

VOLUME 2 NUMBER 1 APRIL, MAY, JUNE 1977

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# PARKS

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AN INTERNATIONAL JOURNAL FOR MANAGERS OF NATIONAL PARKS, HISTORIC SITES, AND OTHER PROTECTED AREAS



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Cover: A tiger rests in a pool in Kanha National Park, India. Photo ©World Wildlife Fund, 1110 Morges, Switzerland/Willi Dolder.

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David J. Parsons

# The Role of Fire in Park Management

Fire has played an important role in the evolution of much of the world's natural landscape. Whether through natural ignition or cultural burning, fire has periodically burned the world's forests, brushlands, and grasslands for millions of years. Many plants have developed specialized adaptations to survive fire, and some species and even entire plant communities depend on periodic burning for their survival.

As a consequence of an ever-growing world population, the development of rural areas, and a desire to "protect" natural resources, there has been an increasing emphasis in recent years on the elimination of fire from much of the Earth's surface. Furthermore, when fire is used as a management tool it is too often done with the purpose of deliberately changing the existing vegetation type. Such practices can pose serious threats to many of our most interesting natural communities.

Managers of national parks and other protected areas must recognize that fire plays an essential role in *maintaining* many plant communities. If we are to preserve examples of naturally functioning ecosystems it will be necessary to allow fire to play as natural a role as possible. The growing body of international literature on fire ecology and management (Kayll, 1974) together with the success of active fire management programs in several national parks (Kilgore, 1975) reflects an increasing attention to this problem.

## Fire Management Alternatives

It is important that fire management decisions in a national park setting be based on a firm understanding of the natural role of fire in the area. Basic information on the frequency, size and intensity of natural fires, the type and amount of fuels, vegetation and successional patterns, microclimate and fire behavior must form the foundation for any successful fire management program (Kessel, 1976). Research designed to obtain such information



Open forest following a natural fire in Sequoia National Park. NPS photo: W. Jones

should be a top priority with land managers interested in using fire as a management tool.

Once it is determined that fire is necessary to maintain or reestablish the natural ecosystems of an area, one must decide what type of management program to use. Fire management may include the use of fire under carefully controlled conditions, called prescription burning, as well as in its free-burning natural state. In either case an active fire suppression program, either at certain times of the year or under certain climatic conditions, also is necessary.

## Natural Fire

Theoretically, the ideal way to allow fire to play its natural role would be to permit all naturally occurring fires to run their course. However, due to heavy fuel accumulations, threats to visitors or surrounding developments, and fear of possible escape, natural fires often cannot be allowed to burn.

Increasingly effective fire control techniques have facilitated the suppression of potential wildfires in many wilderness areas. But where suppression techniques are not so effective, such as in the more isolated parts of Canada, Alaska and Australia, wildfires continue to burn uncontrolled. Yet such fires have always been a part of these ecosystems. As long as personal property, lives and valuable cultural and historical resources are not destroyed there may be little reason to suppress them. This philosophy has recently been extended to a number of national parks and national forests in the United States where in certain designated zones natural fires are now allowed to burn (Kilgore, 1975). Each fire is continually monitored and evaluated. Suppression activities are taken only if the fire threatens public safety or is not achieving objectives desired for the benefit of vegetation or wildlife.

## Prescribed Fire

For thousands of years, fire has been intentionally used by man to clear land or improve forage. In most cases, in those early years little attention was paid to the long range impacts of uncontrolled burning (Kayll, 1974). More recently prescription burning techniques have been used to attain the beneficial effects of fire while avoiding the damage of uncontrolled wildfire. In all such burning it is important to carefully identify the management objectives. Attention must be given to such factors as weather (temperature, relative humidity and wind), fuel properties (quantity and moisture content) and direction of burning (head or back fire) since they will determine the ultimate success of the fire. For such a program to succeed it is essential that carefully defined and controllable limits for each of these factors (a prescription) be developed. Only then will accurate predictions of the effects of any given fire be possible.

