilderness Bill from its earliest beginnings, the mainspring of action was provided by the Wilderness Society. The late Dr. Howard Zahniser, executive director of the Society, first broached the idea about 15 years ago. He discussed it with a group of friends at the Second Wilderness Conference held by the Sierra Club in Berkeley, California, in 1951.

The late Dr. Olaus Murie, president of the Wilderness Society, worked very closely with Dr. Zahniser in developing provisions of the bill. Their basic thought was that the preservation of a small percentage of our public lands as wilderness needed statutory sanction by Congress.

From the beginning there was strong opposition to the Wilderness Bill from commercial users of the national forests who claimed their rights and privileges might be jeopardized. The users mostly were lumbermen, cattlemen and miners. It was pointed out to them that nothing in the bill changed the status of logging and grazing, but their opposition persisted.

As far as mining was concerned, serious concessions had to be made on both sides. The final bill banned all mining in officially designated Wilderness Areas after 1983, but prospecting may be carried on under certain conditions. We hope those conditions will be strict.

Sometimes, special commercial projects would interfere with maintaining Wilderness areas. A hotly-contested dispute developed this year when a group of Southern California promoters wanted to build a ski resort in the San Gorgonio Wild Area near Los Angeles.

Congress finally refused to exclude the ski area from the wilderness. But the fight was long and bitter. Had we made a special allowance for this area, it would have constituted a dangerous precedent for similar raids on other portions of the Wilderness System. Strangely, there was very little expression of public opinion for or against to guide us in our final conferences, but Congressional people from California believed Los Angeles and Southern California should have had this playground. I just want to say to you as one person who stood there through the whole battle and who made most of the motions to ex-

clude the San Gorgonio outfit from being in there, that it was very, very difficult to decide what to do. There was a group of sportsmen from the Los Angeles area who said, "We must have this San Gorgonio area. We just take a little bit of the ground area for a road. We won't disturb the wilderness at all, and all we do is build a road up it." I said when did you ever make such a proposal, and back and forth it went because they could have contemplated a 300-ft. strip of roadway up to the ski area. With the proper number of eating places, dance halls and honky tonks, this would not have been what we would have regarded as "wilderness" at all and of course the peopie who were especially approached to help on this made a strong pitch for it. It was eliminated in the House on a motion by Congressman Saylor of Pennsylvania who is a dedicated friend of conservation. I say that John Saylor is a very wonderful man because he stood and fought this as bitterly and as vigorously as he could.

Then when the bill got to the conference with the House of Representatives attempts were made to introduce the San Gorgonio ski area again. They even got a ruling from the House parliamentarian that it was a proper way to go at it. Of course we in the Senate had a parliamentarian who said it wasn't fitting and proper so we relied upon our authority and sure enough, it didn't get in. But if you ever start taking these pieces out, say that this little ski run here should be allowed and say that little ski run there can be permitted, before you get through with it you are really in deep trouble.

I just want to say that the things advocates said about the Forest Service were not extremely complimentary, but when it comes to the public welfare, the Forest Service is prepared to rule such things out and did. The strange thing to me, as I said just a moment ago, was that when the bill was in committee and there was steady conference between the two groups when we were having amendments on which the vote in the Senate committee was very close, no organization appeared on either side to say the plan was good or bad, which struck me as rather unusual. I can understand how the Sierra Club didn't protest because they knew the bill was all right as we had it. I would have thought that the people from Southern California who wanted this would have said a whole lot more than they did, trying to get it done.

The fight for the Wilderness Bill was one of the longest legislative struggles I have been in as a member of Congress. The final result was worth the effort. Under no other conditions could such valuable, natural, beautiful areas of our country be protected against encroachment; I am glad it protects so much wilderness in this state.

To some not too close to the scene of wilderness controversy, it was just another Congressional issue, but to me a great question was involved: Should we preserve a tiny fraction of a great God-given heritage for all to enjoy, or yield and see large stretches of the wilderness bulldozed, leveled, divided, commercialized and promoted into another area crammed with all the concrete and steel and asphalt marks of modern civilization? I believe Congress gave the right answer.

Breakthrough for Recreation Lands

Almost at the same moment Congress was passing the Wilderness Bill, it gave final approval to the Land and Water Conservation Fund Bill. This is the landmark measure that paves the way for acquisition of new land and water areas for public recreation purposes. President Johnson said this bill "assures our growing population that we will begin, as of this day, to acquire on a pay-as-you-go basis the outdoor recreation lands that tomorrow's Americans will require."

The Land and Water Conservation Fund is designed primarily to assist the states in planning, acquiring and developing outdoor recreation areas. Normally, 60 percent of allocations from the Fund will go to the states. The remaining portion will be available to certain Federal agencies for acquisition of needed recreation areas, and for payment into miscellaneous receipts of the Treasury to help offset capital costs of Federal water development projects which are allocated to public recreation and fish and wildlife enhancement.

The Fund established by this Act becomes effective next January 1 and runs for 25 years. Its revenues will come from nominal admission and user fees at certain Federal recreation areas, the existing motorboat fuels tax, net proceeds from the sale of Federal surplus lands, and repayable advance appropriations beginning in 1967.

In its first 10 years the Fund is expected to average $180 million in revenues annually. Federal matching grants to states over a decade may total more than a billion dollars, while appropriations for Federal purposes may run $700 million or more. These projections indicate that we are on the threshold of dramatic achievements in conservation and outdoor recreation.

All the opportunities that lie ahead are momentous. But what Congress and the Administration have done for conservation and outdoor recreation are not ends in themselves, but rather beginnings.

What is done with the tools provided is up to all of us, but especially the Federal, state and local levels of government and private organizations.

The new Bureau of Outdoor Recreation will be working with states and Federal agencies to develop more outdoor recreation opportunities.

States, cities and counties have demonstrated that they are aware of the importance of conservation and recreation programs to keep pace with tomorrow's demands. A number of states and local units of government already have programs to acquire more park and recreation land.

I was especially impressed by California voters who have just resoundingly approved Proposition 1 to authorize $150 million in state bonds to finance the acquisition and development of park and recreation areas.

The California bond measure provides $85 million to acquire lands for state parks and beaches, $20 million for development of these lands for public use, $40 million to develop county parks of five or more acres, and $5 million for wildlife conservation work.

Californians and residents of other states know that provision must be made for conservation and recreation before it is too late. Otherwise, needs and demands cannot be met. Incidentally, it seems to me that California placed itself in an excellent position to become a recipient of Land and Water Conservation Fund money in approving the bond issue. That State will have money available for matching purposes.

As I spoke of the Wilderness Act, it brought to mind the rivalry between economic interests and conservation interests. It is a natural rivalry.

In all honesty, I must remind you that the economic interests are not necessarily villians, and usually not villains at all. All the angels are not allied with the conservationists. Miners, lumbermen, and cattlemen helped build this part of our country. Economic gain was the driving force that carried the flag westward and the power of government followed it.

But across the nation, the rivalry is ever present.

Near Naples, Florida, a 57,000-acre wilderness of cypress and palm trees—south Florida's last primeval watershed—is faced with extinction by new roads and drainage canals. Several citizen groups are making a determined effort to save it. Let's see what public opinion does there.

In northern New York, studies are in progress to determine if beautiful Lake Champlain can be converted into a waterway for ocean-going vessels. Proponents of the waterway argue that Vermont dairy farmers could save $6 million a year in lower freight rates on feed grains.

But there are other people who recall that in April, 1963, hundreds of wild ducks were killed in the Niagara River after they became fouled with sludge from ships. And they also remember that in June, 1962, Thousand Islands State Park Beach had to be cleared for a month after bilge water polluted it. How did the public like that?

New Ally for Grand Canyon?

Closer to home, authorization for the Central Arizona Project will again be introduced in the next Congress. As part of the project, it is proposed to build Bridge and Marble Canyon dams on the Colorado River. The question of feasibility with electric power from coal costing only four mills per kilowatt hour must first be answered.

I hope that you people will listen to that sentence. It is very important. When we built the Glen Canyon dam, its feasibility was based on 6 mill electric current being available from it and being desired by every possible user of electricity. It took 6 mills per kilowatt hour to pay off the dam on a proper basis. If you find that the situation now arises in the Four Corners Area where current from coal only costs 4 mills, there is less demand for 6 mill power and therefore, for some of these projects, I want to say dam projects, but I don't mean it in the wrong sense—some of these dam projects have to be carefully considered. I made a special study one time and put it in the Congressional Record of what would happen if the rates of interest were just a little bit higher on some of these conservation projects. As you know, Hoover Dam was built on a 2½ percent basis of interest at that time. Had the rate of interest been above 3 percent Hoover Dam would have not been feasible. I have been reviewing that problem all along. Money is going up all the time and some of these projects that have had conservationists worried made out all right if they used the old figures, but they aren't all right at all if you use the present cost of money and then compare it with the present low cost of current generated from coal. Therefore, I am not trying to say the Central Arizona Project is not feasible; I want to say to you it may not be feasible paying 3⅝ percent for money and only receiving 4 mills for the electric current, because they have to have 6 mills for the current to make it pay out. Therefore I just suggest that if any of you should feel prompted to oppose the projects in Arizona, you might think a little bit about the possibility of comparing the costs of electricity from the Central Arizona Project, with the cost of current generated from the coal beds lying across Arizona, New Mexico and Utah. You might find that you have a stronger argument there than you do by saying that it might inundate a certain piece of ground. I just suggest that to you. The best information presented so far to the Senate Interior Committee is that no wilderness areas will be flooded by water backing up behind the dams. Water from Bridge Canyon Dam, however, will flow into part of the Grand Canyon National Monument, but not into Grand Canyon National Park.* The technical experts report that no real damage will occur in the monument. But the Sierra Club had better take a long look!

I say to you again that if you have any legislative representatives who want to know what high interest costs do to a multi-purpose project, I tried to cover that very thoroughly once. I think I still have some copies of the talk I made because there was very little interest in it at that time. But I tried to point out that many of these

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* Various heights for Bridge Canyon dam have been proposed, some of which would not put a reservoir in the park; the Bureau's present proposal, however, would back water 13 miles into it.—David Brower

dams were not feasible at all if you applied the current rate of interest to them. We built some of these early. We naturally used the best dam sites first. When we come to more expensive dam sites and as you try to apply the full rate of interest to those dam sites and use as factor of return from them, 4 mills instead of 6, you might be in very serious difficulty. I don't want to start you off on a new path, Dave, but this is a possibility you ought to look at, I think, because we all have to watch it very carefully. There have been some instances where it seemed to me a project has been approved that might not have paid out. I tried to oppose some of those. I think we should look carefully at all of these because the difference between coal at 4 mills and hydroelectric power at 6 mills is very, very substantial. The power companies now are proposing to build some very large power structures in Arizona, New Mexico, and California using coal. They are going to develop that power at a very low rate per kilowatt. They are going to have a very low cost for fuel. I think that means something in the development of these additional projects. It just might be that you have an unexpected ally in the coal industry.

The impoundment may provide a water route for many more persons to see the natural wonders of the canyon than ever before. This surely will be the case at Rainbow Bridge National Monument in Utah. Once extremely difficult to reach, the reservoir from Glen Canyon Dam will make access relatively easy.* This is as it should be.

While some forest should remain primeval, it should not be a private preserve reachable only by the wealthy.

In recent years we have come a long way in conservation. Organizations involved in the protection of natural resources have learned how to work together to achieve a common objective. The Sierra Club, the Wilderness Society, the Izaak Walton League, and others were mobilized in behalf of the Wilderness Bill, to cite just one measure. This is invaluable experience on the battleground for wise conservation practices.

Seeking the Wider Audience

But I do not believe the burden of continuing the good progress to date should rest only on the willing shoulders of these groups. The message of conservation must be carried to a far wider audience. There are a number of leading newspapers and newspapermen in the nation who are aware of this need. Ed Meeman, the Scripps-Howard conservation editor, Brooks Atkinson, of the *New York Times*, the *St. Louis Post-Dispatch*, the *Washington Post*, and a few other outstanding newspapers are with us in the fight. More editors and publishers should be brought in.

The work in Washington should not be left only to the representatives of the conservation societies. Conservation-minded Congressmen and Senators should be elected to Congress. I see the day coming when conservation policies will be a key issue in many districts.

Our work is not only on the open expanses of the public lands, in the national forests and the national parks. The job of preserving America the Beautiful must also be carried on in the crowded cities.

Under the weight of technology and population expansion, our environment is changing faster than we gain ability to control it. If it is to be a hospitable environment rather than one that is barely tolerable, the job of conservation must be accelerated. That is our assignment—and I think the people who love our land will be with us.

I just say in passing now that one of the pleasant experiences of my life has been the association I have had with these conservationists groups as we try to pass a good many pieces of conservation legislation. I have never seen a more dedicated group of conservationists come to Washington to try to bring that about. We need more than just these groups at Washington. I think the issues should be known at home.

I had a letter not long ago in my office which gave me some very severe thoughts, for a few minutes. The person writing it said that I was mainly interested in wilderness because I wanted to keep people out of our State. Not at all! I want people in New Mexico. I am not trying to keep them out of our State. But I love these primitive areas. I love the wilderness areas. I have gone with Fred Kennedy to the Gila Wilderness two or three times. I am not a very good mountaineer. I do not ride horses as well as I should, but just the same I love the primitive areas of our country. I think they can be made useful for everybody and a wonderful thing for all of us. We have to have support once in awhile. On the Wilderness Bill there was some real fine aid given to us in the Senate. There was not so much aid given us in the House, and I just hope that all the people who are here tonight realize that if these conservation measures are going to succeed, it is going to take an awful lot of people working together to make them succeed. Many of your battles, I am sure, Dave, have been against the encroachments the dams sometimes make in these national areas. I think I said a moment ago that you are going to have real help on that in the lower cost of coal as a fuel, in the possibility of interest rates going higher; therefore the dam is not going to be quite so practical as earlier ones have been. I hope when that time comes you will all be in Washington beating the drums for more economy in your Government and more beauty in the wilderness of our land.

* It was a conservationist failure—more the Sierra Club's than anyone else's—not to have demonstrated to Senator Anderson and other leaders how accessible Glen Canyon was, at very low cost, before Glen Canyon Dam was authorized. Too few articulate people saw and spoke soon enough. In my own ignorance I myself joined, in 1954, in the advocacy of a still higher Glen Canyon Dam. Music Temple and Hidden Passage were just names; no one spoke at all of the Cathedral in the Desert. People who know such places can save them. No one else.—D.B.

A reassuring number of thinking people are realizing the threat of reckless population growth to the wholeness of man. A creative chemist-geographer faces the need that a wider realization must come faster.

Numbers Against Wilderness

By Daniel B. Luten

Except to help rosy predictions of growth fulfill themselves, most conferences on American resources and resourcefulness have had little to say about the threat to people of reckless growth of human population.

In Sierra Club Wilderness Conferences the matter was not mentioned as a potential problem until 1957, when David Brower had this to say: "A serious problem, upon which no conservation organization I know of has adopted a policy, is the population problem—an especially touchy cat to bell." Belling, he felt, was needed, and he called for volunteers. None stepped up.

In 1959, again in San Francisco, Raymond Cowles, in a major address on the dilemma of population, anticipated the dilution of a wilderness and said, "We will find it difficult to preserve for our great-grandchildren the benefits we envision for them. We . . . are threatened by an ecological sickness that resembles not a static condition of organic ill health but a progressive illness." He said with reference to parks, "We cannot succeed unless we can stem the multiplication of our population within the very near future." The press, some of it friendly, picked up his plea.

In a panel discussion in 1961, at the Seventh Conference in San Francisco, Robert Stebbins said: "One of our first problems—it has been mentioned a number of times, and perhaps I'll be ushered out of the place now when I mention it again—is the growth of human population. To put it bluntly, we need more birth control. I fear otherwise we are fighting a rear-guard action." The audience applauded.

A letter I wrote following that conference appears in its proceedings, *Wilderness: America's Living Heritage*, and says in part: "If, however, the end of growth is by increase in deaths, no one with a concern for human welfare can look to the future with anything but dismay. For before we come to that vindication of C. G. Darwin and Thomas Malthus, we shall have crowded every other living thing off the face of the earth, except it bend its will to our demand." And without any assurance that we can make it alone.

The discussion became more spirited in Seattle at the Fourth Northwest Wilderness Conference in 1962. William Catton said, "The answer lies in the short range in preserving more areas of wilderness as wilderness. In the long run, it can't lie in anything else except population control." The audience applauded this statement. William Oberteuffer added that we will know whether man is something more than an animal "when we find out whether he will control his numbers or whether his numbers will be controlled as animals' numbers are controlled."

In the San Francisco Conference in 1963, Fairfield Osborn concluded: "It is now becoming clear that ever-increasing population is detrimental to every aspect of human life, including the values to be derived from wilderness. The population explosion—not only in our country but throughout the world—is the greatest social problem facing man today."

In the same conference, Secretary of the Interior Stewart Udall spoke more to the point than any high government official to my knowledge. Of his several paragraphs on the subject, two are especially pertinent here:

"Is it not time to give serious consideration to the 'ecology of man'—the relation of human population to its environment? Is it not time to ask whether man, as part of nature, is subject to the laws that govern other species, particularly the law that for every species in a particular environment there is an optimum population?

