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NATIONAL PARK SERVICE
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

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Memorandum

To: Directorate, WASO and Field

From: Associate Director, Professional Services

Subject: "Another Look at Wildlife in the National Park System"

The enclosed report has been prepared in the Division of Long Range Planning to stimulate thought and--hopefully--action, where appropriate, on improving opportunities for wildlife viewing and interpretation in the parks.

We believe that such an improvement can only come about by utilizing the various and dispersed talents in the parks and various support offices of the Service. A sufficient supply of this report is being sent to the Directors of Regions to allow distribution to the parks as they see fit. A sufficient supply is also being sent to the professional support offices to allow wide circulation. A small supply of additional copies is available from the Division of Long Range Planning on request.

The report is informational, and no specific actions or compliance is required. It would be unfortunate, however, if ideas generated or fueled by the paper could not find access, through channels, to a responsible person who would collect and appraise such ideas and take any such follow-up actions as seem indicated. We would hope each Region would assign someone to this task to solicit and handle park responses, as well as ideas from support offices, as they might apply to a particular Region.

This Office would be happy to receive comment of general Service applicability through the regional offices and from reviewers in other offices.

Ernest Allen Connally

Enclosure

National Parks Centennial 1872-1972

ANOTHER LOOK AT WILDLIFE
IN
THE NATIONAL PARK SYSTEM

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Washington, D. C.

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Purpose

The purpose of this paper is to analyze the reasons and opportunities for greater and more varied interpretation of wildlife in the parks to give humankind a better appreciation of all forms of life and the natural processes upon which they depend for sustenance.

Expected Consequences

The expected consequences of increased and improved interpretation of wildlife are:

A. Greater enjoyment and a clearer understanding of the value of parks by the visitor.

B. Increased support for the protection of parks against hunting and other inappropriate uses.

C. Clearer understanding of the biological processes underlying and necessary to all life.

D. Creation of positive attitudes toward a life of quality and diversity.

E. Support for the development of more humane ways of controlling and treating our animal competitors and servants.

DISCLAIMER

This paper was written by a single individual and must, therefore, reflect his particular bias. The primary assumption is that the National Park System has an important wildlife resource and that, present efforts notwithstanding (and the author is unaware of many of these efforts), there are opportunities for viewing and interpreting that we have not yet recognized or capitalized upon.

The approach of the paper is, hopefully, logical and holistic; that is, it attempts to look at the entire wildlife picture and draw conclusions from the manipulation and recombination of the various parts.

The paper is not aimed at solving any current problems. Rather, it is designed to nourish thought by NPS people on how they, from their particular position and perspective, can utilize any of the content to better interpret wildlife for the benefit of the visitor and, subsequently, for wildlife itself.

It is not assumed that any programs or answers are put forth here; nor should it be assumed that the author claims any unusual knowledge about the management of wildlife or ecosystems or of the specific ways and means of interpretation. Programs and answers, if any are

forthcoming, should grow out of the consideration and necessary alteration of ideas put forth in the paper, utilizing the ecological, educational, and interpretive talents of those in the Service and of others we might choose to involve.

Furthermore, it is clearly understood that wildlife is but one aspect of the total fabric of nature represented in the parks and cannot be divorced from that fabric and effectively interpreted in isolation.

A NATIONAL PARK SERVICE MISSION FOR WILDLIFE

The greatest threat to life on earth is humankind. This threat arises from man's cumulative knowledge and subsequent power, which, coupled with exponential growth in population, technology, and pollution, gives him the ability to effect vast changes, intentionally and unintentionally, in the life-producing processes of the globe. This power is beginning to seriously affect the balance of life over vast areas of the earth.

Man has been described as many things--tool-maker, hunter, herdsman, farmer, trader, warrior, artist, explorer, ad nauseum. He is all these things and more, just as he is a pawn of politics, economic organization, theology, ideology, genetics and environment. But he is also in transit and, consequently, can and does leave behind him (or retain as vestiges) social and mental characteristics which are no longer necessary to survival--or which may even threaten his survival.

Before he was a farmer, man was a hunter, and there are still significant portions of the earth where simple hunting and gathering is a primary or important contributor to livelihood. To the hunter, wildlife was a necessity, and he revered it as one reveres that

which is essential to life. To the farmer, wildlife was a competitor or, if domesticated, a possession. Nomadic and sedentary herders still tend their flocks over sizable areas of the earth's land surface and, in some cases, have built up a considerable social mythology around their way of life.

The hunter thins, and sometimes extirpates, animal populations, including aquatic life. The farmer dispossesses many forms of wildlife by altering their environment, although--and this is significant--certain agricultural areas had, or have, large wildlife populations. This latter situation is a result of the form of agriculture practiced and the attitude of the people, e.g., the Hindu reverence for life.

Wildlife has never had it easy, but in the last 100 years a new threat has arisen in the form of pollution from agricultural practices, sewage disposal, fertilizers, pesticides and other poisons, and the effluents of industrialization. Entire river systems are dying, ocean bays and estuaries are affected, and signs of oceanic pollution have been detected for some time now. Pollution of the air and soil is also a serious problem.

Three completely interrelated major trends of our time that will not soon be reversed--though they must be leveled off--are population

growth, urbanization, and technological proliferation. These trends are worldwide. The major results of these trends are the increasing occupation and almost irreversible alteration of environment by man, and the poisoning of life support systems. One can sight down these trend lines to where they converge at disaster--or, with a collective will, we may bend them to where they converge at a steady state of dynamic continuation.

In the United States, and in other parts of the world, the collective will is beginning to show signs of vitality and life. Its environment is harsh, for the present industrial system of most of the world is based on exponential growth of products and consumers. Polarization is already beginning between the environmentalists and the business sector.