One of the first large scale control burning programs in a forest



An example of fire scars used to date the frequency of past fires. NPS photo.

type was in the highly flammable eucalypt forests of Australia (Hodgson, 1967). While the primary objective was to reduce fuel hazards to the point where wildfires could be controlled, it was suspected that a burning cycle of every 4 or 5 years would closely simulate natural ecological conditions. In 1958 prescribed burning in the U.S. National Park System was initiated on an experimental basis in Everglades National Park, Florida (Kilgore, 1976). Its initial purpose was to control tropical hardwood invasion of subclimax pine forests which fire suppression had encouraged. From 1958 to 1971, some 102 prescribed burns covered 11,331 ha. From 1972 to 1974 there were 124 prescribed burns covering 10,927 ha, ranging from saw grass glades to pine forest. During the next 3 years at Everglades, 57 lightning fires and 14 man-caused fires were allowed to burn, covering a total of 3440 ha.

Abundant evidence is available on the effects of fire, both natural and man caused, on the vegetation of Africa (Phillips, 1974). Much of the recent burning has been done with the purpose of improving conditions for wildlife, but the importance of fire in perpetuating native ecosystems has long been recognized, and progressive fire management policies are in effect in a number of African parks (van Wyk, 1972; Owen, 1972). While fire is known to be important in many areas of tropical America (Budowski, 1966), most burning activities there have been for the purpose of pasture renewal or the clearing of land for agriculture.

In the Mediterranean region, fire has long been regarded as a destructive force to be avoided at all cost (Naveh, 1974). However, recent studies in the coniferous forests and maqui of Greece (Liacos, 1974) and the garrigue of France (Trabaud, 1974) have shown fire to be a necessary and viable management tool for the perpetuation of these community types. In northern Europe, Viro (1974) recognized fire as vital to the virgin forests of Scandinavia but also stated that prescribed burning is mainly used to develop more productive forests.

Significant advances in the use of prescribed burning to perpetuate natural ecosystems have been made in North America. Most of the forests of this area evolved with periodic fire. Tree ring and fire scar studies in the mixed-conifer forests of the Sierra Nevada in California show a minimum fire frequency before the arrival of European settlers of from 7 to 9 years (Kilgore, 1973). These were generally low intensity ground fires because they occurred frequently enough so that hazardous fuel buildups were seldom attained. During the 20th Century efforts to "protect" these areas were aimed at the suppression or elimination of all fires. The result has been an increase in fuel accumulation which threatens to

produce destructive crown fires. Recently, prescribed burning programs have been instituted in Yosemite, Sequoia and Kings Canyon National Parks as a means of reversing this trend.

Extensive prescribed burning programs have been underway in the southeastern United States for several decades (Komarek, 1974). These programs are considered essential to the perpetuation of the endemic flora and fauna found there (Robertson, 1962); and indeed it is essential to the maintenance of commercially valuable pine forests that would be succeeded by less valuable hardwood stands in the absence of fire (Garren, 1943). Burning also has been carried out in the forested regions of Alaska, Canada and northwestern United States, but here it has been used mainly to clear logging debris.

Whenever fire is to be used as a management tool for simulating natural processes it is essential that there is a thorough understanding of the vegetation, weather conditions and fire behavior. Intensive monitoring studies should be carried out in conjunction with all fire management programs because even though certain basic principles and practices developed for one area may apply to another, the specifics may differ considerably.

### Potential Conflicts

As in any natural resources management program, park managers must be aware of potential conflicts between fire and other park interests. Before a burning plan is approved care should be taken that no important archeologic or historic resources will be damaged. In many management programs insufficient attention has been placed by both archeologists and fire managers on evaluating the potential effects of the fire on cultural materials on or under the surface.

Parks exist in a large part for the enjoyment and use of the visitor. Thus any burning activity which might infringe on visitor use patterns must be carefully evaluated. It should, however, be remembered in making such a decision that one purpose of national parks is to allow people to experience a natural environment—an environment which in many cases includes the effects of fire. What may be needed in many areas is an increased educational effort directed toward building an understanding of the natural role of fire.

Atmospheric pollution by smoke must be carefully considered in fire management programs. Although wood smoke does not contain significant levels of environmentally dangerous pollutants,



Above left, this 1890 picture shows the open nature of the Mariposa grove of giant sequoias in Yosemite National Park. Photo: George Reichel (courtesy of Mary and Bill Hood). Left, this 1970 photo of the Mariposa grove, taken from approximately the same position as the 1890 view, shows the dense understory which has come in following fire suppression. NPS photo: Dan Taylor. Above, two members of a Park Service team monitor a high-elevation natural fire in Kings Canyon National Park. NPS photo: W. Jones

it can be a dangerous visual obstruction. Burning should be carried out during periods when smoke will be carried by air currents away from populated areas to places where it will be gradually dissipated. It should, of course, also be realized that the smoke produced by controlled burns may be slight compared to that which would result from an uncontrolled wildfire.

natural fires have burned a total of 3,654 ha (Table 1). Typical fires have been slow burning, low intensity ground fires, often burning for periods of several months. Fires have ranged from less than 0.1 ha to over 1,200 ha in size.