"When a species expands beyond its optimum population, it puts pressure on its resources until there are not enough to go around, and the individual fails to achieve his full growth. Although this is most obviously true of food resources, it is also true of the resource of living space."

In September 1963, at the Asilomar meeting of the Federation of Western Outdoor Clubs, David Bohn insisted that the program of that meeting was concerned only with symptoms, that the illness was population growth, and that no hope for the future of wildlands could be realistically held until growth ended. The audience did not pick up the matter.

Here we are again. Some of us may feel that the subject has been exhausted; our talk goes on and so does population growth, unmitigated. Engineers doggedly design for the overcrowded ultimate and planners seek and serve the self-fulfilling predictions that give the world more and more people and less and less earth.

But there are good signs too. Growthmanship is losing its luster not only among the ordinary people who approve of nature, but also on campus and in the churches. The economic and political world is catching on too. There is still a chance that *better* will take precedence over bigger, and there isn't a person here who can't help that victory come about.

The past is still prologue, so I'd like to paraphrase part of what I wrote a year ago (1963): Men have lived on this earth for a long time: 600,000 years is an adequate guess because an hour could cover this period at 10,000 years per minute!

—Thirty minutes for man's learning how to make and use tools;

—fifteen minutes on learning how to use fire;

—fourteen minutes on the early stages of domesticating plants and on exploring the earth;

—the last minute for the invention of field agriculture, villages, herding, writing, and the great outpouring of technology starting with the use of irrigation by civilizations of the Middle East, through Greece and Rome;

—a fraction of the last minute for the Dark Ages and the torrent of the Renaissance; and

—in the last few seconds, the Industrial Revolution and the present science-led technological revolution.

Growth of the world's population at the time of Christ was perhaps 0.04 percent per year; today it is almost 50 times as great. What happened in a century back then happens in two years now.

Can this growth continue indefinitely? No. Today's population growing at today's rate would require only 800 years to reach SRO Day, the standing-room-only population, five square feet per person, land and sea. Perhaps 2,000 years later the periphery of the earth's mass of humanity would be expanding outward at the speed of light.

My only purpose in playing with these numbers is to convince you utterly and irrevocably, finally and remorselessly, mathematically and logically, that the growth so familiar to us today was unknown to all but the most recent of our ancestors and that it must be unknown to all but the most immediate of our descendants.

Of all these 600,000 years, man has had to contend with appreciable growth for less than 6,000, and most of that growth can be limited to the 600 years beginning with 1500 A.D. Its peak will probably lie in a 60-year period centered in this century. We live in a unique age. It will not continue; it probably will never recur.

I said all this a year ago and still believe it.

THE world's population reached a half billion in about the year 1650 A.D. In the next two centuries it doubled, reaching a billion in about 1850. In the next 80 years it doubled again. The doubling time is now 40 years.

As I have said, such growth must end. How it will end cannot be predicted with assurance but the alternatives are limited. First, it will not end with emigration to other of our sun's planets. Even granted that these are as accessible and hospitable as the earth, they represent no solution. To demonstrate this: if we assume a continuing growth at today's rate, it would take only forty years from the time we occupied Venus to fill it to the same fullness as the earth's. A second forty years for the third and the fourth, a third forty years to fill the last four planets. Postponement, not solution. May I suggest that any scientist who seriously presents such emigration as an answer to the problem thereby disqualifies himself as an expert, for it is evident that he does not understand the nature of exponential growth! Major population problems cannot be solved by emigration; they can only be postponed.

The alternatives for the equalization of birth and death rates are limited to two. An increase in the death rate would mean a world where few people live to a great age; where many, perhaps a major fraction of infants die in their first year of life. It is a world not entirely unfamiliar to us, but to most of us it is familiar only by report. It is the grinding world of the Bolivian Altiplano, the deprived world of India in the famine of 1943, the hazardous world of an Eskimo hunter. We would not be eager for it.

A reduced birth rate would mean a world of smaller families. Given a choice between long life and a large family, which will man choose?

Several writers have tried to clarify this dilemma by analogy. Although analogies must always be imperfect, let me try one:

In an ancient civilization, the younger of two brothers whose duty was to lift water from the river into one of the village's paddy fields said, "Elder Brother, sometimes it seems to me futile to continue to lift water into this field where the dikes have not been repaired for years, so that the water runs straight back into the river. Does it really make good sense that we should do this? In half a day we could repair these dikes so that they would hold water."

"Younger Brother, yesterday I, too, wondered about this matter, and spoke to the elders of it. They told me to cease my malingering. They said that they were seeking more men to help us lift water and that it was not our task to repair dikes. Somewhere, they said, perhaps in the next village, there is a man who repairs dikes; it is not our responsibility."

The moral is: The task of population limitation is the task of every man who sees the problem.

No solution is to be found in long-range efforts to increase the world's food supply. For the short run, we must, in practical humanity, do what we can to extend it; but the long-range efforts we must, in good conscience, oppose.

Some people extol the algae farm as the answer, pointing to the vast yields obtainable per acre. Rarely do they mention the vast costs of creating such farms. Scarcely ever do they mention that such extensions of food supplies, almost inevitably at the cost of all other human values, suggest an entire Malthusian world. Such a course

provides no solution; it only postpones the day of reckoning, and each forty years' delay doubles the piper's bill. Occasionally they say they hope someone else will do something about population growth. Yet if we had spent one dollar to learn how to terminate growth for each thousand dollars we have spent on increasing production, we might have this whole matter well in hand!

The fact is that the people who urge such long-range research and who get monstrous budgets to undertake it are, on the face of it, either ignorant, mesmerized, or cynical. Either they will not or cannot see what is staring them in the face, or they can see it and prefer to protect their research budgets. They will have a hard time proving that alternative explanations exist which reflect more credit on them. They can espouse pure research, justified by the gain in human understanding, but not if they have sought support under the guise of helping solve the world's food problem. Worse, by supporting the delusion that a solution exists somewhere down the primrose path, they encourage lassitude in a public which should instead be alerted.

Governments awarding such research contracts cannot be criticized too sharply because they are rarely able to lead public opinion very much. But our great research foundations are granted certain immunities in this society in order that they may exercise leadership. If they are too addicted to the conventional wisdom, too timid to take this leadership, then their rights to these immunities may well be questioned. If their scientists tell you to follow them for their science will save you and will lead you into eternally green pastures, and if you believe and follow them, you will deserve whatever fate comes your way. The Pied Piper of Science offers no guarantee and may exact the same price as the Pied Piper of Hamelin.

Must we focus our primary research attention on food from algae, energy from the sun, on minerals and water and food from the sea? Must we say that while our mouths do not water for chlorella steaks, this is nonetheless our prospect and only hope? Must we divert the Columbia River through Arizona? Or are these the defeatist wails of a dying society with declining living standards, its back to the wall? A better path exists.

William Vogt, in a similar allegory (1960), speaks of a mental hospital that cannot afford psychiatric appraisal. So they herd new patients into a large room with water taps on the walls and many mops at hand. The attendant turns on the taps and the staff watches through the windows. The sick go to the mops, the sane to the taps.

In these parables, one points at leadership, the other at each of us; we have a personal responsibility we cannot pass to those who lead us.

Aldous Huxley (1962) brought in the idea of crisis when, in his last year, he wrote in the dedicatory note to a recent book, "On the stage of international politics, a whole orchestra of Neros, some consciously malevolent, but most of them full of good intentions and high ideals, insanely fiddle, while all around them, at an ever-accelerating rate, Rome burns."

In a recent term paper, John Wingerd (1963), a graduate student at the University of California in Berkeley, wrote: "The image which comes to my mind as applicable today is that of a Kafka-like toboggan, running down a slope at ever-increasing speed. Most of the passengers are completely unaware that the slope is becoming steeper; in the front, the official drivers are too busy quarreling over possession of the steering-bar to notice anything at all. Here and there among the passengers are a few individuals who recognize the danger. Some of these, convinced that a precipice lies ahead, shrilly exhort the others to 'Turn! Turn!'—how, they cannot say, and usually they indicate a direction somewhere along the receding track. Others knowledgeable in toboggan construction, offer wise expedients to hold the vehicle together for a few moments longer, in the hope that the slope will level off.

"Whom shall we heed? The sober individuals with the bailing wire, just emerged from conference, speak with authority as they point out that, although the slope is becoming steeper, it cannot yet be considered a precipice. But it looks rather like a precipice to us, and we have just remembered that it was they who a few miles back told us how to grease the runners when we so wanted to feel the rush of crisp, winter air."

Here again the finger points at leaders, but also at nostalgia for what is inevitably lost forever. As M. K. Hubbert (1946), speaking of the relation of the world's population and consumption of fossil energy, said almost two decades ago, "we cannot turn back. . . ."

Back to the question, large family or long life? Let me emphasize that this dilemma, immediate for most of the world today, is not imminent for the societies of Western Europe and Anglo-America. Yet it is no escape to think this is not our problem but our grandchildren's. The momentum of human affairs is such that the irrevocable decision to turn toward large families or toward long life must be made several generations before we approach the brink. Once the society of western Europe and North America enters the ultimate rapids of descent to the Malthusian society, there will be no escape. This is a river of no return.

It is like the descent of Yosemite Creek, half a mile above the falls. Imagine yourself canoeing down it, the stream crystal-clear, and refreshingly cold, the day warm, the overhanging alders coming into leaf. Presently the current quickens ever so little, the channel deepens and narrows slightly, the beaches dwindle and the walls rise. Now they are almost as high as the hands can reach. Al-

though the sky is clear as crystal and blue as wild lilac, there is a rumble of distant thunder.

Will we leave the raft at the warning of quickening current and rising walls? Or assay the situation carefully and decide that there will be more beaches later? Will we persuade ourselves the thunder is from a rare May storm still below the horizon and not possibly the roar of the cataract? Our answer, of course, depends on whether we think this trip is fun, on our appraisal of the course of descent, on our confidence in a later take-out point. It depends on whether we are reckless or conservative and on our concern for the future.

I need not at this moment choose whether to have a large family or a long life. We are not yet at the brink. I can have and most of us do have large families and still seek and expect long lives. Rather, the question is this: When I have managed to remove the blinders of the conventional wisdom (I am eternally grateful to John Kenneth Galbraith for that phrase) and to get the rudiments of an understanding of the relation between family size, long life, exponential growth, and the limits of the environment, then which will I choose? Shall I take a large family for myself and short lives for my descendants some day? Or will I choose a small family for myself and at least a continued, a revived hope that my descendants may also have this extraordinary luxury of long life, not unique in the biological world but nonetheless rare? My choice will depend on my temperament, my knowledge, and my purpose.

The choice should not be too difficult for those who remember the day in 1954 when Alan Gregg, then Vice President of the Rockefeller Foundation, compared the clinical manifestations of malignant neoplasms with the phenomenon of human society and its effects on the earth's surface. He was, I believe, widely criticized for what he said. So far as I know, his critics, when they had had their say, put their heads back in the sand and have left them there to this day. Dr. Gregg's paper, abridged, is in *Science* (1955). It lost something by abridgement. I wish you could have heard him; you would not forget it. There is a crescendo of aptness in his analogy that makes it the most powerful I know. Listen to these chords:

"Metastasis is the word used to describe another phenomenon of malignant growth in which detached neoplastic cells carried by the lymphatics or the blood vessels lodge at a distance from the primary focus or point of origin and proceed to multiply without direct contact with the tissue or organ from which they came. It is actually difficult to avoid using the word colony in describing this thing physicians call metastasis. Conversely, to what degree can colonization of the Western Hemisphere be thought of as metastasis of the white race? . . .

"Cancerous growths demand food; but, so far as I know, they have never been cured by getting it. . . .

"Our rivers run silt—although we could better think of them as running the telltale blood of cancer. . . .

"At the center of a new growth, and apparently partly as a result of its inadequate circulation, necrosis often sets in—the death and liquidation of the cells that have, as it were, dispensed with order and self-control in their passion to reproduce out of all proportion to their usual number in the organism. How nearly the slums of our great cities resemble the necrosis of tumors raises the whimsical inquiry: Which is the more offensive to decency and beauty —slums, or the fetid detritus of a growing tumor?

I HOPE I have made certain points implicitly. What I have said, though, is not yet specifically to the issue. Let me say what I believe to be basic:

A society which can discern the limits of its environment will guide its conduct and will control its population so as to remain within those limits.

The deliberate limitation of populations is not new. Throughout human history, societies that found the incentive to limit their populations managed to find techniques. A. M. Carr-Saunders (1932) has catalogued them by the score. The techniques are as varied as human imagination; each year the anthropologists and sociologists get wind of new ones. Some of the techniques we all deplore, others are deplored by some of us, and a few simply remain unexplained mysteries.

Irene Taeuber, in *The Population of Japan* (Princeton University Press, 1958), had this to say about a medieval period of isolation from the West:

"Contraception, abortion, and infanticide were all known to the ancient Japanese, but even in the late *bakufu* period there was no sharp differentiation among the three as biological procedures or ethical concepts.

"The procedure easily and cheaply available to the people was not abortion but *mabiki* (thinning). According to the ancient tales, when the woman in a poor family was delivered, the midwife asked the family whether to let the infant remain, *okimasu-ka,* or whether to return it, *modoshi masuka*. The midwife either cared for the infant who must be assisted to survive, or managed the death of the infant for whom there was no room.

"Abortion and infanticide were known throughout the society, and their utilization is reported to have been widespread. Many families of the *bushi* class had such low incomes that they had severe difficulties in obtaining food and clothing appropriate to their status. In Kyushu men were enjoined not to marry until 30 or later, and it was regarded as somehow disgraceful to have more than three children. The number of wives who had abortions performed secretly was 'countless.' In the cities power and wealth were in the hands of the merchants and the artisans. Among these, so it was reported, adultery was com-

mon, and abortion utilized to avoid publicity and disgrace. The peasants did not resort to abortion, but, instead, to the 'inhuman' practice of infanticide. We quote (from a Japanese source): 'Many of the poor peasants in the remote regions do not raise their children. Their humanity is below that of the animals. The practice (of infanticide) is beyond description, but it has become a custom and people do not think it strange. It is reported frequently that the custom (of infanticide) has penetrated even to persons of high character. This practice is most common in the Hyuga region (of Kyushu). Here it is said that if a birth occurs to a person of high character and the decision is made to raise the child, (people) offer them congratulations. If (people) learn that the child is not to be raised they pretend ignorance; (under these circumstances) they do not offer congratulations. Generally only the first son is raised, and the others are not. If two or three sons are raised the family is ridiculed for undue attachment. This is a shocking situation.' "

Incentive to limit populations, I am coming to believe, existed in and was recognized by any human group able to measure the relation between its needs and the capacity of its environment to meet those needs. Within an environment whose limits are simple and obvious, even simple-minded groups could get the message. Such societies also tried to tread evenly on their environment, so that no part of it was destroyed through poor management. It seems plausible that the concept of property, as a piece of land a given man owns, developed as a mechanism to assure protection of the environment, even as territoriality develops in birds and other mammals.

Game laws among the Choctaws were as strict as those of today (Swanton, 1931). The amount of game killed was reported to the chiefs; the amount that could be killed each season was regulated on the basis of the expected supply. Where and when fish poison might be used was also regulated by the leaders. Among the Algonkian tribes, generally northeast of the Great Lakes, hunting territory was owned by the family, was hereditary from father to son, and was divided usually into four quarters, only one of which was hunted each year.

The Iroquois Indians did not kill female animals during breeding season and did not disturb birds when nesting (Speck, 1913). Sometimes a family having a very bad year might get temporary permission from another family to hunt or fish in a certain stream or valley. When traveling, one could properly ask permission to cross another family's territory. Among the Senecas, pigeons were not disturbed until the squabs were ready to leave the nest. The old birds were allowed to go free to nest again. Chief Simon Pokagon of the Potawatomi said, "Under our system the pigeons continued to increase while the white people, who killed both old and young pigeons, depleted the stock."

But with the coming of the white man, these practices deteriorated, and the record is full of destruction of game by the Indians. Can we read into this that it had now become impossible for them to see the limits of their environment? Perhaps we should write it in our books that the coming of broader horizons brings with it not merely greater opportunity, but also greater responsibility.

In this latter part of the record, it is told repeatedly how the advent of firearms temporarily increased the harvest of wild game, but also commonly it so depleted the stock that the total amount that could be harvested thereafter diminished. One simple technological change upset the ecological balance of the large mammals and led quickly to depletion of the range.

WHAT is the limit of our own range, our environment? How clearly must we see this limit before we find the character to keep within it?

Our limit must be defined carefully. We are not a Malthusian society, deprived, existing at the very margin of life itself. We have a society of great richness, of opportunity. We cherish ideas which, if not new, had at least been submerged in the press of the early industrial societies: the idea of progress is recent and the idea of human dignity, of individuality, is still almost brand new. Perhaps these ideas have no survival value and will be scoffed at by our descendants. If we intend them to persist, we will have to do a great deal more than to boast about them. We will have to take great care that what made them possible also persists. We cannot talk of the limits of our environment in food, clothing, and shelter alone.