The quarrel over "growth or no growth" is specious, for it assumes that we must either continue doing more of what we are doing, regardless of the consequences, in order to bolster the economy and keep it from stagnation--or we must stop doing what we are doing in order to avoid disaster, thereby bringing on disaster of another sort. What is really needed is population control; wise use and recycling of resources in order to keep them from becoming wastes; land use planning to keep an increasingly scarce commodity from being put to

inappropriate and harmful uses; a considerable amelioration of the conditions (racial, ideological, religious, psychological) that cause man to act irrationally; a dynamic, shared economic system based on quality, enrichment and embellishment, rather than quantity; the creation of wholesome and diverse environments, incorporating sound ecological principles; and the general acceptance of a new attitude towards life--a reverence for it generally and a respect for it specifically.

It is relatively easy to give up those things which we have outgrown. It is easy to tolerate that which we need not fear. Attitudes no longer necessary to the present situation can be discarded and may be harmful if persisted in. A failure to recognize the existence of a condition makes it impossible to constructively change it.

There is evidence to indicate that the National Park Service can give up attitudes and defenses which it has outgrown. We no longer control predators in the parks. We no longer think that growth of ungulate populations in the parks does not require some adjustments in the interest of those populations and their environment.

We can now better tolerate wildlife control programs, since, in the parks at least, we need not fear the extirpation of wildlife.

But there are attitudes about wildlife that we need to examine if we are to make the most of the resource for the good of man and nature; and there are new conditions that we must recognize before we can deal with or capitalize on them.

As we begin the second century of national parks, we would do well to ascertain what we can leave behind us and consider what we must retain or acquire in order to play a needful and essential role in the affairs of humankind in the 21st century.

We know the purpose of the parks and of the National Park Service. The conservation of scenery and natural and historic objects and wildlife was a primary objective of the early park movement, and it still remains a vital force in this country and around the world. Providing for the use and enjoyment of park resources so as to leave them unimpaired for the enjoyment of future generations continues to be essential to gain support for the parks and to assure that inappropriate uses do not rob future generations of their heritage.

Accepting the above, we may still ask what end we seek through fulfilling this purpose. Why is it important to conserve and wisely use park resources? What relevance does it have for the visitor? What set of circumstances makes it desirable now, or at any other

given point in time? These answers are found in the conditions external to the parks.

The parks are, paradoxically, very much in and very much out of the world. They are affected, to a greater or lesser degree, by all the forces operating on the world; yet, they have a transcendent quality that makes a park visit lie beyond the realm of ordinary experience. Natural parks typify the wholeness of nature--the unaltered fabric of natural processes. This is their essential quality, wherever they may be found. To the extent that this is not so, they are diminished as parks in the eyes of the beholder.

Man has broken out of the natural fabric of nature and can never return wholly to it in view of his numbers, technology and culture. Yet, man is still dependent upon the healthy functioning of natural process for his very life; and, as his power and numbers grow, he will become more, not less, dependent upon the controls imposed on him by natural processes.

Humankind is learning slowly that there is no action without a reaction; that a gain here means a loss there; that unexpected consequences of his actions may be of far greater importance than the stated purposes of his actions.

There is no single end that the parks serve, but one which they may serve today is to demonstrate environmental quality in a world where environmental quality is diminishing. They may serve to give man a sense of continuity and place in a world of technological and social change that increasingly threatens these values. They may also serve to help man to develop or reinforce an appreciation of life and the wonderful natural processes upon which life depends. All of these ends have positive survival benefits. Others could be named, as well. This paper is concerned, primarily, with helping man to develop a sense of kinship with all of nature, through a program of interpreting wildlife in the parks.

WILDLIFE IN THE NATIONAL PARK SYSTEM

From coast to coast, from seashore to mountain top, from tropics to the arctic, the areas of the National Park System conserve a significant portion of the myriad species of wildlife--well known and obscure--found in the United States. Probably no other Federal agency administers land with as diverse and representative a sampling.

Wildlife is where you find it. Some of our historic areas have outstanding wildlife resources. Many of the recreation areas have species of great interest not found elsewhere in the System. Conversely, some few natural areas have relatively few forms of wildlife.

A categorization of wildlife by general classes follows:

Marine Invertebrates - Found in all seashore areas in both tidal and subtidal areas. Relatively sedentary and easy to display and interpret.

Marine Fishes - Found in all seashore areas, more elusive and more of a challenge to interpret than marine invertebrates.

Marine Turtles - Rare in southern marine parks and very vulnerable to disturbance during the short time ashore to lay eggs. Direct interpretation is difficult, but the story of marine turtles can be told by films and other means for the purpose of gaining public support for the endangered species.

Marine Mammals - Channel Islands National Monument is an outstanding example of a park possessing this resource, but a number of other marine parks have marine mammals in greater or lesser degree. With controls, they are easy and exciting to view and interpret.

Fresh Water Invertebrates - This resource exists in varying degrees in all parks with fresh water but is not of interpretive quality in all of them by any means. It is useful for biological collecting in environmental education, and a variety of other ways for small controlled groups.

Fresh Water Fishes - Very many parks contain this resource. From desert pup fish in Death Valley to vast runs of salmon in Alaskan

parks, it is varied, exciting, and poses a real challenge to the interpreter. Since fresh waters are, as a class, highly polluted, relatively pure park waters are useful examples of environmental quality.

Terrestrial Invertebrates other than Insects - This group includes land and tree snails, millipedes, centipedes, worms, spiders, and a variety of lesser forms. Some desert parks are rich in species. Many kinds are relatively easy to work with.

Insects - There are more known species of insects than all other forms of animal life combined. No park area is without them. They fill almost every available environmental niche and are an extremely important part of the food chain. Their life cycles are interesting, and many species are easy to work with.