In the middle elevation mixed-conifer forest zone which in-

### Example of an Integrated Fire Management Program

Sequoia and Kings Canyon National Parks, located adjacent to each other in the southern Sierra Nevada of California, have had an integrated fire management program since 1968. This program uses a combination of fire suppression and prescribed burning in the low and middle elevations and natural fire in the higher elevations. The ultimate objective is to restore fire to its natural role in all park ecosystems.

The Natural Fire Management Zone, which includes about 71 percent of the Parks' 342,898 hectares, is located in the higher elevations (generally above about 2600 m) where temperatures remain low, the growing season is short and many years of fire suppression have not yet resulted in excessive fuel accumulations. All naturally ignited fires are allowed to burn in this Zone (Kilgore & Briggs, 1972). They are continually monitored by aerial reconnaissance, and suppression actions are taken only if the fire threatens to escape Zone boundaries. News releases, signs and other forms of public education are used. Through 1975, 120

**Table 1. Lightning fires in high elevation Natural Fire Management Zone, Sequoia and Kings Canyon National Parks**

	Size Class (ha)					Total Fires	Total ha
	0-0.10	0.11-3.9	4-39	40-120	121+		
1968	1	1	0	0	0	2	3.2
1969	2	0	0	0	0	2	0.1
1970	20	1	2	0	1	24	200.0
1971	18	0	0	1	0	19	57.3
1972	11	2	2	1	0	16	65.5
1973	7	1	0	0	3	11	1,932.2
1974	15	0	2	1	1	19	1,340.8
1975	4	1	2	0	0	7	23.6
1976	14	5	1	0	0	20	31.3
<b>Total</b>	<b>92</b>	<b>11</b>	<b>9</b>	<b>3</b>	<b>5</b>	<b>120</b>	<b>3,654.1</b>

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cludes the groves of giant sequoia (*Sequoiadendron giganteum*) fuels have accumulated to unnaturally high levels during the last 50 to 75 years of fire protection. Whereas once frequent ground fires burned the area, it is feared that a hot summer fire would now get quickly out of control, killing the overstory. In these areas it is thus necessary to set fires in well defined plots under carefully chosen weather conditions. It is anticipated that once the heavy fuel accumulations now present have been reduced, naturally occurring fires will once again be allowed to determine the vegetational mosaic of the area (Kilgore, 1973). Fires which start under dry summer conditions are still suppressed in this zone.

Fire suppression is also practiced in these parks around developed areas and in some of the low elevation brushlands where fire hazards are high and effective prescriptions have not yet been worked out (Parsons, 1976). Ongoing management oriented research is attempting to find acceptable ways to reduce these unnatural fuel accumulations and to re-establish fire in its natural role in these areas as well.

The program at Sequoia and Kings Canyon National Parks has combined research efforts with management action to develop an effective plan for allowing fire to be re-established as a natural process. It provides a valuable model of a fire management program which integrates the use of natural and prescribed fire with fire suppression.

Most natural area parks of the world are managed with the objective of maintaining natural ecological conditions. To do this effectively, many areas (but not all) should incorporate the use of either naturally occurring fires or prescribed fires that simulate naturally occurring ones. A careful and thorough integration of research, planning, interpretation, and management is needed for all such fire programs.

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Ulrich Wotschikowsky

# Management of Red Deer in the Bayerischer Wald National Park

The management of large herbivores is a severe problem in many national parks. Parks frequently offer suitable habitat only during a part of the year, while the areas outside of the parks needed by the animals often have been utilized so as to destroy their value as wildlife habitat, or they are prevented from using their migration routes. Large predators have often been exterminated, and with them a very important natural mechanism of population regulation. Finally, the demarcation of national parks is seldom made according to ecological considerations. Serious damage of the ecosystem is thus not uncommon, and consequently, impassioned discussions concerning the national park idea arise.