Those of us who have time to think about it feel that an essential component of our lives is the opportunity to know the natural world—the world which has shaped man during all but the last few seconds of his hour. I am sure support for this proposition is growing rapidly. I believe that widespread support for it already exists in most parts of our country.

Aldous Huxley wrote in *Brave New World* (1932): "The purpose of life was not the maintenance of well-being, but some intensification and refining of consciousness. . . ." The major opportunity for the intensification of consciousness lies in nature. Any infringement in the opportunity for free contact with the natural scene diminishes the quality of our lives. Once we lose touch with nature, our society loses its values, its purpose. And this should concern us more than bricks and mortar. It is one of our great failings that few of us have the spirit to hold spirit above material welfare.

I can already hear the voices: "Let's be realistic about nature; you can't eat the natural scene. It makes no jobs and is worthless on the tax rolls." I would ask you who

speak in this voice to dedicate one day to a conscious effort to erase all the influences of nature from your life. Should you see a flight of geese overhead, as I just did, avert your eyes, close your ears to their clangor, and remember: *last year we reduced our waterfowl to its lowest level yet*. When you walk out to your car, turn your eyes from your lovely garden: *it will look better done up in high-rise apartments or under pavement*. As you step across the parking strip into your car, cross out the trees in that parking strip: *we will widen the pavement; hail the marvelous ducts beneath the asphalt that bring our energy, water, communication, and take away our effluents!*

I can go on. In your offices and homes, turn your eyes away from all the decorations with symbols of nature. Turn to the walls all paintings except the abstractions devoid of nature. Hear no birdsong; smell neither seashore nor violets. Taste only the synthesized foods. Touch plastic and never a river-worn stone. Try all day to put yourself in such a world and then decide how much of the natural scene you and your children should settle for.

THERE is today a crisis in wilderness; from now on, there will be a crisis in wilderness. It is threefold. First is the immediate challenge about whether we can provide a legal basis for the salvation of a minute residue of our wildlands. This must be what Allen Morgan (1955) had in mind when he said that what we save in the next few years is all that will ever be saved!

The second crisis will come from repetitive attrition, dilution, and saturation. Even though title has been gained to the wildlands, the attacks on them will not cease. Of this Mr. Morgan might say that what we save in this decade must also be saved in the next—an unfair burden.

The third crisis is of population growth. Other matters always seem more urgent. Must the vitally important always give way to the conveniently urgent?

The ever-growing population is absolutely and uncontrovertibly incompatible with the preservation of our wildlands, which is the mission we have above all others. It must follow, if reason was granted to man for any purpose at all, that these wildlands cannot survive reckless parenthood, uncontrolled birth, whether in poor lands or rich. Each of us is responsible, not just our experts or our statesmen. It also follows that a conservation organization concerned as it must be with the wholeness of man, needs to have a population policy. What should it comprise?

As a suggestion: Wildlands conservation organizations should willingly acknowledge that population is the common denominator of all resources problems. They should audibly conclude that the termination of the world's unbridled population growth is to be desired. They should acknowledge that if wildlands in the United States are to endure together with a high level of living, then here, no less than in the poor lands, a cessation of population growth is imperative. The world's population growth derives from a humane diminution in death rates. Termination of growth can be humanely sought only in reduced birth rates.

It is immoral to contend that ever-growing populations and wildlands can coexist. It is therefore appropriate to support the organizations which seek to illumine the population problem with logic. I would suggest that development of techniques and education in their use and distribution is *not within* the scope of conservation organizations. But creating an incentive does lie within our responsibility and we should be unstintingly at it. No one else has the insight and the responsibility we have. If we shirk this task, do we have integrity and ought we be taken seriously?

To paraphrase an item in the record of an earlier Wilderness Conference (Luten, 1961): "If we are afraid to come to a decision, then the wilderness movement will end as other romantic movements have ended—in obscure history books."

It may be worse than that. Man has not demonstrated in any convincing way his ability to survive without wildlands. In prudence, he ought to take the most important step toward saving them or there may be no writers at all to record his failures.

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PIRKLE JONES: Wave and Sun, the Pacific

THE CRUCIAL RESOURCE

From what immortal hungers, what sudden sight of the unknown,
surges that desire?
What flint of fact, what kindling light of art or far horizon,
ignites that spark?
What cry, what music, what strange beauty, strikes that resonance?
On these hangs the future of the world.

Of all resources, the most crucial is Man's spirit.
Not dulled, nor lulled, supine, secure, replete, does Man create,
But out of stern challenge, in sharp excitement, with a burning joy.
Man is the hunter still,
though his quarry be a hope, a mystery, a dream.

GERRY SHARPE: Boy and Horns

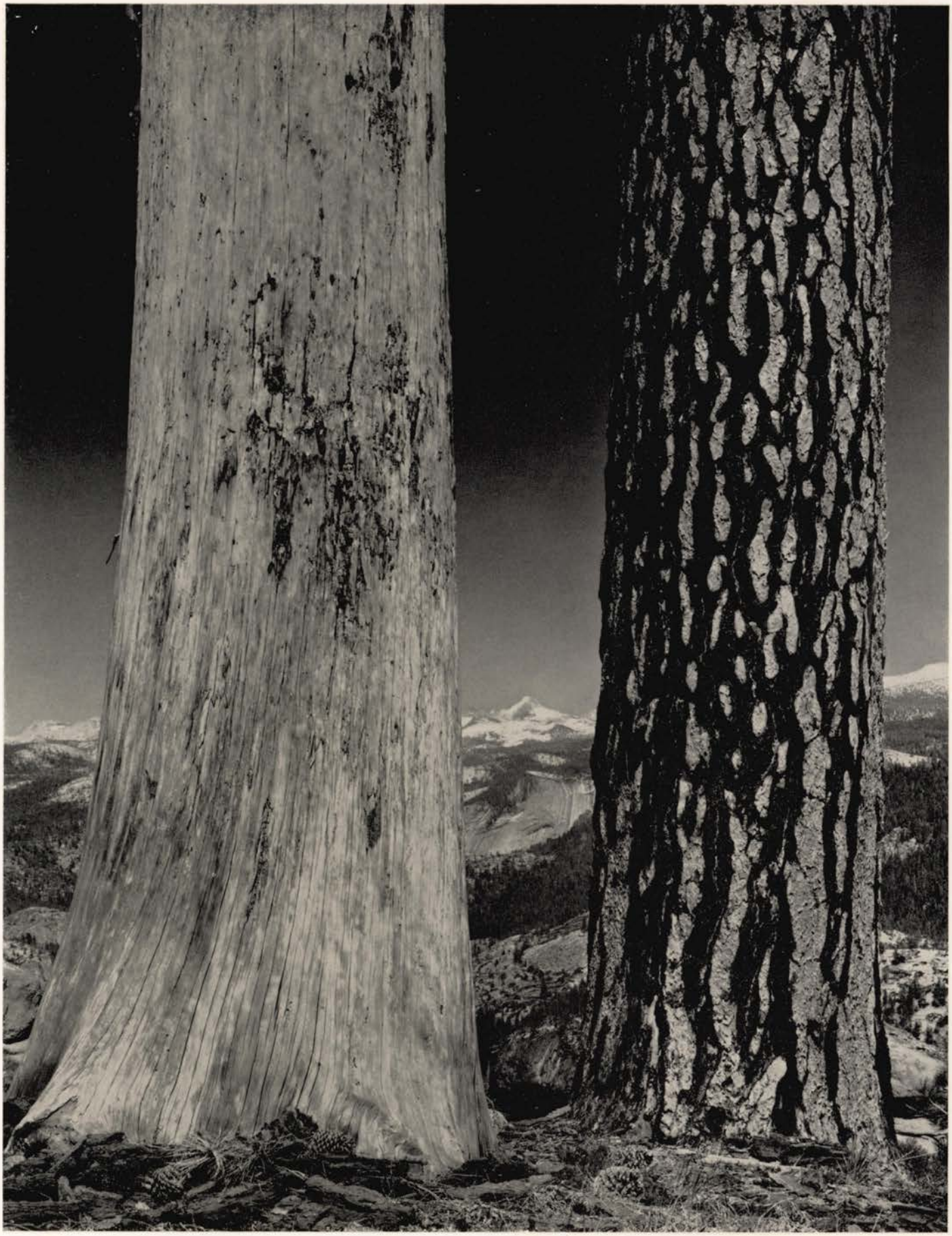
Reduced from the exhibit-format book
This Is the American Earth,
by Ansel Adams and Nancy Newhall (Sierra Club, 1960)

Pristine forever, now and for the unborn,
let us keep these miracles, these splendors;
Pristine forever, these sources of Man's spirit, symbols
of his goals, landscapes eternally of freedom.
Pristine forever, our ancient, basic right to know —
to know through every sense of body, mind, heart,
reaching from finite to the infinite,
through every note and modulation
of this instrument
we for a time inhabit —
the great experience that is matrix of all others.

ANSEL ADAMS: Tenaya Lake, Yosemite

Shall we not come as pilgrims to these sanctuaries?
limit, where need exists, our numbers,
that each may find a singing solitude and pass
free as a cloud's shadow?
Shall we not leave behind, below, tensions and frenzies,
the cacophony of machines and fractured time?
Shall we not strip to essential skills,
embrace the deep simplicities?
Be heir once more of all light's splendor, back in diurnal time,
time of the turning earth and of the rising stars?
Approach, humbly and on foot — in joy — the thresholds of heaven?

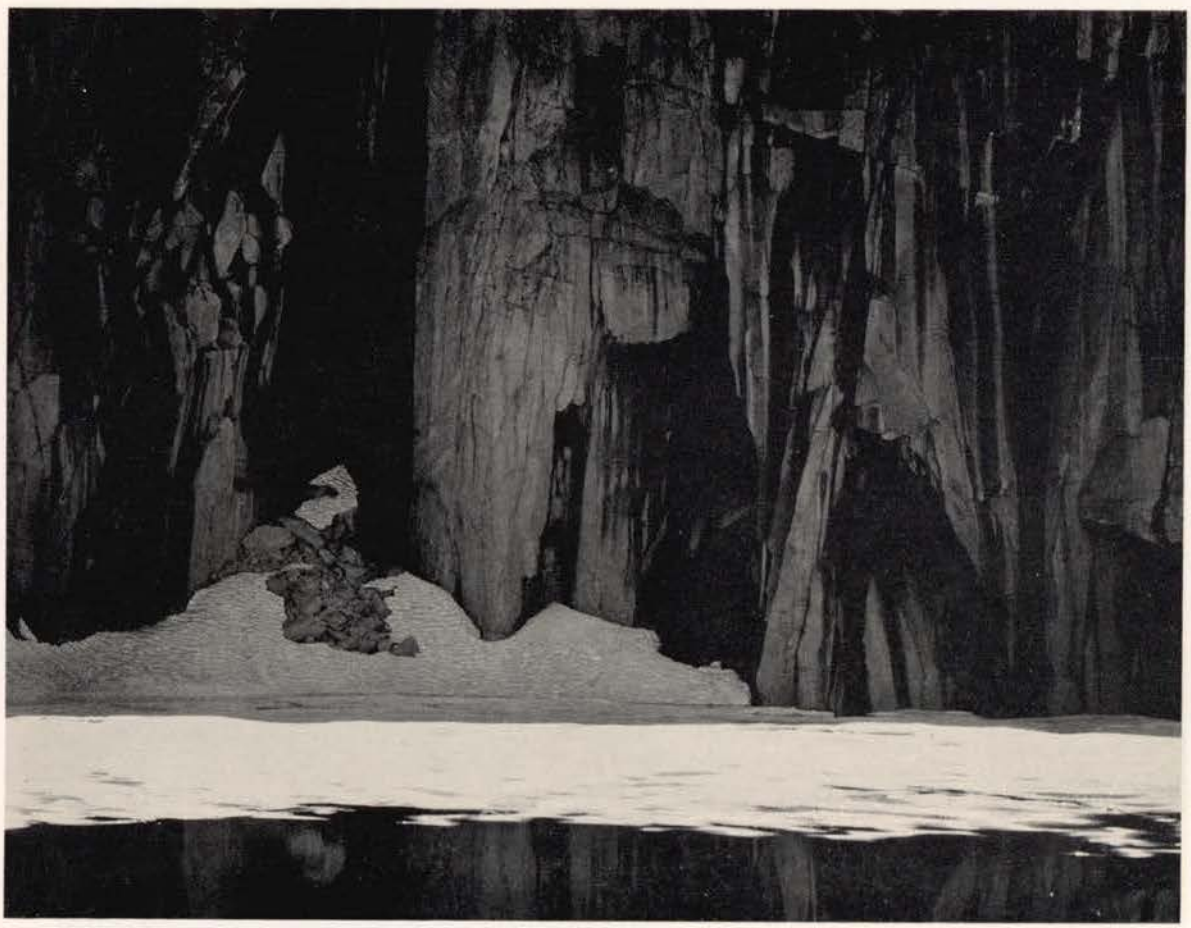
ANSEL ADAMS: Dogwood, Yosemite Valley



ANSEL ADAMS: Trees, Illilouette Ridge, Yosemite National Park

To the primal wonders no road can ever lead; they are not so won.
To know them you shall leave road and roof behind;
    you shall go light and spare.
You shall win them yourself, in sweat, sun, laughter,
    in dust and rain, with only a few companions.

You shall know the night — its space, its light, its music.
You shall see earth sink in darkness and the universe appear.
No roof shall shut you from the presence of the moon.
You shall see mountains rise in the transparent shadow before dawn.
You shall see — and feel! — first light, and hear a ripple in the stillness.