Amphibians - There are relatively few kinds of amphibians, though they may be locally abundant in numbers. Frogs, toads and salamanders are interesting as forms intermediate between fish and reptiles, between water and land.

Reptiles - Both aquatic and terrestrial, the reptiles are widely distributed across the country and are an important element of the fauna in the southwest and elsewhere.

Birds - Birds, like insects, are found in all the parks. Mankind has a strong affinity for birds, and many of their habits--nesting, feeding, rearing young, migration, etc.--make them good material for interpretation.

Mammals - Mostly when we think of animals or wildlife we are referring to mammals, the group to which man, himself, belongs. Our largest forms of wildlife--and probably the most interesting to the general visitor--are the mammals. Deer, elk, moose, bear, and prairie dogs--to mention a few--are prime visitor attractions in many of our larger parks.

WILDLIFE CHARACTERISTICS THAT MAY BE USEFUL IN INTERPRETATION

To see wildlife in its environment is to immediately feel or comprehend some aspect of its personality, life history, and characteristics. Wildlife, unlike plant life, is not a continuous or near continuous carpet spread across the landscape. Rather, it is a sparse sprinkling of usually mobile and unevenly distributed life. The word "animal" comes from the Latin "anima," or "soul," and is indicative of early man's intuitive understanding of the quality of volition which he attributed to wildlife.

It is instructive to contemplate a young child's response to three objects: a piece of rose quartz, a chrysanthemum, and a rabbit.

The first object will hold interest because of its texture, translucence, and color; the second, because of its intricacy, ordered form, and color. But the response to the rabbit is one of either fear or, more usually, delight and is a response to the anima or related life force, which the child recognizes intuitively. Robert Frost indicates this same kind of response, but of a mature and philosophical nature, in his poem about a mite, entitled "A Considerable Speck." Numerous other examples from literature could be given. Suffice it to say, man's almost invariable response to wildlife is one of interest, and this interest is usually manifested as delight, or fear, or both. We, as interpreters need do nothing to elicit this response, but we can certainly capitalize upon it once it appears. More importantly, we can arrange, through careful and original planning, for humans and wildlife to meet so as to permit the subsequent interpretation to take place.

What do we interpret? Certainly, in light of the environmental crisis in the world external to, and impinging upon, the park, we should interpret wildlife as part of the total fabric of nature--part of an energy cycle, chain of life, etc. In fact, if there were no environmental crisis, we should still do this. But for such interpretation to be effective for the visitor--and not just a salve to the interpreter's conscience--it should grow out of demonstrable

aspects of the animal's character, life habits, instinctive behavior, and ecological relationship to its environment. The precise way in which this is done may vary widely depending upon the species, the ingenuity of the interpreter, and the method of interpretation.

Besides the above, of course, there is much of interest that may--and should--be conveyed to the visitor concerning specific habits and characteristics of wildlife. Much of this is purely informational at the start but may be woven into a larger comprehension through the visitor's own thought processes or by the interpreter.

We should remember that to the urban dweller, or to the visitor from another region, ordinary park wildlife may seem extraordinary. We should certainly take advantage of such knowledge. How many people see woodchucks in their daily lives, or prairie dogs, Steller's jays, golden-mantled ground squirrels, herring gulls, mound builder ants, salamanders, or lizards? For literally millions of Americans, the only wildlife seen in the ordinary daily round are pigeons, English sparrows, starlings, and maybe rats and cockroaches. Even these can be meaningfully interpreted.

Finally, it should be noted that the effectiveness of wildlife viewing and interpretation in any park will be a marriage of knowledge of wildlife habits with innovative interpretative techniques. Many

species adapt easily to the presence of humans if they (the humans) behave in a consistent fashion. Other species, because they are shy, nocturnal, sub-terrestrial, and for other reasons, are difficult to view and interpret, but therein lies a challenge.

The following list of characteristics is random and hardly exhaustive. Out of these and others, the biologist and interpreter may begin to move into the important area of ways of interpretation.

Sedentary or Near-sedentary Wildlife - Many marine and fresh water forms fall into this group. Relatively few terrestrial forms do. If these forms and their environment can be protected from the visitor, they are relatively easy to interpret.

Life Cycles--Egg, Infant, Immature and Mature Stages - Some aspect of the life cycle can be shown for all forms of wildlife.

Territorialism, Ranges and Carrying Capacities - All of these are instructive in understanding natural balance.

Food Storage - This can be demonstrated in a wide variety of wildlife: wasps, bees, beavers, pikas, acorn woodpeckers, squirrels, mice, etc.

Seasonal and Periodic Phenomena - Swarming of mayflies, ants, termites, and bees; migration of birds, caribou and fish are but a few examples of interest to people.

Mating Procedures - Often these are readily observable, with care, in fish, certain birds (mating dances) and other animals.

Complete Metamorphism - An interesting aspect of the lives of many insects.

Sexual Dimorphism and Dichromatism - Both phenomena are found widely in the animal kingdom, birds being a good example.

Critical Factors in Environment, Climate, etc. - Those physical, climatic and biological factors necessary to the existence of a given species may, in many cases, be demonstrated in a way that will help the visitor to better understand ecology. Effects of water pollution on environment are applicable here.

Symbiosis--Animal to Animal, Animal to Plant - Animals living together in harmony or actually cooperating for their common good can have an important message for man.

Instinctive Behavior - Particularly applicable to insects and other invertebrates but also to higher forms as well.

Food Chain Phenomena - Easy to demonstrate in certain areas. Predator-prey relationships are included here.

Structure Building - Numerous insects, spiders, birds, rodents, carnivores, etc., modify their environment for one reason or another by developing structures for their use.

Natural Population Controls - A wide variety of wildlife can be used to demonstrate the mechanism of natural population controls. Salmon from egg to ocean and back to the parent stream, toads from the egg to tadpole to young and breeding adults, etc.