In Central Europe the red deer (*Cervus elaphus L.*) is foremost in such discussions. In the Swiss National Park, this species causes considerable damage by browsing during summer, causing people again and again to call for reinstating hunting in this strongly protected area. When the Bayerischer Wald National Park was declared in 1970, a real red deer controversy broke out between hunters and nature conservationists. Also in the Berchtesgaden National Park, West Germany's second preserved area of this type, the red deer and the conflict between protection and hunting has dominated the scene.

Hunters like to point to the risks which increasing deer populations can create if hunting is excluded, as is usual in national parks. They ignore, however, the fact that this very hunting-oriented game management has itself created great problems, especially for forestry. In Europe, these problems are not limited to the few national parks. This is illustrated by the severe damage caused by browsing and debarking which occurred in the two Bavarian

national parks, Bayerischer Wald and Berchtesgaden, *before* they were established as such. Similarly, the deer problem in the Swiss National Park is not only one of the Park, but of the whole Canton, where a reasonable adjustment of the hunting season to the situation has not been made even today because traditional hunting patterns have not been adjusted to modern conditions.

## The concept of nature conservation in national parks

National parks are sometimes praised as being "the crown of nature conservation". Many of them, however, are exposed to mass tourism, and the land continues to be utilized as usual although this is not permissible according to international standards. This means that even national parks quite often are not strictly preserved. At least in Europe, hunting, agriculture, and forestry, as major forms of land utilization, are quite commonly practiced in national parks.

In spite of the fact that national parks have to be "opened" for man's recreation to an appropriate extent, the *national park idea* provides for universal, indeed for "total", nature conservation. The aim is the free development of all forces of nature without modification by man. There is no valuation of natural phenomena in human terms (for example: "harmful" or "useful" species, "calamities", or "natural catastrophies") and, therefore, there cannot be any preference of single species by active management, e.g., feeding, habitat improvement, or reduction of predators or competition. The national park idea appears to be the antithesis of normal land utilization.

*The Bayerischer Wald National Park is almost completely forested. It provides only a summer habitat for red deer as winter weather conditions are too severe. Photo: Dr. Hans Bibelriether*





*Left, a large red deer stag in the highlands of the park during the rut in early October. Above, a young red deer stag leaving a trap after having been eartagged. Photo: U. Wotschikowsky*

### **The contradiction between hunting and nature conservation**

In Germany, a special kind of wildlife management has been developed within the past decades. Called "Hege", it appears as a form of normal land utilization, a permanent human manipulation of the natural struggle by wild animals for existence, with the major aim to enable greater hunting harvests in the form of trophies, venison, or recreation. The large predators have been extinct for a long time. Winter's nutritional bottleneck has been offset in part by artificial feeding, as has seasonal migration. Recently, efforts even have been made to reduce parasites by medication. The population structure has been altered by selective shooting of age- and sex-classes, and also the individuals have been selected according to human standards. Commonly, hunters consider this type of management to be necessary for the conservation of wildlife.

They consider hunting to be an essential part of nature conservation. Classical German wildlife management embodies the consequent elimination of all natural factors which could diminish the desired harvest. This means intensive manipulation of both natural environmental systems and wildlife species. It endangers the character of native wildlife, which is exclusively a result of natural influences and factors, and it dissolves, inevitably, the natural relationship between wildlife populations and the ecosystem. Today's "Hege", therefore, is the opposite of nature conservation and can not possibly be integrated into the national park concept.

But red deer don't pay attention to these controversies over philosophies of management; like the elk (wapiti) in Yellowstone or elephants in African parks, they ignore the borders of national parks. Therefore, a management concept is required which can satisfy both the aims of the national park idea and the hunters'

interests. I believe it is possible to develop such a concept that is workable in most situations.

### **The Bayerischer Wald National Park as habitat for red deer**

Like most red deer areas in Germany, the Bayerischer Wald is ecologically an incomplete habitat for deer. It is a 130 sq km section of mountainous area between Bavaria and Bohemia (CSSR), characterized by a rolling plateau, gently climbing toward the southwest, completely forested. On the German side of the border it falls quite abruptly from the highest peaks (1453 m) to valleys of about 700 m. The winter climate is severe; nutritional conditions, therefore, are poor, and to a great extent food for deer is limited to the forest canopies. Ungulates cannot survive in this area during winter; snow depth can reach up to 2 m and more, and snow covers the ground at least 4, sometimes 5 and even 6 months of the year. In former times, deer therefore migrated to the valleys south of the mountains, and crossed the border between state and privately owned hunting grounds. This situation is characteristic of red deer areas in Germany, both from the ecological and administrative points of view.