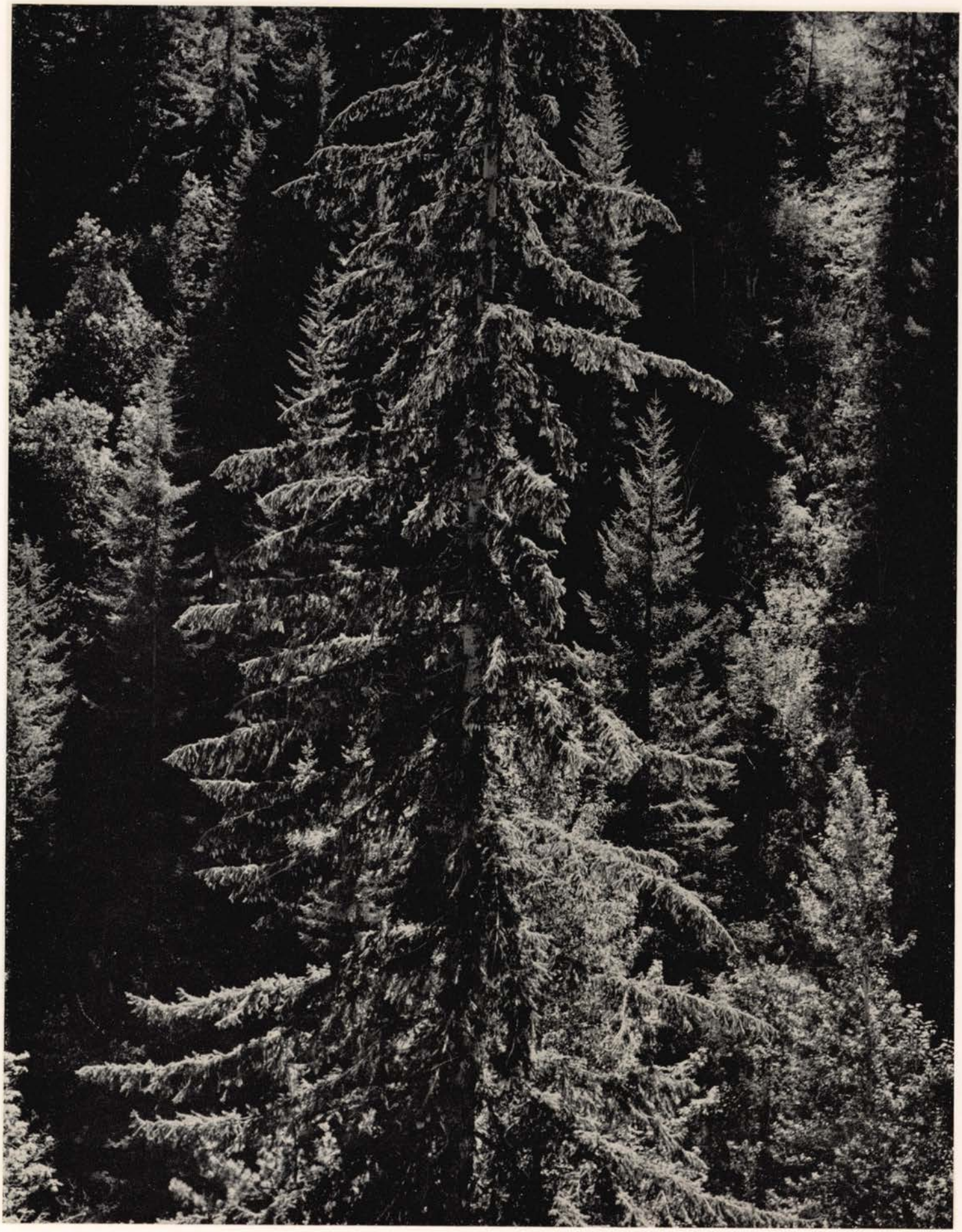


ANSEL ADAMS: Frozen Lake and Cliffs, Sequoia National Park

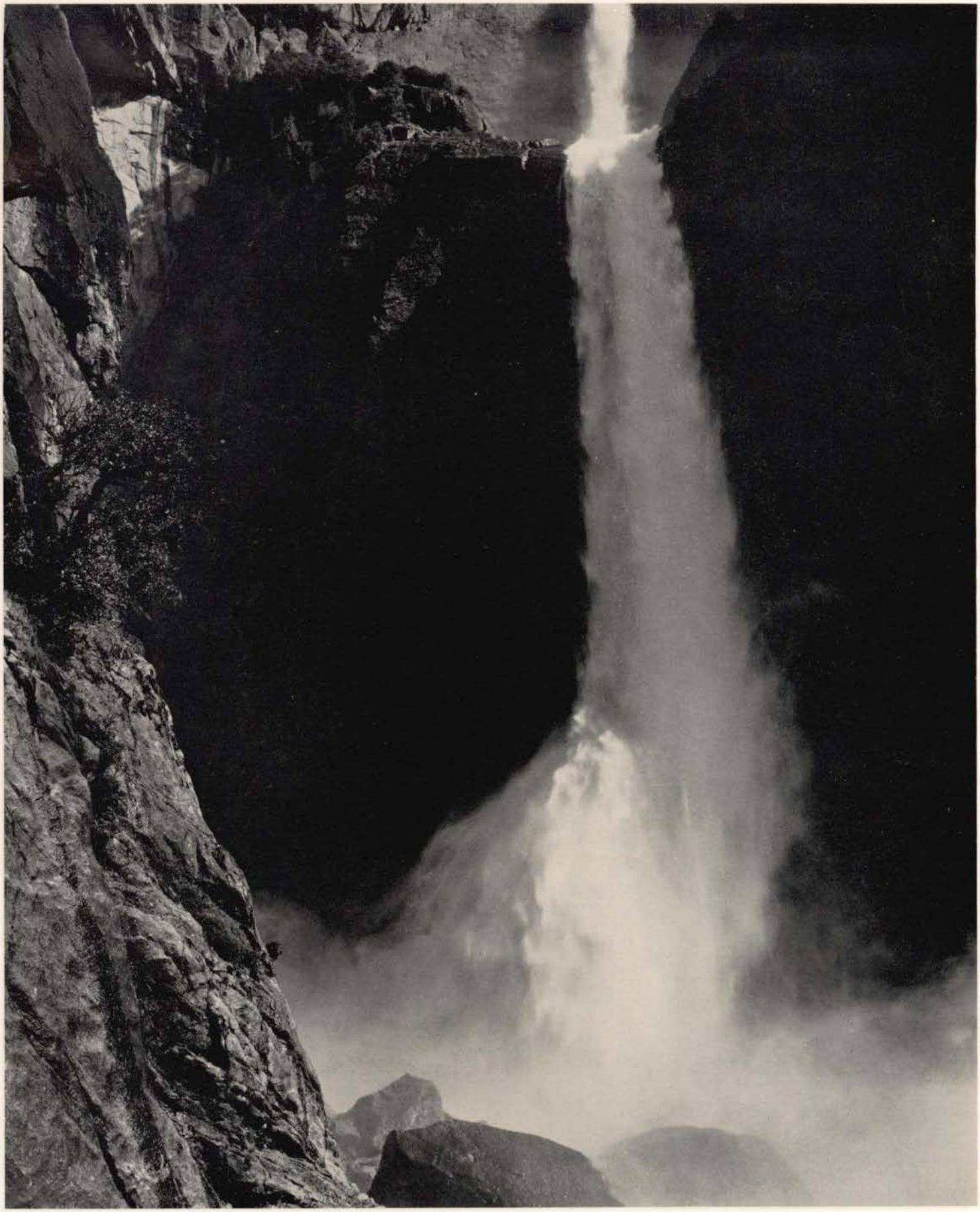
ANSEL ADAMS: Dawn, Mount Whitney

You shall enter the living shelter of the forest.
You shall walk where only the wind has walked before.

ANSEL ADAMS: Child in Mountain Meadow, Yosemite



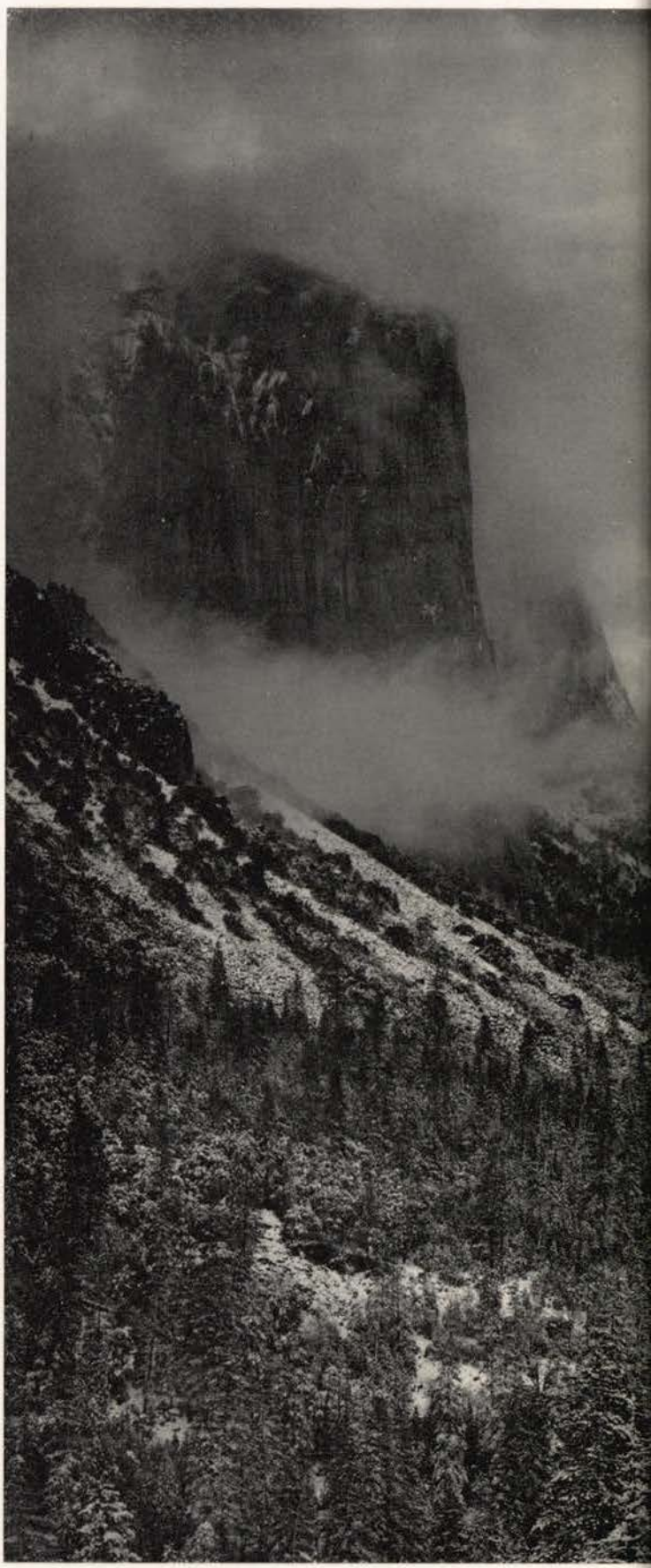
ANSEL ADAMS: Stehekin River Forest, Northern Cascades



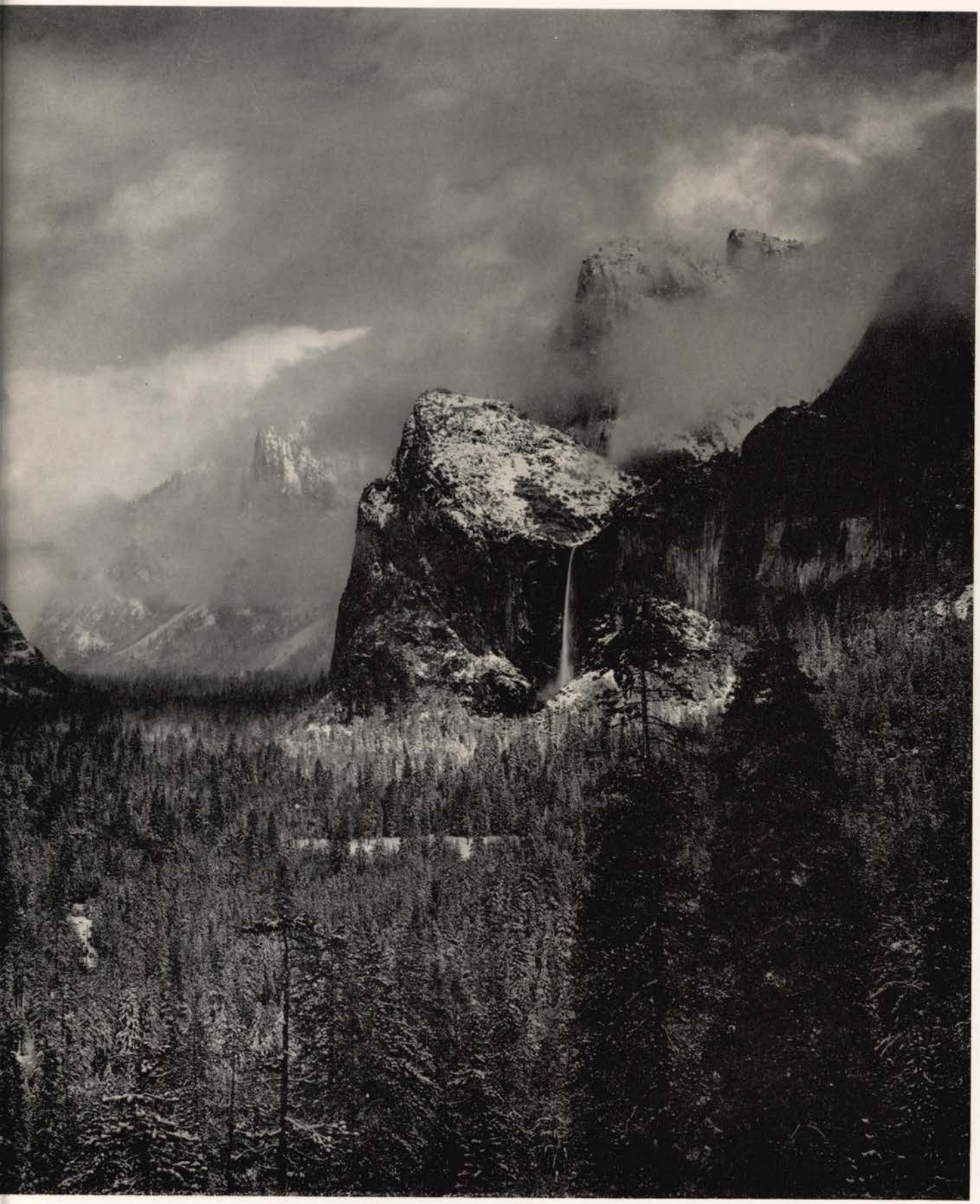
ANSEL ADAMS: Yosemite Falls

ANSEL ADAMS: Stump and Mist, Northern Cascades, Washington

You shall know immensity,
and see continuing the primeval forces of the world.
You shall know not one small segment but the whole of life,
strange, miraculous, living, dying, changing.



You shall face immortal challenges; you shall dare,
delighting, to pit your skill, courage and wisdom
against colossal facts
You shall live lifted up in light;
you shall move among clouds.
You shall see storms arise, and, drenched and deafened,
shall exult in them.
You shall top a rise and behold creation.
And you shall need the tongues of angels
to tell what you have seen.



ANSEL ADAMS: Winter Storm, Yosemite

ANSEL ADAMS: Sunrise, Mount McKinley

Were all learning lost, all music stilled,
Man, if these resources still remained to him,
could again hear singing in himself
and rebuild anew the habitations of his thought.

Tenderly now
let all men
turn to the earth.

ANSEL ADAMS: Aspens, New Mexico (Courtesy Polaroid Corporation)

Tree-Farming in the Prairie Creek Watershed: Modern tractor logging by Arcata Redwood Company, one mile from Gold Bluffs Seashore and one mile from Prairie Creek Redwoods State Park. This photograph was taken in July, 1964. By October 1, 1964, the forest in the background was gone.

The battle to save California forest land progresses only slowly —a vital battle because wilderness forest is safe only when commercial forest is well managed.

California Forest Practices: A Progress Report

By PHILLIP S. BERRY

AMENDMENT one year ago of the California Forest Practice Act culminated successfully several years of hard effort starting with publication of the article, "The Need to Revise California's Forest Practice Act" in the October 1961 *Sierra Club Bulletin*. That article catalogued deficiencies of the old Act written into law in 1945 and specified a number of sorely needed amendments. Happily, we can report that the 1963 amendment incorporates many of the changes first proposed in that article and supported by Sierra Club representatives at public hearings and in private conferences with the State Forester and his staff in Eureka, Redding, Santa Barbara, and Sacramento.

Changes Effected in 1963

Crucial changes were effected by the 1963 amendment:

1) The burden of compliance is now on the private landowner as well as the timber operator.

2) More stringent penalties can now be applied for noncompliance with Forest Practice Rules; e.g., renewal of a cutting license can now be denied for failure to abide by the cutting or logging practices.

3) The State Forester may now enjoin violations of the Practice Rules.

4) The State Forester may now repair damage done by operations in violation of the Forest Practice Rules. The cost, up to $40 per acre, is redeemable by civil suit against the operator or the owner of the land.

5) Legal procedures for achieving compliance have been simplified.

Conservationists can be thankful that the amendment put meaningful teeth in the law, and that the changes were supported by the lumber industry through its most effective lobby, the Forest Protective Association. Without this aid the new law might have failed to pass. Great credit must be given also to State Forester F. R. Raymond and his able deputy, Tobe Arvola, who are charged with enforcing the Forest Practice Act.

The Need for Further Changes

It is important to know what the amendment failed to do—the further changes that should be urged as we remember Lord Morley's saying that "small reforms are the worst enemies of great reforms."

The great reform needed is the saving of forest soil. United States Forest Service figures show the amount of silt carried to sea by the rivers and streams which drain our state's forest areas. For example, note the following current levels of soil losses from some north coast drainage, all in tons of sediment per square miles of drainage: South Fork Eel, 8950; Van Duzen, 5300; Eel River at Scotia, 4800; Mad River, 3120. Where it runs through extensive National Forest lands, the Mad River still is fairly clear, with a loss of only 329 tons per square mile. While logging is not the sole cause of these losses, it is the prime contributing cause. The loss from the South Fork of the Eel drainage amounts to roughly *6 pounds of soil for every square yard of land per year!*

In my opinion, based upon a detailed analysis of the law, its recent amendments, and the Forest Practice Reports covering its enforcement since 1945, the Act still has four deficiencies:

1) *The Act's basic premise still remains ignored.*

The salutary purpose of the Act is to "conserve and maintain the productivity of the timber lands [of this state] in the interest of the economic welfare of the state and the continuance of the forest industry; to establish . . . standards of forest practice . . . adapted to promote the maximum sustained productivity of the forest."[1] Recognizing the need for different rules because of varying forest conditions, the Act divides the state into four different Forest Practice Districts and provides for a different set of Practice Rules in each. This division underscores the Act's basic premise that varying terrain, soil stability and chemistry, and differences in native vegetation should all be taken into account before writing rules to prevent erosion. Unfortunately, little has been done to follow through on this premise. Though forest conditions vary more widely within each district than they do generally between any two districts, each district at present has only a single blanket set of rules. Dr. Paul Zinke, Associate Professor of Forestry at the University of California School of Forestry, has pointed out that "a uniform set of Practice Rules is formulated for such a wide variety of landscape conditions is bound to result in a failure under some of these conditions."[2] Since the Practice Rules are recognized as minimum regulations,[3] it is logical to conclude that they do not meet the erosion problem under most conditions.

2) *Adequate inspections of operations are still needed.*

The state is in touch with the average timber owner slightly more than once a year for inspection of his operations under the Act. This is the result of the Legislature's budgeting for only eight regular inspectors to canvass the entire state. The average operation undoubt-

edly is inspected far less than once a year (assuming the operation lasts that long) since most operators log in more than one location and have many operations as defined under the Act. Clearly, more frequent inspections are needed to achieve full or at least substantial compliance with the law. No one would trust his life to the highways if highway patrolmen were encountered on them by the average motorist only once a year; it is overoptimistic to believe that all lumbermen will maintain good practices unless the apprehension of offenders is a real probability rather than a mere possibility.