Moulting in Waterfowl - Renewal of flight feathers grounds ducks at the time they have young, providing an interesting mechanism to promote parental care.

Method of Food Gathering - From the amoeba to man, here is a fascinating story.

How Wildlife Changes its Environment - Similar to structure building, but also includes food gathering activities, etc. The beaver is a prime example.

Flight Characteristics - Opportunities here with bats, birds, and insects.

Grouping--Inter- and Extra-Specific - Herding of mammals, hives, or nests of social insects, winter groupings of several species of

birds, schooling of fish, flocks of birds, etc., all provide interesting material for interpretation.

MEANS OF RELATING THE VISITOR TO WILDLIFE

In the age of television and movies, it is possible to vicariously see wildlife in their natural environment almost anywhere on earth. As the science of ethology advances, the interpretive quality of these programs improves markedly. Man is making an effort to understand animals and those genetically-induced behavior patterns which we share with them. Out of this effort man is gaining new perspectives on himself. From this work, and from the related fields of anthropology, sociology, psychology and psychiatry, man is beginning to understand that part of his nature essential to fashioning a better emotional, as well as physical, environment.

These television programs also help man to understand the deterioration of the natural environment and the conditions that must be met for the survival of wildlife. The interpretive quality of these programs is high, and it is likely that it will improve. The good they do wildlife, and subsequently man and his environment, is immense. However, they share one of the aspects of technological society that we in the National Park Service would do well to combat--even though we do, and should, selectively use this medium--and that

is the vicarious, impersonal, almost unreal nature of the mass media in communicating reality.

It is conceivable that, at some future date, in a vastly overpopulated, totally urbanized society, we might collectively choose to close the parks to all people except for TV crews, which would permit one to see the park and its wildlife on a TV wall selectroscope. Through extensions of his technology, man would finally become entirely sessile, the ultimate consumer, permanently perched upon his fundament but with extended sensory contact with the entire world.

Such a future is conceivable, and to some may even be desirable, but the author has a sneaking suspicion that constraints in the world ecosystem and in man's genetic makeup make it unlikely, even though it looks like a natural product of present trends.

Unless population is checked, and unless vast new recreational lands are generally available to the public, it will be necessary to set capacities on most of the parks--just as we are doing in certain parks today. Reservations will probably be necessary and may need to be made weeks or months before the visit. Time of stay will be restricted, not by economic factors affecting the individual, but by park management in the interest of resource protection and optimum use.

In such an environment, parks will undoubtedly be extremely popular, for they will represent the last refuge wherein one may have the transcendent experience of being in a wholly "natural" environment. The emphasis will be on direct contact with real nature--the ultimate trip.

The pressures of uncontrolled use move the National Park Service in the direction of increasing regulation and controls for the sake of the resource and order. The effect of controlled or capacity use will allow us to begin managing and regulating in the interest of the quality of the park experience for the visitor. This should be the logical course to pursue--the experiential quality of direct contact with the natural "reality" of the park. Exceptions to this approach exist and are treated in this paper.

Today most park visitors see wildlife incidentally as part of their park visit. This does not mean that park roads, trails, and facilities were planned always without reference to their potential for wildlife interpretation. Fortuitously, if for no other reason, park developments have been situated, in part, where wildlife could be seen. In some cases these developments may have been placed disruptively in critical wildlife habitat, driving the animals away from contact with man.

As long as most visitors spend most of their time--and cover the greatest amount of distance--in their cars while in the park, it is likely that most will see wildlife in this way, however unsatisfactory this may be for them and for effective interpretation.

In some parks we have taken advantage of roads to provide wildlife observation areas--a prairie dog town, the valley of a meandering river frequented by moose, waterfowl concentrations, etc. And, of course, we have bears that have learned to beg from people in cars, creating our famous "bear jams." These are certainly "wildlife experiences" for the visitor but are hardly an ideal man-animal relationship or good material for interpretation.

Accepting the transient nature of park visitors and the tendency of the visitor to remain encapsulated in his car, there is still a varying percentage of visitors who spend sufficient time in a park to permit them to see beyond the big landscape to the particular aspects of it. For these, good information and interpretation is of great value.

What follows is simply an annotated listing of possible (although not always desirable) ways of displaying and interpreting wildlife and informing the public about wildlife. The first five headings deal with ways in which people can see wildlife; the remainder

relate to vicarious information and miscellaneous means of interpretation.

Park Roads

As already mentioned, most visitors probably view wildlife from their cars or in very close proximity to them at wildlife observation parking areas. Motor nature trails are a special breed of road that may increase viewing opportunities. Car headlights make it possible to see certain wildlife at night, and possibly this is the only significant way nocturnal wildlife is viewed in most parks.

At Everglades National Park, interpretation of wildlife has been tied closely to park roads, with spurs, observation areas, and trails. Admitting that it has wildlife in greater abundance than most parks, it still is an excellent example of what can be done to give the car-related visitor an outstanding opportunity to view wildlife.

Auto caravans, bus tours, bicycle field trips, and other specialized uses of roads for viewing and learning about wildlife (and the rest of the park features) are used in some areas and may have much to recommend them where circumstances are favorable to their use.

Boat Tours

At both Acadia and Everglades, boat tours are used to provide a novel park experience, of which wildlife and its habitat are important aspects. Boats of all kinds place people in a new environment and tend to sharpen their perceptions of their surroundings, particularly if the boat is open to the elements.

Float trips on the Snake River in Grand Teton or at Ozark National Scenic Riverway, to mention but two examples, offer excellent opportunities to see wildlife of both the river and its shorelines. Opportunities exist in a number of parks to use boats to place people in a new and exciting environment where wildlife is an important element of the scene. How this is done will vary from park to park, depending upon the resource, the kinds of boats usable, time of year, economics, safety, visitor characteristics, etc.