About 1950, the practice of artificial winter feeding in the inner Bayerischer Wald became established to prevent deer, particularly trophy stags, migrating to the hunting areas in the lower elevations. Deer remained inside the summer habitat the entire year. The population density in general was underestimated, and hunting quotas were set too low. Consequently, the deer population increased considerably. When the National Park was established in 1970, about 20 feeding places existed in the Park area, and more than 500 red deer were counted. Nearly 3,000 ha of forest were

severely damaged by debarking, and reforestation of mixed forests of the original type was impossible without fencing. There is no doubt that winter feeding was the main cause of this situation. On the other hand, the German hunting law actually requires winter feeding of game, and a special exception for the Park does not exist. Therefore, to protect the forest, the feeding methods had to be changed: instead of 20 open feeding places, 3 fenced areas (30–40 ha each) were established for that purpose. Red deer were fed exclusively in these enclosures from December until May, when grasses and herbs start growing. In addition, the density of deer was markedly reduced. Winter numbers are now about 120–150 deer, but a considerable number of deer move into the Park from outside during early summer.

It is obvious that these changes were highly advantageous for the vegetation. Young trees and bushes look much healthier now, and damage by debarking has almost completely ceased. However, the fencing of red deer for half of their life cannot be accepted as the ultimate answer. It is one more step, both drastic and expensive, towards domestication and away from wildness. In the long run, this concept cannot be reconciled with the national park idea.

### **A real National Park—to the benefit of wildlife, forest and hunters**

For most modern red deer management in Germany, winter feeding seems to be inevitable. Feeding is a tradition which goes back more than 100 years in the well-known deer hunting areas, but in the Bayerischer Wald it was begun as late as 1950.

Probably it was not based on ecological considerations. Natural winter feeding grounds still exist south of the National Park and, in my opinion, they could enable red deer to survive in sufficient numbers without intensive human help. Additionally, agriculture is retreating more and more from difficult locations, and habitat management could increase the carrying capacity of the wintering areas, which has diminished both in quality and quantity by civilization and corresponding human activities. Consequently, winter feeding in the inner Bayerischer Wald, with its low capacity for herbivores, could be avoided. Winter feeding must not, however, be initiated by private hunters in the valleys: the resulting concentration of large deer herds in the lower elevations would certainly create severe damage in the forests there. It is of utmost importance that the deer be distributed generally in the area, not concentrated by feeding. Seasonal migration appears to be an essential condition for a moderate utilization of the natural food supply.

Natural movements of deer from the summer range inside the Park to wintering areas outside would be the main prerequisite if

population control (hunting) inside the Park is to be avoided. Instead, private hunters outside the Park could assume this function, which would lead to a number of distinct advantages:

1) Hunting would cease in the National Park. The adaptation of deer to increasing tourist pressure would be facilitated. An important consistency with international considerations in national park philosophy would be achieved.

2) Population control would be achieved in the lower elevations and less densely forested areas, in which hunting is more effective. The hunting season could be reduced from the present 8 months to 2 or 3 months. The burden of successful regulation could be spread over a larger area with more hunters—there would be “more shoulders” to bear the responsibility.

3) Expenses for hunting, feeding, and fencing in the Park could be avoided (currently more than 100,000 DM per year).

4) The private hunters would get greater harvests from their hunting areas.

5) The sensitive vegetation in the National Park would be relatively free of browsing during the winter months, which is the most critical time of the year for deer. The expensive and ineffective fences to protect the young trees would not be needed in the Park, and consequently, fence-related accidents to wildlife (capercaillie, goshawk, deer) would cease.

6) The danger of short-term but damaging increases in deer populations would be avoided if feeding were stopped, because feeding is an artificial input of energy into the ecosystem which causes higher reproduction rates and interferes with normal migrations.

7) Although reproduction would decrease, production of venison would remain high, because the deer, especially young of the year, would be harvested at times when they are at their optimum weight.

This concept may appear quite simple but is, in my opinion, logical. It would be consistent with the ecological needs of the Bayerischer Wald. But, once more, I want to point out that current deer management in Germany is governed by tradition much more than by ecological considerations, and because today's hunting law prescribes winter feeding. In addition the hunting law still permits hunting in the National Park area.