3) *The 1963 amendment failed to close the loophole in the Act which allows indiscriminate clear cutting.*

Under the provisions of the Act and the California Administrative Code allowing the conversion of timber land to nonforest uses,[4] more than 600,000 acres have been converted since 1946, according to Division of Forestry figures.[5] Thus, upon the simple affidavit of an owner stating a "bonafide" intention to put the land to another use, a total area two-thirds the size of Yosemite National Park has been logged by clear cutting in the last seventeen years. It is disconcerting with what ease timber land may legally be converted regardless of its suitability for the substituted use and the erosion which may result. Not only has resulting erosion often ruined the land converted, but in several notable places it has damaged adjoining property and property lower on the same watershed. For example, rapid conversion of too much of the land upstream contributed to the disaster of the Bull Creek Redwood State Park during the winter of 1955–56.[6]

4) *Tax exemptions for growing timber should be conditioned upon compliance with the Act.*

Rather generously, the state grants a property tax exemption for immature forest trees.[7] Paradoxically, the state does not insist that the land so exempted be managed in accord with principles of good forestry. There is little reason to grant tax exemption for growing timber to a landowner whose interest in sustained productivity is so casual that he fails to comply with minimum standards of good forestry.

Proposals for Further Changes

Bold steps are necessary to follow through on the basic premise of the Act that varying forest conditions call for different rules to prevent erosion. It is suggested that all forest lands within the state be divided into "hazard classes," each class with its own set of practice rules tailored to the specific soil, vegetation, and topography of the particular type of land. Admittedly, some of the information regarding the types of soil and vegetation needed for development of such rules is not available as yet for every square mile of forest land within the state. This is reason to speed the Soil Vegetation Survey which develops such information at the bargain cost of 25 cents per acre.

In counties where such information is already available (e.g., Mendocino, Lake, Glenn, and Tehama),[8] pilot projects should be started where specific, meaningful, hazard-class systems of rules could be developed and applied. Possibly, such pilot study programs would be more expensive to administer than the current method of regulation. In the long run, however, nothing could be costlier to future generations than our present policy under which we pour hundreds of tons of forest soil down to the sea yearly in streams draining poorly managed forest watersheds.

It would be easy to increase inspections under the Act if only the Legislature would provide the money necessary for hiring more inspectors. Adding one inspector to the state payrolls could cost from $5,300–$7,350 per year, depending upon grade and experience.[9] The state could double its present inspections for less than $50,000 per year. It certainly could be argued that this expenditure would probably save future generations of Californians many times that amount per year.

It would probably be unwise to close completely the loophole which allows conversion of forest land to other purposes. However, the privilege of conversion should be restricted to insure against undue erosion and to protect against the impairment of adjoining or downstream lands in public ownership. Probably these ends could be attained by instituting the hazard-class regulation suggested above, since only with knowledge of all relevant factors affecting erosion on a particular watershed can it be intelligently decided whether a proposed clear cut will be beneficial. Certainly the constitutional principles which permit the zoning of particular pieces of property for a single specific use are broad enough to allow the State to deny the privilege of conversion wherever long-range damage would clearly ensue.

To make the current tax exemptions for growing timber conditional on compliance with the Forest Practice Act would obviously require a constitutional amendment since the exemption itself is provided for in the Constitution. However, this should not prove to be an insurmountable difficulty, particularly in view of the lasting benefits to the State as a whole.

The 1963 amendment to the Forest Practice Act is a significant conservation victory. But the most important changes in this significant and unique law are yet to come and without Sierra Club leadership may come too late.

[1] Public Resources Code, Section 4901.
[2] Letter of October 26, 1961
[3] Papers regarding Forest Practice Act—June 26, 1962, pp. 1, 2, 4, published by California Division of Forestry
[4] Public Resources Code, 4947
[5] Forest Practice Report, 1956–1961
[6] *Sierra Club Bulletin,* Jan., Apr., May, 1960
[7] Section 12¾, Article XIII, Constitution of State of California.
[8] Letter November 15, 1961 from F. H. Raymond
[9] Circular State Personnel Board, circa 1961

Some developers may not think so, but soil is not yet old-fashioned. A scientist in an uncelebrated field implies why man needs to build the deepest respect for the thin epithelium upon which all life depends.

The Soil of the Wilderness

By Wm. Bridge Cooke

Let us picture ourselves in a high mountain meadow and asking *why*. Not so much why we are there as why it is there. A meadow is always a good place to rest and it is easy to prolong the rest by probing the grass on which you lie. What lies beneath it to make possible the kind of green expanse man has always liked to look upon?

The meadow is carpeted with heather and laurel and dwarf huckleberry. Along the creek are clumps of grass of parnassus and many little plants of the primrose monkey flower. Mosses grow among them and Indian paintbrushes daub the landscape with crimson. The meadow is lush with rushes, sedges, and grasses. Bordering the creek on the dry side of the meadow are other herbs whose tiny roots just reach the irrigating influence of the soil water. Knotweeds and onions thrive here; at a greater distance the blue bunches of Lyall's lupines rise among the silvery leaves on the ground. Not too far away from the water is a grove of mountain hemlocks and farther up the ridge a parklike forest of white-bark pines marches upward toward the high snows.

The moist meadow, the dry meadow, the hemlock woods, and the white-bark pine groves—all have something in common with your backyard: soil. No matter from what it has been derived, or how its derivation took place, there must be some way for the vast store of the earth to be put to the use of plants, and some way for these resources to be returned when the plant has finished with them.

Finger the soils in each community and feel the differences. In the wet meadow the soil is black, wet, and formed of a sandy mud. Plant roots are abundant, fibrous, and penetrate deeply. In the dry meadow the soil is dusty, sandy, moist toward the creek, but appearing dry farther away. Plant roots are scattered; in the moister areas they are more or less feathery, in the dryer areas they are widespread and woody, possibly coming from a large taproot. They are all modified to provide water to leaves and flowers. Under the hemlocks the soil is different; a layer of the current season's litter—needles, twigs, and cones—covers a strongly compacted layer of duff, the litter of the last several years which still includes some identifiable fragments. In its turn, the duff covers a layer of decomposing humic materials above the mineral soil. Near its surface this still immature soil includes gravel, sand, and humus or incompletely decomposed plant parts which are no longer recognizable. It is dark, turning to gray a bit deeper, where certain materials have been leached out. Below this it again becomes darker where some of those materials gather. Up under the white-bark pines the soil is coarser, the litter is deeper, and the duff is not so thick. In the mineral soil, along with the sand and gravel and humic materials, one can identify various fragments of plant parts—pine needles, cone cores, and pine-nut shell fragments left by the squirrels and the Clark nutcrackers. And all this description is the grossest oversimplification of the exquisitely complex organism upon which all life depends.

Many hundreds of years ago the meadow and ridge were bare. They lay near the side of a great glacier which covered the adjoining canyon floor and walls. The glacier had pushed timberline down the mountainside; then the glacier receded and timberline started a long tedious climb back up the mountain. The particular valley system left by this glacier never again developed an ice mass, although nearby cirques, filled with living ice at least once again, were actively eroded away.

The valley in which our meadow now lies, and the slope above it, were apparently bare rocks as the adjacent glacier melted away. Smooth rock walls, talus slopes, and surfaces of rocky moraines formed the landscape. The air-conditioning system developed by the glacier had effectively prevented colonization of the area by flowering plants, although their seeds were carried up the mountain by every updraft and by the occasional birds that flew by after a meal of berries or a wade in some marsh. Maybe they had dined on the wrong fruit or waded in the wrong meadow, for the seeds they carried failed to germinate. On the rock slopes of the ridges a few airborne disseminules of lichens found a resting place, germinated, and covered the rock with their black, gray, green, yellow, or cinnabar bodies. But many rock slopes in the area today testify by their barrenness that some other means must yet be found to develop a soil in good time.

As the air and the ground grew warmer in the summers, other organisms, also airborne, became active in the area. Some cell fragments of some blue-green algae supposedly came to rest in the small flat valley where a trickle of water showed the presence of a spring. The snow itself, covered successively with layer upon layer of windborne dirt from lower regions, housed a large population of the green alga called red snow.

The air passing over the valley continually dropped parts of its load of bacterial spores, fungi, algae, and cysts of protozoans, as well as fern spores and seeds of flower-

ing plants. Mosses came to the area the same way the fungi did; spores fell out all over the region but only those which found their niche in the habitat could develop. The blue-green alga filaments grew and multiplied, using only the common gases of the air and the minerals of the rocks as food sources. The fungi and bacteria developed in turn on the fragments of organic matter carried by the air up to them or deposited by dying portions of the algae, lichens, and mosses, and so small reservoirs of organic material began to develop.

Wherever such a reservoir developed, a seed, if it found it, sometimes germinated and grew. If the seedling was not adapted to existence in the habitat, it died. If it could survive the rigors of the area—poor soil, cold winters, high cold winds, intense daytime insolation and nighttime radiation—it could now progressively form a plant, a cluster of plants, a patch of wild lawn. Other plants could join the early pioneers and by their very presence begin to lessen the rigors of the habitat.

And Then the Meadow

Eventually, through processes of elimination, adaptation, and selection, a meadow developed in the valley, and on the adjoining slopes the dry meadow and the ridge forests came into existence and thrived. Meanwhile the premature soils were also developing.

As the roots and rootlets die, and the leaves and twigs too, they become litter upon the surface of the soil or within it. Organisms of many kinds then proceed to use these materials as food, until they decay so much that they are no longer recognizable. Even a fallen tree can be quickly disintegrated in this way.

Within the soil a population of organisms develops, some of them are large enough to be seen. These include various kinds of insects, earthworms, and other kinds of life which busily search for food, eating it on the spot or carrying it home to nests. Microorganisms have established themselves in a variety of subterranean habitats. Those most readily seen are the films of green and blue-green algae which may bloom on the surface of the soil. The fruiting bodies of fleshy fungi appear in season. These correspond to the fruit of an apple tree, for the vegetative and assimilative tissues form an extensive network among the fine particles of soil.

Surrounding the roots of plants in the soil are the extensive populations of the rhizosphere. These bacteria, fungi, and protozoans, all microscopic, take their nourishment from organic materials extruded from the root cells as well as from the dead cells which slough off the roots. Two other groups of microorganisms occur in soil. The first of these, found throughout the soils of the earth's crust, are the bacteria, fungi, and protozoans which live on dead organic matter and are mixed in the soil by wind movement, water percolation, the tunneling of rodents and earthworms and insects, and even the walking of animals and man.

The second group includes root-nodule bacteria and the fungi which form mycorrhizae. The best known root nodules are found on the roots of leguminous plants. The rhizobiaceous bacteria are able to penetrate root cells and develop within them, forming large gall-like colonies known as nodules in which nitrogen is fixed directly from atmosphere and formed into biologically useful material. The nodule, a partnership between legume and bacterium, shares this power only with certain bacteria and a few blue-green algae. The nitrogen that these organisms fix becomes available to other creatures following the decay of their cells and the subsequent release of the nitrogen-carrying compounds into the soil. There are but a few other minor groups of plants that are known to be able to harbor nitrogen-fixing bacteria. One is the alder, in which nitrogen fixation has been studied only in a few parts of the world. It is known that in new areas near glaciers which are receding in Alaska, nitrogen is added to the soil through the activities of alder root nodule bacteria. In some areas in Alaska, in recently deglaciated land, colonies of *Dryas* also harbor nitrogen-fixing bacteria. The Ceanothus of the California chapparal is host to microorganisms which produce nitrogen-fixing nodules as in Myrica, the sweet gale.*

Mycorrhizae are literally "fungus roots." If a fungus gets more intimate with a root than merely satisfying itself with sloughed off cells as in the rhizosphere—if it actually enters the root two types of mycorrhiza may result. In the first type the fungus cells grow between the cells of the host root; in the second they grow discernibly into these cells. In both cases, while the fungus derives much of its food and vitamins from the tree or other plant, it also contributes to the life of the tree by supplying it with important nitrogen supplies as well as other types of food substances. Both types of fungi may also utilize dead organic matter as food supplies.

The activities of the various microorganisms vary according to the amount of moisture in the soil, its temperature, and the amount of organic matter present. In soils which are dry most of the time there is little chance of finding a large population of active microorganisms. In swampy soils the microorganisms are adapted to extremely wet habitats, where oxygen supplies are poor. Among such organisms we do not find a wide range of species capable of degrading all possible types of organic matter; consequently a large amount of organic matter persists. Even where a moderate amount of water is present, all the

* Alders may also play a critical role in reinvigorating soil of the clear-cut areas in the Pacific Northwest. Mountaineers may deplore their impenetrability and the loggers may view them as trash species; they would probably be loved, however, by the Soil God, if such a diety should be identified.—Ed.

organic matter is not completely degraded even by the most omnivorous types of organisms. This results in an accumulation of the material generally called humus—a number of highly complex organic materials which are left after the types of organisms producing rapid decay have completed their work. We find still at work on these substances a few of the mushroom-type fungi and other organisms which seem to be able to take apart the large complex molecules of humic acids.

Soil temperatures can be critical too. At higher elevations a snowpack may insulate soil for many months and also keep it moist; but other soil may be exposed to a chill winter wind that keeps moving it from one place to another or freeze it under a mantle of ice. Few microorganisms can function at temperatures below freezing. Under a snowbank, if the freezing mark is passed in a warming trend, activity increases so that a considerable population of organisms may resume active but slow decomposition of processes in the soil, litter, and decaying logs. As the snowbank melts away in the spring and early summer the soil becomes exposed to the effects of the sun. Under the shade of a forest, where a deep layer of litter and duff have accumulated, the sun's rays have little effect on the surface layers except to warm them and dry out the immediate surface. On the open slopes of a mountainside the insolation may become very intense, heating the soil to high temperatures, drying it out, and slowing or stopping any activity.

These conditions affect the amount of organic matter in a soil by increasing or slowing down the rate at which the trees, shrubs, and herbs produce leaves and other plant parts. If there are few leaves to decay there are likely to be few organisms to effect the decay. If there are many leaves, as in a swampy place, there are likely to be many organisms, but these may have specialized requirements which will result in the accumulation of large deposits of organic matter eventually developing into coal, lignite, and similar deposits.

We can move on now. People are beginning to suspect the reason for prolonging our rest period. There are streams and lakes to explore, and distant peaks and passes. But perhaps we have learned a little more, as passers-by, of the lives that go on after we have left, even as they did before we came—some of them millions of years before we came. Wherever we go they affect us and we affect them. How much? That is another story, worth looking into on our next pause, because it is an interrelationship that needs to endure.

What Is Soil Worth?

The value of soil per ton is not easy to perceive if you are paying to have it hauled away and dumped in San Francisco Bay, or even if you are buying it to cover the barrenness a subdivider left when he scraped the soil off and shipped it away in the first place in order to get a level piece to build a rubber-stamped house on.

A new dimension is needed. What is soil worth per pound in a planter that brings welcome green, between smog attacks, on Fifth Avenue or Montgomery Street? Or per ounce in the dish in the window that supports the life span of a banzai tree, year after year, with nothing added but water and light? More relevantly, what would you say is the capitalized value, with centuries in mind, of a square mile of forest soil, which, if properly protected, can produce both forest products and amenity in perpetuity? Once that figure has been determined, what is the real loss—and not the vestige of it reflected in an uninformed marketplace—when we allow watersheds to go down the drain the way they are going with the forest practices that prevail in California redwood country and in most of the United States?

Anyone who has watched the streams run clear even after days of torrential rain have poured down upon the unspoiled watersheds of Glacier National Park, and who then looks at what the rain has done in the logged-over redwood country, where fifty-year storms seem to be producing thousand-year floods, may come up with still another question: not can we afford a redwood national park, but can we afford not to have one.

So far as we know, no one has looked hard enough at the long-range worth of soil. We will give a free set of the club's exhibit-format books for the best piece on the subject suitable for these pages. DB.

Howard Zahniser and the Preservation of Wilderness

By George Marshall

In the midst of a Wilderness Conference, Howard Zahniser suggested a short walk to a second-hand book store. The sessions, including his own contributions, had been excellent as usual and the days were filled with old and new friends. We had been up late the preceding night at an informal gathering to consider next steps toward the establishment of the Arctic Wildlife Range. Browsing among books and reading them was one of Zahnie's greatest relaxations; buying them his one great extravagance.

His own library filled his home at Hyattsville, Maryland, and spilled over to his office. It included books of many fields in which literature predominated; his outstanding collections were of Dante, Blake, and Thoreau. His scholarly knowledge of the latter helped develop his deep appreciation of nature and wilderness and of their essential and continuing place in our culture. His boyhood in and around a small town in western Pennsylvania, where he was born February 25, 1906, undoubtedly implanted his love of these values.

Following his graduation from Greenville College in Illinois he taught high school English and was a reporter on the *Pittsburgh Press*. In 1931 he became an editor and writer for the United States Biological Survey and for the first time became involved directly with conservation issues. Under the tutelage of the remarkable men associated with the Survey, especially Edward A. Preble, he was launched on his life's work. Some ten years later, he transferred to the Bureau of Plant Industry, where he served as research writer and head of information.

In 1945 Howard Zahniser became Executive Secretary and Editor of The Wilderness Society, a position he filled with distinction until his death on May 5, 1964. Soon after he joined the Society's staff, he developed its magazine, *The Living Wilderness,* into a quarterly with feature stories, book reviews and news items on wilderness and allied conservation subjects, to which he usually added his own editorial. Being a great documenter, he often included major documents of interest, especially the texts of the Wilderness Bill as it developed from Congress to Congress.