Walks--Self-Guided and Conducted

Seldom is a trail designed or a walk conducted purely for the purpose of seeing wildlife, but there are a number of examples where wildlife may be a principal attraction. Seashore walks at Acadia or Cape Cod, and the Anhinga Trail in the Everglades fit this category. With a good knowledge of wildlife ecology, occurrence, seasonal phenomena, etc., park biologists and interpreters could

design trails or plan walks that would feature wildlife. One can think of many random examples--bears on a salmon spawning stream; white-throated swifts at Grand Canyon; mayfly swarms; marmots in alpine areas; seasonal concentrations of waterfowl in seashore areas; migration of birds, etc. Such walks should not drive away the wildlife nor place the visitor in jeopardy. Within these two constraints many things are possible.

Hiking and Walking

Nearly all parks have hiking trails. In some parks, one may easily hike across country without benefit of trails. For the solitary hiker or small group, hiking or strolling offer good opportunities to appreciate the park environment and to see wildlife, from invertebrates upward. Probably few of these trails were planned with wildlife viewing in mind, but, since they pass through a variety of representative park environments, they can hardly fail to produce opportunities for viewing wildlife. Still, an interesting question for the park interpreter to ask himself is: "Are there hiking or walking opportunities in this park, featuring wildlife, which if developed would be used without harm to the wildlife involved or danger to the visitor?"

Special Constructions or Management Techniques

Studies of wildlife have shown us that certain environmental requirements exist before wildlife can survive or thrive in an area. Certain other environmental characteristics might be desirable but not necessarily essential, i.e., an area for bathing by birds.

Some of these characteristics that have been noted are food, shelter, protection or special requirements for raising young, resting places far from predators or continued disturbance, bathing areas, mating grounds, etc. A knowledge of wildlife habits can thus be useful in thinking about ways in which wildlife might be attracted to an area where they could be viewed by people.

Because the parks are to be maintained in a "natural state," such methods would need to be carefully thought out to avoid portraying wildlife in an unnatural way, i.e., bear feeding at a garbage dump, putting out winter food for elk, or bird feeders. There are far better ways that avoid removing the animal from dependence on the natural environment.

At Everglades--that premiere wildlife park--dredge spoil from a marina was fashioned into a mud flat, which became a choice

resting area for hundreds of shorebirds--black skimmers, white pelicans, herons, egrets, etc. This is in easy view of the Flamingo Visitor Center. Across the road from the motel, a barrow pit, tastefully fashioned, became a bird bath for salt water birds. Maintenance of such constructions may be required to keep them from passing through successional stages of from disintegrating to such a point that they no longer serve wildlife.

Any good biologist or naturalist, knowing something of the life histories of park wildlife, could think of ways in which wildlife might be better portrayed without harm to the wildlife, the "natural state," or the visitor. Such constructions and management techniques could extend from insects and other invertebrates, aquatic species, through birds and mammals. One thinks of nesting sites for birds, sunning spots for turtles, maintenance of meadow or prairie for ground squirrels, fruiting trees and shrubs for birds, certain flowers for humming birds, water sources in dry climates, bathing areas for birds, alteration of aquatic environments to better encourage concentration of wildlife or make it more easily observable. Done with taste and an understanding of natural processes, such techniques could be very effective. In recreation areas, we have greater leeway in developing or enhancing habitats for wildlife.

Vicarious Methods

Man learns much about the world around him vicariously--through story-tellers, from books, films, TV programs, museums, and art. Such methods serve both to inform and to interpret selectively. It is in this way that many of our attitudes and ideas about anything are formed. We may learn that animals are dangerous or neutral or friendly. We may develop ideas about "usefulness" of wildlife or of their value. We may learn about taxonomy, evolution, or ecology. We may learn a little bit or a lot. It may be exciting or dull.

At the beginning of this section, I said that the logical course for the Service to pursue, as far as the visitor is concerned, lies in the experiental quality of direct contact with the natural "reality" of the park. Few would disagree, given assurances that this would not lead to overuse or degradation of the park environment. Nonetheless, we have a long tradition of vicarious interpretation and information on wildlife that is useful to the visitor and affects his thinking about the natural world.

Slide programs, films, TV, and written material can treat wildlife in a great variety of ways. They can inform the visitor of the kinds of wildlife in the park, where wildlife may be seen,

or why certain kinds should not be disturbed. They can treat the life history of a species or its ecological relationship with its environment. These methods may be used to tell the story of environmental jeopardy that affects man and wildlife alike. They can introduce one to wildlife or enlarge upon one's understanding of it after an initial acquaintance. These are versatile media, and we should not become too restricted in our views of their usefulness or the variety of techniques applicable to them.

Other Assorted Techniques

Museums. The great natural history museums do much to help humankind to understand the world through reference to artifacts, restorations, and depictions of natural realities. We do much the same in our park museums, admittedly with a narrower focus, but hopefully with as much penetration. But, of course, the park itself is the truly superlative museum.

Thus, we must always ask ourselves why we need the smaller museum building at all. If we ask this question honestly, we will receive some valid answers--answers which should vary somewhat from park to park. One thinks of Louis Shellbach's old museum at Grand Canyon, which had little appeal for the general visitor but was the research center for the park--a great place for the interpreter

to prepare a talk or evening program. And the exhibit at Yavapai Point was Grand Canyon.

Museums and visitor centers have real limitations. They are generally expensive; and exhibits, once in, are seldom changed, so that the museum's vintage is sometimes showing. This applies not only to the age of the exhibits and the techniques, but also to the attitude of mind that created them.

The Oral Tradition. The NPS, through its campfire programs and guided walks, has a tradition of personal communication between the park employee and the visitor. The quality of these contacts is usually as good as the knowledge and skill of the park person and the curiosity of the visitor.