Within the next few years, however, the hunting law of Bavaria will be revised, and a special decree for the Park probably will be enacted. This will provide an opportunity to establish—in terms of German hunting tradition—a new type of wildlife management that will benefit the hunter as well as the Park.

*Ulrich Wotschikowsky is Chief Forester and Adviser on Wildlife Management, Bayerischer Wald National Park.*

Robert Schloeth

## Traffic Control at the Swiss National Park

Many foreign visitors to our national park seem to be disappointed when they find out they cannot do their sightseeing by car. They have to walk.

Today there are thousands of similar parks and preserves all over the world, offering their natural beauty and riches to friends of the outdoors. It is understandable that modern transport techniques do not stop at the park boundaries. Aircraft, motor boats, sightseeing buses, snowmobiles, cable cars and electrobuses are often used as a means of transportation of the tourists seeking recreation in national parks. However, I am afraid that not only are these technical conveniences taken for granted, but they cause air and noise pollution of the natural environment—and this, of all places, in the areas we are trying to protect from damage and preserve for future generations.

The Swiss National Park is small and its numerous mountains form a natural protection against destruction. The insistence that all visitors must walk surprises some of today's visitors. After all, isn't Switzerland famous for its mountain trains and ski lifts? Why should this little piece of unspoiled nature be left alone—dreamy, quiet and untouched for years to come?

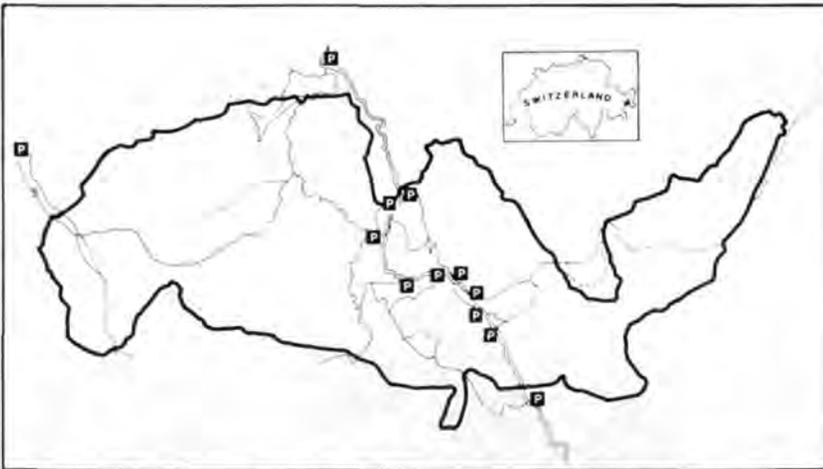
Actually, what started the establishment of our national park

was a plan to build a large mountain train to go to the top of Europe's most famous mountain, the "Matterhorn," at the beginning of this century. Even at that time, however, it was already clear that some of these areas had to be protected. And today? With all the progress in the development of transportation vehicles what would happen if all the demands for convenience, time saving and profit-making would be fulfilled—without listening to the voice of nature? Throughout the Alps irreparable damage has been caused by the construction of highways, mountain trains and ski slopes. Now that it is too late, everybody complains about it: not only the conservation agencies are up in arms and are warning



*Below, every parking area has a large information display. Maps, regulations, and other necessary information for visitors are provided in several languages. Photo: Dr. Robert Schloeth. Small photo: Dr. Fritz Vollmar. Right, park headquarters is located in this building on the outskirts of Zernez. It also contains a superb museum and interpretation center to explain the park's geology, history, and rich biological resources for visitors. Photo: Dr. Robert Schloeth.*





Above, principal access to the Swiss National Park is from the highway that crosses it from east to west. Parking is not permitted except at official parking areas, of which there are nine within the park boundary. Limited space for autos effectively controls the number of people who can use the extensive trail system. Right, foot trails form the only access within the Swiss National Park. Trails are carefully maintained. Excellent interpretive guidebooks are available. Photo: Dr. Fritz Vollmar



about upsetting the ecology by destroying the natural resources, but also the population generally is waking up, and the demand is increasing to set aside more natural areas where people can relax and recuperate from the stress of everyday life.

Rarely is it necessary to supply the park visitors with all kinds of transportation. If transportation has to be provided, it should be noiseless and emissionless and fit into the surroundings. The national parks should set an example in this respect.