The Wilderness Society grew in membership and effectiveness under his leadership and he worked on a wide variety of issues in Washington, D.C., and around the country. One of his most valuable innovations was to hold annual meetings of the governing Council of the Society out of the city where there was an excellent opportunity to discuss problems and develop major policies in a relaxed and uninterrupted way. This led to combining annual meetings near areas of wilderness, where there were special problems or new opportunities, with field trips into these areas. This in turn resulted in developing a Council of experienced experts on wilderness classification. These meetings generally gave the opportunity to exchange ideas and information with local and regional conservation leaders and administrators of wilderness. They also helped develop a close relationship between staff and Council so that even though difficult problems were discussed with great spirit, there was always excellent and friendly coöperation. Olaus J. Murie, as Director and, for much of this time, President of the Society, helped set this tone. He and Zahnie, and for a time four members of the staff, were also members of the Council.

Zahnie had countless friends throughout the country. Whenever he went on field trips in connection with preliminaries for wilderness reclassification, or spoke at conferences, or appeared at hearings, he met with local leaders, guiding them and encouraging them and giving of himself and of his remarkable joy of life and his delightful and often puckish sense of humor.

I do not know whether he ever had an enemy. Even those in administrative posts and in the Congress with whom he had strong and clearly stated disagreements on policy respected him and, I believe, most of them regarded him as a friend. This was both the result of his vast knowledge and the accuracy of the facts he presented, his calm and determined manner of presentation, his wise understanding of human frailties, his fine sense of humor, and his liking and appreciation of all kinds of people as people. He preferred to reach concurrence through persuasion and usually succeeded, but when despite his patient work this was impossible he was ready to "fight"; although I doubt that he used this word. He was well aware of the difficulties in rational solutions of problems and once testified about the opposition this way:

"Wherever we seek to preserve we are confronted with protests from those whose instincts or habits are to exploit. In our national forests—federal lands, owned by the public, including areas of undeveloped, unappropriated wilderness—when we seek to assure preservation, we are confronted (surprising as it may seem and indeed has been to some of us) by opposition from those who sense even in an indefinite future and vaguely that we may thus be frustrating some later development by themselves or their commercial successors. Even the public custodians of these public lands—the Forest Service itself—holds us back, nudges us aside, trips us if necessary to make sure that preservation of wilderness will not include areas that even these public servants seem to consider first for their usefulness in an economic way."

When situations became very tense, generally he found

ways to break these tensions, tense though he might be within himself. One example of this was at the Panther Mountain Dam hearings in a small Black River town in the western Adirondacks. A sheep in a slaughterhouse atmosphere, he introduced himself and then gave his jocular definition of wilderness which he attributed to a school boy: "Wilderness is a place where the hand of man has never set foot." After this, he had no difficulty in holding the attention of the hearings board.

Zahnie was well versed in more serious literature, especially the journals and other writings of Thoreau. In his Thoreau Society presidential address he indicated his debt to him.

"When we think of Thoreau and the preservation of wildness . . . we think not only of the preservative qualities that wildness has for us, but also of the preservation by ourselves of wildness and of areas of the Earth that still are and that still remain wild and untrammeled."

Ten years before he had wondered "if the greatest enduring significance of Thoreau may not be in his apprehension of the human values of wildness." He quoted passages from *Walden, The Maine Woods,* and the essay on "Walking," as the three major sources of Thoreau's expression of the human need for wildness and the need to "have our national preserves" of wildness. From "Walking" he quoted, "In Wildness Is the Preservation of the World," which, soon after his becoming Executive Secretary of The Wilderness Society, he placed on its letterhead as a motto or text.

Zahnie first made his own extended statement on wilderness in 1952 in a series of editorials in *The Living Wilderness.*

"It is characteristic of wilderness to impress its visitors with their relationship to other forms of life, and to afford those who linger an intimation of the interdependence of all life. In the wilderness it is thus possible to sense most keenly our human membership in the whole community of life on the Earth. . . .

"We can prosper for long . . . only as conservationists. We actually run the risk of extinction if we forget conservation. . . . Our conservation to be truly successful must arise, not from a too selfish concern for our own day, but rather from a sense of ourselves as a responsible part of a continuing community of life. . . .

"We deeply need the humility to know ourselves as the dependent members of a great community of life, and this can indeed be one of the spiritual benefits of a wilderness experience. . . .

"Wilderness for most of us is vacation country. . . . There is no doubt that in this recreational value there is an importance that warrants safeguarding our wilderness carefully. . . .

"Yet deeper and broader than this value, encompassing it, is an importance of wilderness that relates to our essential being, indicating that the understandings which come in its surroundings are those of true reality. So derivative do our lives seem from the wilderness, so dependent do we seem on a renewal of our inspiration from these wild sources, that we wonder sometimes if we could long survive a final destruction of all wilderness. . . .

"In these areas . . . are the opportunities for so important, so neglected a part of our education—the gaining of the true understanding of our past, ourselves, and our world which will enable us to enjoy the conveniences and liberties of our urbanized, industrialized, mechanized civilization and yet not sacrifice an awareness of our human existence as spiritual creatures nurtured and sustained by and from the great community of life that comprises the wildness of the universe, of which we are a part." . . .

. . . "So long as wilderness exists in reality, . . . so long will the safeguards against an urban, industrial, mechanized ignorance of the facts of human life be effective."

This deep understanding of the abiding necessity of wilderness to mankind and his experience in many efforts to establish specific areas in wilderness classification, as well as the campaign then current for the defense of Dinosaur National Monument and the integrity of the National Park System, led Howard Zahniser to the conclusion that a new method of long-time preservation must be found. "We must recognize," he said, "that all our land is destined to be put to some human use. If any of it is to be preserved in its natural condition it must be as the result of a deliberate setting aside of it for our human use of it in a natural condition."

At the Second Wilderness Conference in Berkeley on March 31, 1951, he made his first extended proposal for a "national wilderness preservation system" to be established and protected by act of Congress: "We must see that an adequate system of wilderness areas is designated for preservation, and then we must allow nothing to alter the wilderness character of the preserves. . . .

"As soon as we have a clear consensus of conservationists," he continued, "we should most certainly press steadily for the maximum security possible; that is, congressional establishment of a national wilderness system backed by an informed public opinion."

This legislation, he suggested, "should affirm the national policy to preserve such a wilderness system. It should define the proper use of areas within the system and should provide for the protection of the areas from inconsistent uses. . . . "Areas to be included should be specified in the bill, and provision for additions." . . .

The first Wilderness Bill was introduced in Congress on June 7, 1956. It included these and other early proposals and was drafted primarily by Zahnie. For the next eight years, in season and out, he developed and led an extraordinary campaign for the passage of this measure. Through dozens of speeches and articles—how many addi-

tional ones he wrote for members of the Congress is unknown—participating in countless meetings and informal conferences, dozens of trips to the Hill and administrative offices, as well as participating in all of the 18 hearings on this legislation, he raised it from an ideal of a relatively small group to an accepted national policy with the support of all major conservation organizations, numerous other civic groups, and the overwhelming majority of Congress. In the process, the American people learned more than ever before of the meaning and need for wilderness in the world of today and of the future.

The Wilderness Act became law when President Johnson signed it on September 3, 1964, four months after Zahnie's death. It had been passed overwhelmingly by both houses of Congress, 73 to 12 by the Senate, 373 to 1 by the House. It is not a perfect measure, as no one knew better than Zahnie; but it is one of the great steps forward in the history of conservation. Whether it will be a step that will lead up to yet more reliable protection for wilderness will depend in large measure on whether those who understand the necessity of wilderness in our life and culture continue to work with vigor for necessary improvements in the law. Zahnie was well aware that when some weakened in the long effort and scattered their energies elsewhere, necessary coordinated pressure was lacking to pass the Wilderness Bill, and that each time a Congress failed to pass this measure, it was weakened by the next Congress. It was his faith and determination and willingness to negotiate and be flexible when necessary, as well as his inspiring of others, that made possible the passage of the Act with most of its essential features intact.

There were countless other issues on which Zahnie worked during all of these years which involved wilderness classifications and regulations, more general conservation matters, and, among others, his major work in the campaign led by the Sierra Club to save Dinosaur National Monument. At least one critical summer it was Zahnie who remained in the heat of Washington to handle day-to-day developments while other conservation leaders were scattered about the country. More than anyone else he worked out the final legislative agreements which saved Dinosaur's Canyons from being dammed and flooded, and upheld integrity of the National Park System. It is unfortunate that the Congress and a Secretary of Interior have not lived up to the third protective provision of the agreement in the law, the protection of Rainbow Bridge National Monument.

During these years and earlier, Zahnie did a monthly book review and essay column in *Nature Magazine* and did the articles in the *Encyclopaedia Britannica Yearbook* on wildlife. He wrote articles for many publications in addition to *The Living Wilderness*. He was an honorary vice president of the Sierra Club, one of the organizers and chairmen of the Natural Resources Council of America, and was associated with and a member of numerous other conservation organizations.

He and his family lived in Hyattsville, Maryland. His wife, Alice, and their four children joined him on numerous wilderness trips in the Adirondacks and in the West, and shared his love of wild country and of books.

In his last speech, made at the Pacific Northwest Wilderness Conference, April 18, 1964, Zahnie said:

"We are representing the common interests of the whole people and they recognize that we are not fighting a rear guard action—we are in the vanguard—we are establishing for the first time in the history of the Earth a national policy whereby areas of wilderness can be preserved, and we are working out the details. . . . This is just the beginning. It is the charter of a program that can endure."

Always the educator who came back to what the individual might do, he urged his hearers to equip themselves to know the areas to be reviewed for classification under the Wilderness Act, to prepare materials in coöperation with land administrators, to appear at hearings, to meet regularly in small groups to study and discuss the basic things about wilderness that need to be known if others are to be persuaded.

He realized that the Wilderness Act, soon to pass, and his own work and life, soon to end, were indeed beginnings. Each needed the other; and wilderness, to endure, will always need a kind of devotion approaching that which Howard Zahniser gave.

As the great battle to save the national-park idea shapes up, it is well to remember its beginning. A professor of physics uncovers serious Bureau of Reclamation errors again.

Grand Canyon of the Controversial Colorado

By Richard C. Bradley

Last spring Stewart L. Udall, Secretary of the Interior, ordered the release of water from Glen Canyon Dam on the upper Colorado River so that the water level and power head could be maintained at Hoover Dam 350 miles downstream. The official reaction to this seemingly innocuous order was, you may recall, swift and vitriolic. "Unbelievable stupidity!" said Big Ed Johnson, former Governor of Colorado and currently a member of the Upper Colorado River Commission. "Secretary Udall," he declared, "is trampling sacred provisions of the Colorado River Compact under his clumsy feet like a bull in a china closet . . . a 'public lawbreaker.' " Johnson and other Upper Basin officials threatened to sue him.

Dodging brickbats such as these was not a new experience for Secretary Udall. The previous year he had ordered the closure of the gates at Glen Canyon Dam so that the new reservoir could start to fill, and this action—also seemingly innocuous—had brought forth similar cries of anguish from an entirely different quarter. "A flagrant betrayal!" charged the Sierra Club, joined by the National Parks Association and other nationwide conservation organizations. "The Bureau of Reclamation has honored neither its own word nor the law." On that occasion Secretary Udall actually was taken into court.

It would seem that the embattled Secretary can do no right. His predicament, already difficult enough, is certain to become more so with time, for his newly proposed Southwest Water Plan puts him in the anomalous position of advocating hydroelectric power development in Grand Canyon National Park and Monument, a piece of land which according to the National Park Act of 1916 he is supposed to preserve unimpaired.

Controversy is no newcomer to the Colorado. For years it has been as much a part of the river as the red silt which gives it its name, the tradition as deeply entrenched as the watercourse itself. This is not surprising considering the millions of people for whom the river is today the central fact of life. It might, I suppose, have surprised one Lieutenant Joseph Ives, an explorer who gazed into some of its forbidding canyons a little over a hundred years ago and wrote: "The region is altogether valueless. It can be approached only from the south, and after entering it there is nothing to do but leave. Ours has been the first, and will doubtless be the last, party of whites to visit this profitless locality. It seems intended by nature that the Colorado River, along the greater part of its lone and majestic way, shall forever be unvisited and undisturbed." His crystal ball must have silted up!

The controversies have come in variety: over the allocation of water among the seven Colorado River states and Mexico; over how much water should be used for irrigation, municipal and industrial purposes, and recreation; over who should develop the river; between those who would use the water within the basin and those who would divert it; between those who advocate complete development of the river and those who would leave some of it forever wild for the inspirational value it can offer in a world already crowded with the works of man.

The earliest, and certainly one of the most entertaining controversies was about *who* made the first descent of the river. When in 1869 that remarkable one-armed professor, Major John Wesley Powell, emerged from his epic plunge down the wild canyons of the Green and Colorado, he found that others were claiming priority for the feat. This dispute was eventually settled in Powell's favor. The other two contenders were a little bit confused as to where they had been. One Samuel Adams had embarked at Breckenridge and floated for about 160 miles down the Blue and Upper Colorado rivers. He lost four boats, four rafts, and eight deserters, peered into the haze to the westward, decided he had come through Grand Canyon, and returned home to be congratulated by Congress!

And one James White boarded a raft he built to escape hostile Indians, drifted several days down a placid stretch, and came ashore exhausted, sunburned, and half starved at Old Callville—not far from the present Hoover Dam. An engineer, hearing of White's story, concluded he must have floated through Grand Canyon (on a makeshift raft) and gave the tale wide publicity. White's own description places his canyons below Grand Canyon, in what is now submerged by Lake Mead.

Powell did not greatly concern himself with the dispute. He knew where he had been and what he had done, and he had other things on his mind. His expedition was far more than an adventure. It was the beginning of a detailed survey of the whole Colorado River Basin, and before he was through Powell clearly foresaw many of the troubles and controversies that lay ahead if the federal government failed to forestall them. He was perhaps the first to realize fully that in this arid land irrigation would be needed, and conventional land and water laws would not be workable; the water resource was limited and an

equitable distribution would have to be worked out. His report to Congress has been called, by the late Bernard De Voto, "the most prophetic document in the whole range of American experience from Jamestown on."

It was too visionary for his day. People still had the illusion that the West was the garden of the world, its resources inexhaustible. Consequently, most of his proposals were rejected outright, not to be revived until years after his death. He did succeed, nevertheless, in establishing the United States Geological Survey. He also lived to see the formation of the federal Reclamation Service, which which would carry out much of what he had envisaged.

He did not live to see the Imperial Valley nightmare of 1905 which spectacularly vindicated his plea for storage facilities on the Colorado to control its floods. In that year the great river, swollen by unseasonable rains, took advantage of an imprudently constructed irrigation cut to leave its main channel and go charging unchecked into the Salton Basin near the California-Mexico border. If the Southern Pacific Railroad Company had not worked night and day to fill the cut with boulders, every farm, home, and town in the Imperial Valley would have been permanently inundated, for the valley is without an outlet and lies well below sea level. The sword continued to hang until Hoover Dam was completed a generation later.

The equitable distribution of the river's waters advocated by Powell in the '70s finally came to pass, theoretically, in the signing of the Colorado River Compact of 1922. At the suggestion of Herbert Hoover, then Secretary of Commerce, the drainage was divided into an Upper and a Lower Basin, and each basin was guaranteed in perpetuity 7½ million acre-feet of water annually. By an international treaty, another 1½ million acre-feet were guaranteed to Mexico. The Compact left to the states of each basin the task of working out the ultimate distributions among themselves. The Upper Basin states of Colorado, Wyoming, Utah, and New Mexico did this by a separate compact in 1948; the Lower Basin states have done it by 40 years of litigation.

There was a joker in the 1922 Compact. The participants thought they were dividing up an annual resource totaling close to 20 million acre-feet. Unfortunately, this was based on streamflow measurements taken during a series of wet years. The long-term average appears to be 15 million acre-feet; instead of disposing of annual surpluses, the two basins are faced with the disagreeable task of deciding whom to charge for deficiencies.

It is the present low flow of the river that is making it hard for Secretary Udall to fill Glen Canyon without impairing Lake Mead. Yet the Bureau of Reclamation is advocating two more reservoirs in Grand Canyon; by the time these could be built, reservoir evaporation from Glen Canyon, plus transmountain diversions from the Frying Pan, the Blue, the Green, and the San Juan rivers, plus evaporation and transpiration from the new irrigated farms in the Upper Basin, would have reduced the river far below its present level. I hope the Bureau will never have the opportunity to start the new Grand Canyon dams, that Congress will reject this proposed encroachment on National Park lands just as it rejected a similar proposal for an Echo Park dam a decade ago.