I do not believe there is much to be gained in discussing the relative virtues of the spoken, as opposed to the written, word. Each has its uses and limitations. Nonetheless, the opportunity for people to discuss wildlife or nature with an expert on the scene is very valuable. Mind plays against mind; ideas grow; divergent channels of thought can be explored; and the unstructured nature of such encounters can be quite satisfying.

Parks near centers of population, where people with specialized wildlife interests may be found in reasonable numbers, might

feasibly start a lecture series on wildlife, utilizing park employees and outside experts as well. Cape Cod National Seashore has already done this. Others could. Such programs can utilize slides, films, artifacts, prepared lectures, question-and-answer periods, informal discussions, and field trips.

Among young adults today, discussion groups, or "rap sessions," are popular and might conceivably be utilized in park programs where the visitor makeup permits it.

Art. Man's earliest art centered around animals. It was an expression of his hunter origins but has persisted beyond that time to the present day. Native arts, Eskimo and Indian, feature wildlife prominently, and such art--and the incentive to create it--could be worked into wildlife interpretation in an effective manner. The reliance of the hunter upon the hunted, and the tendency to worship or revere animals are two examples.

The depiction of wildlife in art by modern artists could also effectively be used to show the constricting world of wildlife, the beauty and harmony of life, and various other themes. Art contests, exhibits, art centers, or "artists in the park" are ways in which art and wildlife could be constructively merged.

Photographic exhibits of wildlife could also be used. Why not a "photographer in the park"?

Several other methods for viewing or interpreting wildlife are available but are of limited applicability because of legislative and policy directives for areas of the National Park System.

Zoos? Parks are not zoos, and, consequently, we have been very reluctant to enclose wildlife within walls or fences, though in some areas (Wind Cave NP) we have fenced the entire park area to keep buffalo in and livestock out. Nonetheless, we might ask ourselves where judicious enclosures for various forms of wildlife--from invertebrates to large mammals--could be used effectively without placing the animals in too unnatural an environment. Space required for some animals might not be great; and, with some modest environmental enhancement, it might be possible to provide valuable viewing and interpretive opportunities not otherwise available. How about an insect zoo?

Night Lighting. One night in January of 1959, my wife and I parked our car on the shoulder of the park road near the service station at Flamingo in Everglades National Park. The lights shone out across a marshy area of several acres in size. In the headlights beam, we watched, fascinated, while two barn

owls and a yellow-crowned night heron searched for food. It was our first and last sighting of either bird in many years of bird watching. It reminds us that nocturnal animals are with us all the time but are seldom seen. Numerous writers have noted that lights do not noticeably affect nocturnal wildlife. They adjust to them quickly and go about their business. Is the idea of night lighting applicable in a park? Can we interpret insects at a lighted insect trap, where they may be captured, displayed and released? Can fish be displayed to good advantage? There are questions about night lighting that we should ask, and probably a variety of answers.

CONSIDERATIONS REGARDING WILDLIFE VIEWING AND INTERPRETATION

In the preceding section, we have talked about some of the means of viewing and interpreting wildlife. We understand that, since such interpretation is in the context of the total park environment, there are special considerations of what we should and should not do; and that, furthermore, legislation and policy affect our activities and decisions.

There are other considerations, however, that relate to the nature of the park, its location, its visitor-use period, and

the makeup of visitation. These considerations are unique to each park, but certain groups of parks display certain similarities.

Remote Parks

Some remote parks have superb wildlife resources but few visitors to appreciate them. It may, in fact, be desirable, from the standpoint of the wildlife, that visitation remain small. Nonetheless, there is the question of how this fine resource can be put to work to benefit man and nature.

One thing we might consider is inviting scientists concerned with wildlife behavior into the parks to study the wildlife and to film their studies for distribution, through movies and TV, to the general public, to special audiences, and to the educational sector. Concern for rare species such as the manatee could be promoted, the story of whales could be told, and the sea otter could be introduced. The list is long, the opportunities significant. Grants from private funds or foundations could help finance this work.

The possibilities are not restricted to remote parks, of course. Remote sections within an otherwise heavily used park, or wildlife at a season of light visitor use, or any wildlife resource, in fact, could be treated this way. Nonetheless, one thinks of parks

like Mt. McKinley, Channel Islands, Buck Island Reef, and Fort Jefferson as naturals for such treatment.

The Visitor's Time Budget

All park visitors are transients; some spend only a few minutes in a park. Their time budget is a factor in effective wildlife viewing and interpretation.

If we provide a day-long wildlife trek, and our visitors are short-term and car-bound, the service will be unused. Faced with this, we can encourage the visitor to stay longer, cancel the service, try to adjust it to the visitor's time schedule, or provide a new service, i.e., a hand-out on wildlife, a book on park wildlife, a film at the visitor center, ad infinitum. We do, however, need to consider the visitor's alloted time for the visit, regardless of what we do.

Our Various Audiences

Not all visitors have the same objectives in visiting a park. Different audiences exist and can be expected to increase in number. A perfectly valid reason to visit Mt. Rainier may be to view the alpine flora in July. Another group may view waterfowl at Assateague in December. A group of school children may wade Biscayne Bay on an ecology trip. Different times of year--

different audiences. Different interests--different audiences. We are geared mainly to serve casual sightseers because they predominate at present. Special audiences, real and potential, are increasing; and it behooves us to think about who they are and how we can serve them. We should remember that special audiences can be created by creating new opportunities.

Critical Factors

Each area has its own visitor pattern, which is a result of identifiable factors relating to location of park, relation to population centers, region of the country, type of facilities provided, terrain and climate, nature of resources, park purpose, etc. These factors tend to affect such things as types of users, length of stay, mode of use and locomotion, length of season, and primary and secondary attractions. These are traditional tools of the planner and should be used in determining what kinds of viewing opportunities and interpretation to employ.