The highway through the center of the Swiss National Park has existed for a long time. Being an international route between Italy and Switzerland, it is extremely busy. This road is also used by public postal buses because there is no other connection with nearby Münstertal. During the peak of the season (July/August) with favorable weather conditions, the average number of cars passing through the Park is 5,000 per day. In spite of numerous petitions by state and federal agencies, so far the speed limit within the park boundaries has not been lowered to 70 kilometers per hour. Consequently there are many accidents at deer crossings, day and night. And these are not the only problems we are faced with on this 12-km section of the road. Up to 1926 no cars were allowed on the roads in Graubünden, and since this park is located in a remote corner of the country, it used to have little traffic. This changed in the 1960's with ever increasing car traffic.

First of all, there was the need for parking places which had to be constructed with a minimum of financial means, which is nothing unusual in this country. We started out with nine parking lots, and after a short while had to enlarge three of them. Now, again, we either have to double the parking spaces available or turn people away during the peak season; these people will have to park their cars outside the park boundaries and walk in. However, we have decided against more parking areas for a number of reasons.

If we would keep enlarging the parking areas in keeping with the demand we would eventually wind up with one large unsightly parking place, which would destroy the charm of the landscape. It would also make it difficult to distribute the visitors evenly over the 80-km trail system, with the trails starting out at the various lots as they do now. Each parking lot is equipped with a large sign giving regulations for the use of the national park and showing the trail system. One of the regulations is that the visitors must stay on the trails provided. We want to be sure that each visitor reads this sign before starting to hike. If they were parked too far away, they would simply disappear into the woods without taking notice of the regulations.

The average visitation figure for the summer season is 250,000 to 300,000 for the Swiss National Park. The area along the road over the Ofenberg Pass is the most popular. The present parking facilities are in keeping with the carrying capacity of the trail system.

In order to avoid unauthorized "wild" parking along the road in between the different parking lots, we have had to block these spaces with hedges, tree stumps, ditches, rocks, and similar barriers. Light-weight objects would be removed or destroyed by reckless visitors. And experience has taught us that signs forbidding certain activities are simply resented by visitors and do little good in a national park.

We feel our efforts in regulating the traffic in our park during the last 5 years have proven successful. We realize that compared to national parks in other countries our visitation figures seem small and our problems minor, but we nevertheless hope that other countries can profit from our experiences.

*Dr. Robert F. Schloeth is Director of the Swiss National Park.*

Zafar Futehally

## Prospects for India's Wildlife

The status of a country's wildlife depends primarily on the government's national policy. Fortunately our government has decided that India will be much the poorer both spiritually and materially if its wildlife is allowed to collapse. So although there is no denying that there is conflict in several areas between the immediate interests of humanity and wild animals, the administration is trying its best to contain it, in the hope that in the long run this policy will be wholly beneficial for the people. The Indian Board for Wildlife, the National Committee on Environmental Planning and Coordination, and the Steering Committee on Project Tiger are all trying to ensure that the interests of wildlife are not disregarded in our development plans.

Let us see how this conflict arises. The larger animals of India, the elephant, the Indian bison, the sambar, and the tiger, to name a few, are essentially dwellers of forests. As a result of human pressure the plains' forests have almost disappeared from our country, and the 20 percent of the land surface which is now under forest cover is mainly in the mountains. In many cases the mountains have within them the catchment areas of rivers which form part of hydroelectric or irrigation projects. These mountains are also well wooded areas and with advance planning and imagination could be retained as wildlife sanctuaries and nature reserves. Because the catchments of these projects must remain well covered with vegetation to prevent soil erosion and siltation of dams lower down, such projects are excellent testing grounds for the principle that conservation and development can proceed hand-in-hand. The areas actually coming under development are not very large in most cases, but the problem has been that once a pristine forest is made accessible by roads and the project staff and laborers are settled in the locality, the fate of animals is sealed unless vigorous protection measures are enforced.

Hydroelectric projects are by their nature sited in forested areas in mountains, and new giant projects are on the anvil. The Kudremukh Iron Ore Company, Limited, financed by Iran, will be the largest open cast mining company in Asia. It is sited in the Western Ghats, and the mining area is surrounded by evergreen forests rich in wildlife. The Western Ghats is a range of mountains extending a thousand miles north to south along the western coast of India. These mountains arrest the movement of rain-laden clouds which travel eastward over the Arabian Sea and are responsible for the country's principal rainfall. Because of the new awareness of the need to protect the environment, the project authorities have decided to take firm steps to ensure that the neighboring forests and their denizens are fully protected.