The Errors at Echo Park

THE ECHO PARK affair was in some ways the fiercest of all the controversies ever to have raged over the Colorado. It was a bitter dispute between those who advocate complete harnessing of the river by power dams in all its major canyons and those who would leave some of the most scenic of these canyons unspoiled. The choice was never between water and scenery. The contentious dams were not for irrigation or water supply; they were for storage and power. The choice was not even between power and scenery, for the Upper Basin has enormous untapped power potential in its coal, uranium, and oil-shale deposits. The choice, simplified, was between a particular series of power dams and the particular scenery these dams would destroy. The controversy decided the fate of Dinosaur National Monument, at least for now, and of Rainbow Bridge National Monument and Glen Canyon for all time. It has direct bearing on Grand Canyon and on all the canyons after that. So ends my prologue to the ultimate canyon controversy.

This ultimate began as an internal dispute within the Interior Department, but eventually spread from coast to coast, and brought to government officials and congressmen more mail than they had ever received on any single issue. The battleground was a peaceful little valley in western Colorado where the Yampa and Green rivers come together beneath Steamboat Rock—as little known to the public in 1950 as Guadalcanal had been in 1940. Within a few years Echo Park would appear on the editorial page, if not on the front page, of major newspapers all over the country.

One day in July 1943 Newton Drury, Director of the National Park Service, noted in the *Federal Register* that the Bureau of Reclamation had staked out a claim for two reservoir sites within Dinosaur National Monument—one at Echo Park and one at Split Mountain. The two reservoirs would flood Dinosaur National Monument's canyons from one end to the other. No one had bothered to consult him; this was the first news. In a letter of great restraint he suggested to the Interior Secretary that there may have been some misunderstanding; that perhaps the Reclamation Bureau had not realized that these sites were on lands already set aside for another purpose.

There had been no misunderstanding. Reclamation, conservationists were forced to infer, had not deemed it

necessary to obtain consent from its impoverished sister bureau, the National Park Service. The Bureau was no longer an infant irrigation service, but a power elite that had built huge dams and was now firmly in the business of producing hydroelectric power to help pay for irrigation. If some of the nine power dams it now proposed to build in the Upper Basin encroached on dedicated lands, this was regrettable but not terribly important. Echo Park in the heart of Dinosaur National Monument was one of the best power sites in the region and had to be included in any comprehensive development program. So said the Bureau of Reclamation.

The Bureau did not relinquish its initiative. It showed a multibillion dollar proposal to the business and political leaders of the Upper Basin, stamping the proposal "Preliminary Draft, For Review Only, Not for Public Release." They embraced it—an interesting contrast to the coolness their forebears showed Major Powell. Assured of vociferous demand if needed, Burec pressed Secretary Oscar Chapman for approval.

Newton Drury, who had not discussed the Bureau's proposal outside the Department, protested vigorously, but was outflanked and outdistanced. Talk arose of putting in a defense plant to use Echo Park's power, and with the Korean war going on Mr. Chapman reluctantly gave his approval to the Bureau's project—and accepted Mr. Drury's resignation. National defense, he said, had to take precedence over park preservation.

So ended the first round in the struggle for the big dam. The American public was about to surrender a scenic resource it scarcely knew it had—the magnificent canyons of the Green and Yampa rivers which Franklin Roosevelt had set aside for permanent preservation only a dozen years earlier.

But now several important things happened to change the picture. Bernard de Voto, a long time champion of the national park system, sounded a call to arms in the *Saturday Evening Post*. As a result the nation, which traditionally has supported its national park system albeit frugally, began to show an interest in the controversy. At about the same time the plan to build a defense plant near Echo Park was abandoned; the plant was eventually built on the Ohio River. And finally, and perhaps most important of all, a retired general from the U.S. Corps of Engineers, Ulysses S. Grant, III, a conservationist as well as a civil engineer of long experience, pointed out that the Bureau's own study showed there were other dam sites in the Upper Basin which the Bureau was not planning to use that would provide equivalent power and storage, would cost less to build, and would flood no parks.

Confronted with this new evidence, Chapman withdrew his approval, called for a restudy, and later flatly stated that Echo Park dam was "absolutely not necessary." Thus Round Two went to the conservationists, and particularly to de Voto and Grant.

But the proponents were not so easily dissuaded. When an election year brought in a new Secretary, the Bureau was back again hammering at his door, apparently quite willing to postpone everything else until it secured authorization for Echo Park dam. Why it fought so persistently for this particular unit among so many others has never been made clear.* Perhaps the alternative sites seemed unattractive because they were even farther from existing load centers. Or perhaps the Bureau felt it could gain authorization for the rest of the project more easily if it focused all the controversy on this one unit—and then later, at the height of the battle, magnanimously relinquished it. This is more or less what eventually happened. Or perhaps—as de Voto claimed—the Bureau really wanted to establish a precedent for building dams in national parks and monuments. The Corps of Engineers had tried in the past, at Glacier National Park, for example, but without success. At Dinosaur, which was then virtually unknown, the Bureau's chances seemed good.

Whatever the reason may have been, subsequent events showed it certainly was not the one they gave to General Grant, namely, that all his alternative sites would evaporate too much water compared to Echo Park and therefore could not be considered. At the time, however, this evaporation argument seemed unanswerable (who could dispute it—especially for reservoirs not yet in existence?) and so "evaporation" suddenly became, in the Bureau's own words, "the fundamental issue" for wanting this particular dam. Through neglect to remember to subtract, the Bureau exaggerated the amount of evaporation, but stuck to the point even after being corrected.

Round Three opened with a bang. For about a year Secretary McKay had remained noncommital while studying the proposal. The proponents must have been very busy behind the scenes, however, for when the action came it was a blitzkrieg—swift, smooth, and sure. McKay announced his approval of the dam in December 1953, several bills calling for its construction were introduced into Congress, and within three weeks the House of Representatives held hearings on them. The President and the Bureau of the Budget added their support.

The lineup at the hearings was an interesting study in contrasts. On the one side were the elite of Interior's engineering staff, including Under Secretary Ralph Tudor,

*I believe that the pressure for Echo Park was from Utah reclamationists who insisted upon getting a large part of their share of Upper Basin water from the Yampa River and Uinta streams, and not from the deteriorating Green River (which was good enough for the Lower Basin and Mexico). They would mix the waters in Echo Park as a compromise solution. Pumping irrigation water from Echo Park is not economically feasible. The Bureau removed this feature from the plan, but would have little difficulty putting in pumps later once the dam was built and conservationist opposition had disintegrated.—D.B.

who now presented in some detail the evaporation argument for Echo Park dam. They were accompanied by a battery of congressmen, senators, governors, mayors, heads of chambers of commerce, company presidents, and countless other luminaries. All had come to argue the merits of the storage project, and nearly, to a man, all pointed to the terrible loss of water the Rocky Mountain states would have to suffer if Echo Park were replaced.

Arrayed against this stellar assembly of competent professionals was a little group of amateur conservationists, variously referred to by the proponents as barefooted nature lovers, bird watchers, wildlifers, self-appointed do-gooders, so-called conservationists, fuzzy-headed thinkers, and well-meaning but misguided individuals. They came to defend the integrity of the national park system, and they came alone. Conspicuously missing from their ranks were their star witnesses—the Park Service officials who from a professional viewpoint could have discussed the effect of dams on park values, or the Geological Survey scientists who might have commented on the wasteful evaporation losses that take place from reservoirs built primarily for power, like Echo Park. These people, being in the Interior Department, were muzzled. The only experts were from the Bureau of Reclamation, and according to them dams would improve Dinosaur.

The Evaporated Argument

In spite of their handicaps the conservationists drew blood. They found the old error in subtraction being repeated and some unaccountable errors in simple arithmetic in Mr. Tudor's evaporation calculations—errors which heavily favored the Bureau's case. In the course of the next three months Mr. Tudor twice had to revise his evaporation figures downward. In fact, with respect to one of the alternative proposals he had discussed and ruled out, his evaporation argument evaporated entirely. So also did this alternative plan; the Bureau removed it from any further consideration because of some "geological difficulties" Mr. Tudor never mentioned.

The errors, although favoring the Bureau, were undoubtedly accidental. But at the same time their existence showed that the whole argument was probably fictitious, its importance grossly exaggerated. If the Bureau was really worrying about evaporation losses it never would have been guilty of such carelessness. Indeed it never would have recommended a power dam for Echo Park in the first place, for even the evaporation from that reservoir would supply a major city and could be avoided simply by building a steam plant instead of a dam.

The well-oiled machinery lost enough momentum over this debacle so that the bills never quite reached the floor of either house that year, although they passed the Interior Committees of both houses. This delay may well have spelled the difference between success and failure, for by the following year the position of the conservationists was enormously strengthened. They had made a color movie of a boat trip through Dinosaur and were busy showing it all over the country. Alfred Knopf published *This Is Dinosaur* as his contribution to the cause. This book, incidentally, was banned from sale in some of the national parks and monuments. That year thousands of people saw Dinosaur for the first time and many of them went down its rivers, tens of thousands saw the movie or read the book, and hundreds of thousands wrote their representatives in Washington, protesting the dam. The tide of opinion was heavily favoring the conservationists.

The proponents still had the greater political strength, and they played it for all it was worth. They had the backing of the administration from the President on down, and they had such veteran front-runners in Congress as Wayne Aspinall of Colorado and Arthur Watkins of Utah, now at the peak of his power from having disposed of Senator McCarthy.

Nobody spoke any longer of evaporation. Echo Park dam was needed to provide cheap power for Utah; Echo Park dam was needed to provide holdover storage so that water could be delivered to the Lower Basin during dry periods in accordance with the 1922 Compact; Echo Park dam was needed, period. It seemed to matter to no one that steam plants, operating from the Upper Basin's rich reserves of coal, could provide the same power at less cost. It seemed to matter not at all that the Bureau was asking for twice the storage *it* claimed was necessary for meeting Compact requirements, the only purpose of the extra storage being to produce more power (and incidentally more evaporation). It seemed not to matter that the Bureau's nine storage dams would destroy forever some of the most magnificent of the Colorado's incomparable canyons, drown them first and then gradually bury them with silt. What mattered now were personal influence and the power of persuasion. The bill passed the Senate despite opposition by men such as Douglas, Humphrey, and the late Senator Neuberger.

The House was not so certain. Congressman John Saylor of Pennsylvania, one of the strongest supporters of parks and wilderness areas the Congress has ever had, was working tirelessly to defeat Echo Park dam.

The proponents made one last desperate attempt. Calling themselves the "Aqualantes," they mounted a publicity campaign, raised a lot of money, and hired a public relations firm to put their project across. They, too, made a movie and called it "The Birth of a Basin." They also obtained from the Interior Department the names of all the people who had ever written President Eisenhower or Secretary McKay protesting the dam, and tried to swamp them out with a flood of slick brochures bearing titles such as "Echo Park—Tomorrow's Playground for Millions of Americans." The dam was now needed for Recreation!

It was too little and too blatant. Time had run out. The coup de grace actually came from Governor Johnson. Disturbed that Colorado would provide 70 percent of the water and receive only 4 per cent of the benefits, Big Ed shattered the illusion of western solidarity by publicly calling the Bureau's project atrocious—a comment the conservationists happily circulated as widely as possible. Congressman Aspinall, with his bill already safely past the Rules Committee, never brought it onto the floor of the House, for a poll showed it would be defeated.

The gong had sounded for the time being at least, on the final round. The proponents, meeting in Denver that autumn, reluctantly decided that Echo Park dam was a millstone which threatened to sink them all. So they offered to remove it from their plans if conservationists would withdraw opposition to the rest of the project. Fearful that the dam might pop up again when no one was looking, the conservationists asked that the proponents write into the law: "It is the intention of Congress that no dam or reservoir constructed under this Act shall be within any national park or monument." They did.

Breach of Promise at Rainbow

AT FIRST glance it might seem like a clear-cut victory. Such a claim, however, would be extravagant. For one thing, conservationists can never really win any fight, they can only prevent someone else from doing so. The dam site is still there, neither out of sight nor out of mind of certain people. In fact the ink had scarcely dried on this legislation when both Senators from Utah and at least two Upper Basin Governors began making public pronouncements about a renewed effort to get Echo Park. To their everlasting credit, Congressman Aspinall and Senator Anderson of New Mexico, both of whom had supported the dam, chided them for bad faith. But there were others who merely chided them for bad timing.

A more immediate defeat for the conservationists was over Rainbow Bridge National Monument—another area to be adversely affected by the storage project. Rainbow Bridge lies five miles up a side canyon of Glen Canyon. When the reservoir is full the arch will straddle an arm of the lake; when it is drawn down—and this will be almost all of the time—it will stand in a mudflat covered with debris and drowned vegetation. The bridge itself may be endangered and its setting and approach will be severely impaired. This was not an issue at the hearings, however, because the Bureau claimed that it planned to build a barrier dam below the monument to keep out the waters of the reservoir. Again the wording of the Act is explicit: ". . . the Secretary of the Interior shall take adequate protective measures to preclude impairment of Rainbow Bridge National Monument . . ."

Again the passage of the act seemed to bring a change of heart. The barrier dam which previously had been described as perfectly feasible suddenly became, in the words of *Western Construction* magazine, "the West's toughest job"; an expense which previously had been considered "insignificant" now became exorbitant. When we asked about this at the dam site two years ago, the Bureau official (standing near an artist's sketch of Rainbow Bridge reflected in a sparkling lake) replied: "They have decided it isn't worth it."

When it became apparent that the Bureau had no intention of building the barrier dam, the Sierra Club, the National Parks Association, and a few others tried to get a court injunction to hold open the gates at Glen Canyon until the protection was provided. They failed, not because they did not have a case, but because in the opinion of the court they had no standing to sue. The gates were closed and now all chance for protection is almost gone.

The Rainbow Bridge affair raises an interesting question: what recourse *does* a private citizen have if a federal bureau decides to flout a law and an agreement which were made after full and open debate of all the issues?

It also raises a question about large bureaus in general: are they the servants of the public or its masters, do they follow public policy or do they make it, and are they motivated primarily by public interest or self-interest?

The Needless Destruction of Glen Canyon

The latest, and by all odds the most crushing, defeat which the cause of conservation suffered as a result of the passage of the Storage Act was the tragic ruination of the incomparably beautiful Glen Canyon by the absolutely needless construction of a wasteful power dam. The trouble was that no one dreamed its construction would turn out to be needless, and so it was never seriously opposed. Besides, it did not have national park status. Wasteful, yes. Everyone knew it would annually evaporate enough water for several cities the size of Denver but not needless. For hadn't the Bureau consistently argued that if the Upper Basin were to use its full share of the water and still meet downstream commitments, it would have to have large holdover storage dams on the main stem of the river to regulate its flow? During wet cycles these huge reservoirs would fill; during dry ones they would empty, and the water released to the Lower Basin could be maintained at exactly the right amount to satisfy the 1922 Compact. Indeed river regulation was allegedly the primary purpose of the nine-dam storage complex proposed by the Bureau. Power generation was to be strictly a by-product, albeit an important one; its sale was supposed to help pay back the cost of the dams and eventually help finance irrigation dams elsewhere. It all seemed so reasonable then and sounds so hollow now!

No sooner was the storage project well started than the Geological Survey, now no longer muzzled, published a report which vitiated the River Regulation argument.

According to this report, which was written by the Chief Hydrologist, the Colorado River can be regulated by 30 million acre-feet of storage capacity. In 1950 there already existed 38 million acre-feet on the main stem, most of it being in Lake Mead. Adding Glen Canyon has increased this to 66 million, more than twice the needed amount. And when the storage project is complete there will be a total of 86 million acre-feet—roughly three times as much as necessary. Unfortunately, extra regulation does not mean extra water for anybody; once the flow of the river has been made uniform, further storage cannot make it more uniform. On the contrary, further storage can only reduce the water resource for every one because of reservoir evaporation. In fact it would be perfectly possible to dry up the entire river simply by building enough storage dams, and the Reclamation Bureau, which once was so anxious to conserve water by building a dam at Echo Park, seems to be well on its way toward this dubious goal. By the time it has added the dams now being planned to those already in existence, the Colorado River Basin will annually lose an average of 2 million acre-feet, or 13 percent of its entire supply, to the atmosphere!

And it will be more ridiculous if it should come to pass, as now seems likely, that even the power benefits claimed for Glen Canyon cannot be realized. Power sales are supposed to pay back construction costs and then help finance irrigation projects. This will be possible only if the Bureau pays back only part of the interest cost assessed the taxpayers and is also able to market Glen Canyon power for 6 mills per kilowatt-hour. According to a *Denver Post* story, the contractors in the area aren't happy about paying 6 mills. Steam plants in their area are now selling it for 5.8 mills, and a nuclear plant in the east will shortly be selling it for 3.8 mills. Hydropower appears to be obsolete in the Upper Basin even before Glen Canyon's generators go on the line. And if it is obsolete in 1965, what will it be in the year 2040 at the end of the 75-year payout period? To provide a benefit that could more economically have come from other sources, a superb canyon was destroyed, its tombstone a concrete slab that should never have been poured.

Some say there is still great beauty in Glen Canyon. From your motor boat or your water skis you can still gaze at beetling sandstone formations now rising above a blue lake. And with the reservoir still filling you will neither see nor smell the vast mudflats that will come later. I hope it is beautiful. It seems little enough compensation for what has been needlessly lost: the living spaces, the sandy beaches and cottonwood groves, ideal for camping; the wildlife—the beaver and the herons; the magic carpet which formerly carried you silently through 143 miles of enchanted canyonland. Neither you nor I nor our children can ever again know the sylvan beauty of its magnificent twisting side canyons where maidenhair fern used to grow above cold sweet springs on walls never touched by the desert sun. They had names like "Twilight," "Mystery," "Cathedral," and "Music Temple."