This doesn't keep us, however, from imagining how we would change things if new factors entered into the equation. A prosaic example, already noted in this paper, would be to substitute vicarious viewing for first-hand observation in certain remote parks. Or, the idea of a distinguished visiting naturalist in

the park to write about the wildlife for the non-visitor. Or going out and soliciting a certain type of user, i.e., environmental education. You can think of other, better examples.

Wildlife has its own ways, too, and these must be taken into account. The bat flight of Carlsbad Caverns is a predictable phenomenon, and so we may plan for its interpretation and viewing. Most animals follow highly predictable patterns, though in some species this pattern may be diffused over a large range and, thus, cannot be pinpointed like the bat flights.

Some animals are nocturnal, some vespertine (evenings and mornings), and others diurnal. The height of people's activities in the parks is between the hours of 9:00 a.m. and 5:00 p.m. This limits their opportunities for wildlife viewing. However, if the visitors knew this, and, further, if they knew of opportunities for viewing wildlife, we might expect a portion of them to change their habits to adjust to those of wildlife. But it is up to us to know the habits of the park wildlife and to inform the visitor of viewing opportunities.

Some Necessary Adjustments

We have already discussed possible structures and resource manipulation as they relate to enhancing opportunities to view wildlife.

In such matters, it is desirable to have the advice and direction of a good naturalist or biologist, so that the impacts and second-order consequences of our actions can be anticipated.

If we begin manipulating the environment for habitat enhancement and bring people into the scene as spectators, we need to predict the ensuing chemistry. As a general rule, one can say that many forms of wildlife can adjust to the presence of humans, and humans may be taught to condition their actions to suit wildlife. But having said this, we are still left to ponder the exact conditions under which it may take place.

How many people may enter an environment without unfavorably altering species composition? When do numbers of people, and the noise they bring, begin to drive the wildlife out? I remember seeing that rarest of herons, the great white, casually feeding on the grassed area around the parking lot at Flamingo in Everglades National Park. This is the busiest place in the park. Cattle egrets were eating grasshoppers stirred up by the movement of cars on the entry road. Bird life in general was abundant around the disturbed and altered environment created by man. But what species were absent because of the concentration of people?

It is conceivable that the general public might need to be excluded from the habitat of certain species if they are to breed and

survive and continue their normal behavior patterns in the parks. Again, knowledge is our key. Since animals are reasonably predictable in their general behavior, we may also assume that they can adjust rather well to humans, so long as their activities are predictable and do not unduly influence breeding, rearing, feeding, and resting activities of wildlife.

We need to consider also whether or not it is desirable to restrict the activities of one class of park user in order to enhance the enjoyment of another class. General and indiscriminate fishing in the parks by 5 or 10% of our users may make it nearly impossible to adequately exhibit aquatic life for what might amount to 20 or 30% of the visitors. This does not mean that fishing would need to be banned in all park waters; rather, that certain areas should be closed to fishing as having higher value for wildlife viewing and interpretation. In the same way, we might need to restrict visitors to the periphery of certain wildlife habitats, rather than let them wander into it at will. Conformance with such restrictions is usually very good if the visitor understands the rationale behind it and if he himself benefits from it.

INTERPRETING WILDLIFE MANAGEMENT

National Park Service biologists, rangers, and collaborators carry out important wildlife management programs in a number of parks.

Most of this work goes on unknown to the park visitor, and perhaps there may be public-relations reasons why certain aspects of these programs should be carried out quietly. Mostly, however, these programs are interesting and tell a vital story of the necessity of maintaining a balance between living organisms and their environment. The principles applicable to maintaining wildlife habitat and optimum carrying capacity are applicable to humankind and, thus, may have great interpretive potential.

Managing ungulates that range in and out of park boundaries is an interesting subject that, properly told, would shed light on the plight of wildlife. Associated with this are related subjects of population control, predator-prey relationships, and why hunting is not desirable in the parks.

Wildlife is frequently seen in only one aspect of its behavior: feeding, resting, raising young, migrating, etc. Knowledge of requirements for the entire life cycle of any species is helpful in informing the public of total environmental needs and in gaining support for enlightened management techniques. People must also come to realize that the fate of most species of wildlife is in their hands, through the management of the environment, attitudes toward wildlife, economic and population growth, pollution, etc.

LAW AND POLICY REGARDING WILDLIFE

The Act of March 1, 1872, creating Yellowstone National Park, instructed the Secretary of the Interior to:

> . . . provide against the wanton destruction of fish and game found within said park, and against their capture or destruction for the purposes of merchandise or profit.

Wildlife was still considered game and apparently could be taken for purposes other than merchandise or profit. This was inadequate protection, and 22 years later the Act of May 7, 1894, provided that:

> . . . all hunting, or the killing, wounding, or capturing at any time of any bird or wild animal, except dangerous animals when it is necessary to prevent them from destroying human life or inflicting an injury, is prohibited . . .

The Act further stipulated that fish could be taken only

> . . . by hook and line, and then only at such seasons and in such manner as may be directed by the Secretary of the Interior.

The Act of August 25, 1916, creating the National Park Service, specified the purpose of the parks for, among other things, "the conservation of wildlife and provision for its enjoyment in such a way as to leave it unimpaired for the enjoyment of future generations."

Protection was not enough, however, and in the Appropriations Act for FY 1924, the Secretary of the Interior was authorized to give surplus Yellowstone elk, buffalo, bear, beaver, and predatory animals to governmental bodies for zoos, preserves, etc., and to sell or otherwise dispose of surplus buffalo.

National Park Service administrative policies reflect the present stance regarding wildlife, including the report of the Advisory Board on Wildlife Management dated March 4, 1963, commonly known as the Leopold Report after Dr. A. Starker Leopold, Chairman of the Board.