Glen Canyon would have made one of our finest national parks. Of all the great canyons of the Colorado it was perhaps the most accessible, for in its entire length there were no rapids. Wallace Stegner described it as "an interlude for a pastoral flute." It was also *The Place No One Knew*. And so it was destroyed.

Now THE setting has been shifted to Grand Canyon where the grisly drama is to be enacted all over again. Once again the Interior Department has plans for dams in a place where no dams ought to be. Once again its supporters speak of the great new prosperity these dams will bring to a growing area. Once again the misconception seems to be abroad, as it certainly was for Echo Park and Glen Canyon, that these dams will bring water to somebody (but they evaporate it for everybody). Once again we find the Park Service pathetically silent, unable to speak in its own defense.

The vicious circle is difficult to break into. A large federal bureau draws up a plan for a huge public works project, huge because the bureau needs to justify the existence of its own large organization. Being huge and well-promoted at great expense the project naturally attracts the enthusiastic support of the local chambers of commerce as no smaller project ever could. Strong business support inevitably means strong political support. By the time the proposal reaches Congress, with all the momentum of an express train, it is already too late to discuss it objectively. Though it is riddled with flaws, it becomes law, the large federal bureau becomes still larger, and the wheel starts around again.

Surely we have learned some lessons from the disaster at Glen Canyon and the near disaster at Echo Park. Surely we now know that on the scenery-rich water-poor Colorado, new hydroelectric projects no longer make any sense. Surely we now know that we don't have to build any more expensive, wasteful, fast-silting reservoirs out in the middle of the desert a hundred miles from anywhere in order to sell high-cost power (probably at a loss) to finance irrigation. If the Interior Department must sell power to pay for irrigation, then let it produce power in whatever manner is most economical of irreplaceable resources. If present laws do not permit this, then the laws should be changed—not Grand Canyon.

Mountaineering Notes

THIS YEAR'S NOTES did not reach headquarters until late in the pre-Christmas rush, by which time space had been committed too far to permit including all the material of broad interest. Some that was hoped for isn't in yet. In omitting so much of the kind of material I myself was first responsible for getting into these pages from 1934 until 1953 or so, I have begun to wonder. How can the sport and the club best be served? With some 27,000 copies of the *Bulletin* now being printed, as against about 2,700 when I started, we probably need to reëvaluate the use of space.

The continuity of Mountaineering Notes had its first cuts and scratches when the *Mugelnoos* started, followed by the *Yodeler* and then by chapter and section newsletters. It got bruised when the ratio of climbers to over-all membership dropped sharply even though achievements rose sharply. It was wounded when climbers all but stopped writing.

Mountaineers would probably like a bigger section of the *Bulletin,* not a smaller one. The readers who outnumber them may prefer more diverse fare, hoping to see only the climbing stories that have something really new to say and say it very well. Can the rest of the record be kept intact by a quarterly, well-printed, separate Mountaineering Notes supplement to the *Bulletin,* its editor appointed by the Mountaineering Committee?

The first (sample) issue of such a supplement is planned to include pieces on Peru by Glen Denny and Leigh Ortenburger, Devil's Tower by Royal Robbins, Mount Brewer NE Face by Ken Boche, the Crumb by Barry Miller, Ribbon Fall East Portal by Allen Steck, El Capitan North American Wall by Tom Frost, Washington Column S Face by Layton Kor, Mount Watkins S Face by Chuck Pratt, Goodrich Pinnacle W Side by T. N. Herbert, Glacier Point Apron by Bob Kamps, Middle Cathedral Rock N Face by Frank Sacherer, and Taft Point by Al Macdonald. These are what didn't fit in or didn't come in yet.

QUESTION: Who, to start it off, (*a*) wants to have these records (printed in the same format as this issue) and (*b*) who would be willing to pay $1 for four issues per year?

—DB

A Summary of Yosemite Climbing

The record of ascents in Yosemite Valley for the summer of 1964 is one of the most impressive in the Valley's climbing history. Typically, a small number of climbers made a remarkable number of spectacular first ascents as well as a great many first free ascents. Activities began early as climbers moved into Camp 4 in May to take advantage of the cool weather and long days. A four-day reconnaissance of El Capitan's North American Wall by Royal Robbins, Tom Frost, and Glen Denny was an indication of things to come. By the end of June successful ascents of two El Cap routes—the Dihedral Wall and the West Buttress had been made, as well as one ascent of the Northwest Face of Half Dome, two ascents of the North Face of Sentinel Rock via the Flying Buttress, and the 2d ascents of Sentinel Direct and the North Face of Quarter Dome. A new route was established on the East Portal of Ribbon Fall which involved an 1800-foot climb over a three-day period.

In June, Lionel Terray spent several days in Yosemite, climbing two of the most popular routes—Royal Arches and Arches Terrace. Near the end of the month, climbing was brought to a halt by the tragic death of Jim Baldwin, a fine climber and a close friend to many Yosemite climbers.

In July the ranks were thinned out by those who migrated to other climbing areas to escape the July heat. Despite the unpleasant weather, a spectacular five-day ascent of the South Face Mount Watkins, one of the last unclimbed walls in Yosemite, was accomplished.

Throughout the summer, the most popular climbing areas in the Valley proved to be the Cathedral Rocks, Glacier Point Apron, and the climbs along the base of the Southwest Face of El Capitan. At least three new routes were established on Glacier Point Apron, including the right side of Goodrich Pinnacle. Most of the other routes on the Apron were ascended at least once, Patio Pinnacle being the most popular. The numerous short climbs along the base of El Cap's SW face saw steady activity throughout the summer. Climbers arriving in Yosemite for the first time were generally introduced to Valley climbing in this area.

More ascents of routes in the Cathedral Rocks were made than in any previous summer, the only untouched route being the North Face of Middle Cathedral Rock. Although many ascents were made of such old standards as El Cap East Buttress, the Southwest Face of Half Dome, and Yosemite Point Buttress, few ascents were made of some of the shorter climbs, such as the Spires and the Overhang Bypass.

Some of the short, difficult climbs which have been established in the last few years have increased in popularity each summer. Rixon's Far West, Slab Happy Pinnacle, and Coonyard Pinnacle were climbed several times, although climbers on Coonyard usually kept to the first pitch. Several more of these short, extremely difficult routes were established this summer, including the left side of Reed Pinnacle, a new direct route on its right side, and a variation on Coonyard Pinnacle which connects the end of the first pitch directly with the fourth pitch.

Although two more ascents of the regular route on Sentinel Rock, and two more ascents of the NW Face of Half Dome were made, the Lost Arrow chimney was climbed but once. In that ascent, all direct aid was eliminated to the notch. This marked the beginning of an unprecedented number of free ascents of climbs which had for years required direct aid. A small number of climbers, outstanding among whom was Frank Sacherer, after a summer of concerted effort had succeeded in eliminating all aid on: The Slack, SW Face of Half Dome, Dihedral Route on Slab Happy, Right Side of the Hourglass, Bridalveil Fall East Side, Yosemite Point Buttress, El Cap East Buttress, NE Face of Middle Cathedral Rock, North Buttress of Middle Cathedral Rock, East Buttress of Higher Cathedral Rock, and the Crack of Despair on Elephant Rock.

In September, Layton Kor arrived in the Valley and with characteristic speed and nervous energy climbed two routes on Sentinel North Wall, a new route on the South Face of Washington Column, and made the 2d ascent of the NE Face of Lower Cathedral Rock, to name a few. First ascents continued to be established during the fall. Two very difficult routes had already been made in the Cathedral Rocks, both of which were climbed entirely free on the first ascent. A new climb was added to the notorious routes on Elephant Rock and was called The Crack of Deliverance by the first-ascent party.

An outstanding climbing season was brought to a fitting close by the first ascent of the North American Wall on El Capitan. A four-man team reached the summit after nine continuous days of climbing and proclaimed the route to be the most difficult yet established on El Cap.

—CHUCK PRATT

Wyoming's Range of Light

The Wind River Range of Wyoming is the closest thing I have yet found to my first love, the Sierra Nevada. One-third the size of its California cousin, the Wind River Range was, like the Sierra, formed by a tilting of a block of the Earth's crust rather than by the folding process of mountain building. Other similarities are the open spaciousness of the extensive highlands, the white granite cliffs, the numerous lakes and meadows, and the streams coursing over expanses of smooth granite strewn with erratic boulders. Two things which one does not usually find in the Sierra Nevada, but which can be expected in the Wind Rivers, are a thick population of mosquitoes and bad weather in the summer. Also, in certain areas one may encounter enormous herds of sheep.

Our party of six, Dick McCracken, Julie Verran, Charles Raymond, Patricia Taylor, my wife Liz, and I, visited the southern Wind Rivers in July 1964. From Big Sandy Opening we hiked to the Cirque of the Towers, one of the more famous and spectacularly Alpine areas in these mountains. We spent a week enjoying the magnificent climbing opportunities here. During our stay, Dick and Charlie and I made the first complete traverse of the Cirque, from Pingora to Warbonnet. This took us a little over one day. We enjoyed one section of this traverse (the east ridge of Wolf's Head) so much that Charlie and I later returned with Patricia and Liz to climb it again. On July 18, Charlie and I made the first ascent of the 800-foot south buttress of the Watchtower, perhaps the most impressive wall in the area. This was an all-day climb, a Yosemite grade IV. Although difficult and challenging, this route did not meet the expectations aroused by the beauty of the buttress, for much of the rock was poor. Both of these first ascents involved periods of rain and lightning.

After these pleasant successes, we shouldered our monstrous packs and hiked to Grave Lake, a large body of water below Mount Hooker. To get there we had to cross a tempestuous river by an exciting tyrolean traverse. Our objective was the north face of Mount Hooker, which had already repelled three parties. It looked repelling to us too, but we started our ascent on July 22. The pitoning was difficult, and after two days we had climbed only 700 feet of the 1800-foot wall. To reach the 700-foot level we used many pitons, 13 bolts (the only ones used on the climb), and 8 fifi hooks for direct aid on flakes or small ledges. We passed our second night fairly comfortably in hammocks. The weather was cold and windy but otherwise fair. Above the 700-foot point the rock improves and we did much excellent free climbing. We passed a third night on a good ledge and, after two fine and difficult free-climbing pitches, reached the summit at noon on July 25. Relaxing on the sunny summit, swatting mosquitoes, we agreed it had been an exciting climb and that we had been extremely lucky with the weather. While we were climbing, the girls had been industriously ferrying our supplies from Grave Lake to the south side of Hailey Pass. Thus, meeting them at Hailey Pass after our descent from Hooker, we were saved the 3-mile trudge to Grave Lake and then back up again.

Our trip to the Wind Rivers ended with a touch of despair. For we hiked out on the Fremont Sheep Trail and saw the shocking rape the "hooved locusts" had dealt this beautiful country. Who' hillsides had been turned from grassy slopes to sand dunes. Near the end of our hike we passed a large herd of sheep. The noise they make does nothing for the wilderness. It is a sound like the anguished wailing of a legion of damned souls. We found it mildly terrifying.

NOTE: Route descriptions of the first ascents will be in the 1965 *American Alpine Journal*. —ROYAL ROBBINS

Perlon and Stretch

The technical climber is aware of the increasing use of European-manufactured Perlon climbing rope, but he may not be aware of the difference in stretch characteristics between Perlon and the U.S.-manufactured Nylon. Nylon rope behaves like this: when you pull slightly it stretches slightly, and when you pull harder it stretches a proportional amount more. In other words, the force-stretch curve is essentially linear for Nylon. This curve is exponential for Perlon and starts out very flat, which means that when you pull lightly there is practically no stretch and when you pull harder there is still virtually no stretch. Not until you apply a fairly large force does the Perlon stretch noticeably, but then the rate of stretch will increase until the total elongation is approximately that of Nylon. This characteristic of Perlon is advantageous during direct-aid climbing, but the difference between the two types of rope can lead to problems.

A rappel was set up recently using joined Perlon and Nylon ropes. When the climber on rappel had descended some distance the differential in stretch caused the ropes to run over the anchor sling. The melting action was halted by an alert climber at the rappel anchor, but it is clear that rappels on joined Perlon and Nylon are to be avoided. If such a rappel is necessary the climber should use a metal ring on the anchor sling or take other precautions to see that the ropes will not run and melt through the sling.

Short falls may not generate enough force to stretch a Perlon rope appreciably; they create an unusually high deceleration strain on the falling climber, his pitons if any, and the belayer. Thus belays with Perlon rope may bring about a greater need for a dynamic belay on short falls than on long falls. A quantitative research study is needed on this subject, but in the meantime it is hoped that climbers will pay heed to the problems inherent in using ropes with differing stretch character. Please communicate to the Mountaineering Committee any information on this or other safety matters.

—RICHARD IRVIN

The Critics and—

our Fall 1964 publication *Time and the River Flowing:* GRAND CANYON

Brooks Atkinson, Critic at Large for *The New York Times*

"The Sierra Club of San Francisco has just published a stunningly beautiful book . . . 'Time and the River Flowing,' consists of François Leydet's text, which describes a 17-day boat journey through 240 miles of violent river, and innumerable photographs in lustrous color . . . Mr. Leydet's chronicle of the voyage at the bottom of this stupendous slot in the Arizona landscape is tonic because it contains not only adventure but also notes on the wildlife that endures . . . Most of the photographs are full size; all are magnificent. They vividly document the Sierra Club's contention that the Grand Canyon is a masterpiece, not only of planes, perpendiculars and textures but of colors as well . . . Most of the photographs illustrate the myriad marvels and extravagant beauties of the river bed that would be destroyed—the flashing river, the crimson cliffs, the many-colored polished stones on iridescent sands and gravels, violet cavern interiors, pearl-stained rapids. The photographs have been brilliantly reproduced on Kromekote paper by printers (Barnes Press) who must have enjoyed working with such splendid materials."

Robert Cromie in *The Chicago Tribune*

"The Sierra Club, which publishes some of the most beautiful books put out in this country as a corollary to its efforts to preserve our natural resources, has just issued "Grand Canyon" by François Leydet. As for the book: it is a readable account of the Grand Canyon, embellished by some of the loveliest color photos you've ever seen, and is a steal at the price.

"What's important for the Sierra Club, and for David Brower, who edited the book and wrote the foreword, is that the Grand Canyon be preserved in its natural beauty."

Robert R. Kirsch in *The Los Angeles Times*

"The pictures alone are so beautiful that ordinarily they would eclipse the text. They produce a quality of awe which is unequalled except by personal witness; and many of these photographs were taken from vantage points rarely seen by the visitor. But the text, as in most Sierra Club publications, is not only eloquent and poetic, it has purpose. In this case, the most important purpose of all. To save the Grand Canyon as we have known it . . . An important document which should be read by every American."

Peter Farb in *The New York Times Book Review*

"100 superlative color photographs by various hands. The book's lengthy text includes an exceptional adventure story by François Leydet who braved nearly 250 miles of the Colorado River to explore inaccessible places in the canyon. But the text is much more than mere daring-do. It explains the significance of the canyon's rapids and rocks, its forest and Indian ruins. It lingers over a small fossil, deftly describes a whole wildlife community, laments the possible extinction of the mountain lion. And, most important, the book is an articulate plea for preservation—for the canyon is in deep trouble."

William Hogan in *The San Francisco Chronicle*

"A literate, informative, often exciting text by François Leydet . . . illuminated with the greatest photographs ever made of the Grand Canyon . . . reproduced flawlessly and with the grandeur worthy of their subject. Leydet's text is a plea for reasoned conservation and—as "The Last Redwoods" before it—a clarion call for sanity, an element in our national planning which apparently comes these days in woefully short supply.

"And those pictures: Philip Hyde's breathtaking cliff detail at Toroweap Overlook; Ansel Adams' "Aspen on the Kaibab Plateau"; boulders like polished jewels at Nankoweap Creek; Sculptured dunes; the smashing Vulcan Rapids, the pink walls of Granite Gorge, and lizards, bighorn sheep, a canyon tree toad, on and on.

"If you suspect I am overwhelmed by all of this, believe me I am. Investigate this book yourself, and join in rejoicing that the Sierra Club engages in this brand of quality publishing."

Time and the River Flowing: GRAND CANYON by François Leydet, 100 color photographs, 168 pages. $25.00

PHILIP HYDE: Sunset, downriver from Nankoweap Creek

The canyon would be essentially 'dead' if the living river were stilled . . . We will convert the canyon from a working geological laboratory into a museum piece, a petrified instant-in-time. But I question whether this is truly the full extent of the damage we stand to do. What happens to the form of a canyon when the river which carved it stops flowing?

We would have taken the authority on ourselves to reverse the direction of the canyon's development. Such an action would foreclose forever the chance that the distant future would see an even more spectacular canyon than we know today. Are we to assume—a classic mistake—that the superlatives of our own experience constitute ultimate expressions?

LARRY R. HARRINGTON