Two aspects of this commendable report would seem to bear scrutiny as the result of passing years and the changes that have ensued. The first relates to natural science research conducted by the National Park Service. This report states, under "Policies of Park Management":

> Most of the research now conducted by the National Park Service is oriented largely to interpretive functions rather than management.

Obviously, this is no longer true, and, with the broadened concept of interpretation that has grown out of a heightened awareness of the seriousness and interrelatedness of environmental, social, and economic conditions, we may at least ask ourselves if research

for interpretation is being adequately performed--or, to put it another way, is adequate use being made of present research findings to insure more effective wildlife viewing and interpretation.

The second statement which merits thought and discussion relates to hunting in areas in the recreation category:

> National recreation areas are . . . multiple use in character . . . Wildlife management can /incorporate/ . . . public hunting as one objective. Obviously, hunting must be regulated in time and place to minimize conflicts with other uses, but it would be a mistake for the National Park Service to be unduly restrictive of legitimate hunting in these areas.

One need not quarrel with the statement per se; it is essentially innocuous. However, this report was prepared prior to Secretary Udall's memorandum of July 10, 1964, to the Director of the National Park Service, setting up the management categories (natural, historic, and recreational). Also, it came at a time when recreation areas were mainly reservoir areas and a few relatively remote National Seashores. The decision to allow hunting was largely a response to past and present pressures of State game departments and hunters' groups to avoid reduction of area available for public hunting--or to increase the area, as could be the case where land passed from private to public ownership. Thus, we understand it as a policy that recognizes

the presence of a political force. It did not anticipate conditions that would occur in the future, other than to assume that hunting would continue to be a valid use of these recreation areas.

For certain areas, hunting as a compatible use may well continue for an indefinite time. There will be areas where acreage is large and visitation per acre is relatively small, and where most other uses occur at times other than the hunting season.

In recent years, however, the National Park Service has slanted its recreation programs more toward the urban scene, where acreages are small and where visitation per acre is large and essentially year-round. Apart from the safety factor, there is the prospect for very real conflict between hunters and other users. Hunting is a consumptive use, removing or dispersing wildlife so that others may not enjoy it, and laying total claim to the area in which it occurs.

No specific provision is made for hunting at Indiana Dunes National Seashore. The few deer, squirrels, crows, ducks, and other legally huntable wildlife have far greater value to far greater numbers than they do to a handful of hunters. Also, in an age when wildlife is becoming scarcer and, hence, more precious to greater numbers of urban people, we would do well to analyze the political

implications of hunting in certain recreation areas. There is little doubt that a large share of today's young people view hunting as an atavistic tendency, a habit that has outlived its usefulness.

We need also to make a careful appraisal of the effects of hunting in NPS areas. How many people indulge in it? What percentage of total visitation do they represent? What area of the park is open to them? What harm, if any, do they do to the environment? What opportunities for wildlife viewing do they destroy through killing wildlife? Through closing off areas to other uses? Through making wildlife shy and secretive and thus making it generally inaccessible to other users?

Inventories of wildlife in recreation areas and knowledge of their ranges, habitat requirements, and relationship to prospective wildlife viewers might suggest that certain areas should be closed to hunting (and fishing) for reasons of ". . . public use and enjoyment of the area," as provided for in the Service's administrative policies for national recreation areas. How closely have we viewed this policy in the light of expanded opportunities for wildlife viewing and interpretation? Is it time to take a new look at our recreation areas? Where might fishing be prohibited in any NPS area in the interest of greater good to a greater number for wildlife viewing and interpretation?

SOME PROPOSALS FOR CONSIDERATION

Inventory

Do you have an inventory of wildlife in your park? Have you mapped nesting sites of colony-nesting birds, or ranges of ungulates, or other aspects of wildlife behavior that can be graphically portrayed? Do you have good counts of wildlife, including ratios of young to adults, and between the sexes? Are there progressive ecological changes that are affecting numbers and species composition of wildlife? What seasonal changes take place in wildlife populations because of migration, etc.? What rare or endangered species occur in the park? In other words, how much do you know about wildlife in your park that would be helpful in management and interpretation?

Analysis of Present Wildlife Viewing Opportunities and Interpretation

What present opportunities exist for viewing wildlife? In terms of vertebrate species in the park, how many of them may presently be viewed by the visitor, and how many might be viewed if changes were instigated in information services, access, facilities, guided tours, use pattern (i.e., early morning use), etc.?

Wildlife Specialists

Do you have access to a Service wildlife biologist to help with wildlife management and viewing? Have you availed yourself of this service?

Visiting Naturalist Program

How about inviting a well-known naturalist to spend time in the park for the purpose of writing about or photographing park wildlife for interpretive purposes?

Wildlife Research

Have you considered working through the Chief Scientist to develop a varied program of wildlife research with educational institutions for your park? Such a program could be aimed at expanding knowledge for both wildlife management and interpretation.

Environmental Interpretation

Assuming that wildlife has as great a stake in environment as man, are there indicator species in your park that can be used as measures of environmental quality? Are there other ways in which wildlife can be worked meaningfully into environmental education programs in your park?

A TV Wildlife Series

What are the possibilities of finding sponsors for a single program or a series of wildlife programs filmed in National Park System areas--a program with content, theme and message on the plight of all wildlife, their place in the parks, their value to man, etc.?

New Parks and Wildlife

Wildlife is recognized by law as a principal feature to be conserved in the parks. Several parks--e.g., Buck Island Reef, Everglades, Channel Islands, Theodore Roosevelt National Memorial Park, and Yellowstone--have outstanding wildlife resources. Are there still areas in the United States that should be preserved to protect their valuable and threatened wildlife resources? Are there extensions to boundaries of existing parks that should be made to protect wildlife?