In the Idukki project in Kerala, an area of seventy square miles has been designated as a wildlife sanctuary and in course of time is likely to become a spectacular reserve. The reservoir created by inundation of the valleys is buttressed by lush evergreen forests, and during a recent visit we saw several herds of elephants grazing peacefully in this secure habitat. We also found cormorants and darters nesting in some of the islands within the magnificent waterspread which covers an area of twenty-three square miles;



*The Indian rhinoceros (Rhinoceros unicornus) appears to be doing well in the Kaziranga and Jaldapara sanctuaries. Poachers have been the greatest threat to this huge animal because of the allegedly aphrodisiac qualities of its horn. Photo: Dr. Lee Talbot.*

and if proper ecological steps are taken, this sanctuary can demonstrate that with imaginative planning wildlife can be encouraged to prosper even under somewhat artificial conditions.

Though many of the smaller mammals and almost all bird life exist outside our sanctuaries, the case of the larger herbivores and carnivores is quite different. They need protected localities and natural habitats if they are to survive. With the plains almost wholly under agriculture and human use and the mountains being increasingly opened up, wildlife will be secure only in sanctuaries. More than 150 sanctuaries exist today covering a modest 0.5 percent of the land area, and several more are being contemplated. Although essentially meant for wild animals, sanctuaries in India are continuing to be exploited for silvicultural purposes.

There has been considerable discussion about the effects of forestry operations in wildlife habitats. According to some, these operations are very deleterious, for disturbance by humans seriously affects the life cycle of wild animals. Others take the opposite view and point to the fact that in the tourism zone of some of our sanctuaries there is more wildlife to be seen than in the truly wilderness zones. Some naturalists feel that, provided there is adequate territory, nature can be left to find its own balance. Others are more in favor of managing the habitat, recognizing that the best policy is to have well-wooded regions interspersed with open meadows. The edges of such habitats seem to hold a great attraction for wild creatures, apart from the fact that open areas with more sunlight produce a lot more forage for herbivores than comparable areas under tree cover.

Of the 500 mammal species and 1,200 bird species of India, the most endangered ones are those whose habitat requirements are



Future of the Indian bison (*Bos gaurus*), one of India's most striking wild herbivores, is linked to preservation of its forest habitats. Unfortunately, the animal is also susceptible to rinderpest, which is communicated through domestic cattle which may use the same sanctuaries. Photo: © Zafar Futehally.

very special and whose demands for territory are rather large. The elephant, for example, requires almost 250 kilograms of browse and grass per day, so that extensive wild country is necessary to provide it with food and shelter. A recent survey carried out by a team of ecologists of the Indian Institute of Science, Bangalore, led by Professor M. D. Gadgil, estimates the total elephant population of south India (the best habitat in the country for this animal) at 4,000. They say that "more than direct poaching the most serious threat to this population of elephant is the alarmingly rapid and continuing fragmentation of its habitat due to a variety of reasons ranging from deforestation, extension of plantations, agriculture, dams, and other construction activities." The best hope for the elephant rests on the fact that the forests of the Western Ghats are intended to be preserved for their ecological functions; and with the saving of the habitat, this intelligent pachyderm, so closely associated with India's cultural history, is also likely to survive.

Like the elephant, the future of the Indian bison (*Bos gaurus*), in many ways one of the most striking of wild herbivores, is also connected with the preservation of its forest habitat. But these animals are unfortunately very susceptible to diseases, particularly rinderpest, communicated through domestic cattle; and in 1968 one of the finest herds in the sanctuaries of Bandipur and Mudumalai was almost wiped out. Since then domestic cattle passing through these sanctuaries are inoculated against this disease; and although the menace has been checked, recent deaths in the Periyar Sanctuary indicate that constant vigilance is necessary.

Of the other herbivores some like the Kashmir stag (*Cervus elaphus hanglu*) and the hardground barasingha (*Cervus duvauceli branderi*) are slowly building up their numbers under stringent protection and with the aid of management plans for their habitats. The Kashmir stag is a close relation of the European red deer, and because of its dwindling numbers the World Wildlife Fund in association with the State Government of Kashmir has formulated a project for saving this animal in the Dachigam Sanctuary near Srinagar. Although the population of this deer was estimated at around 550 in Dachigam in 1957-1958, it is feared today that the number is nearer 200. This decline has been largely due to poaching, which has now been arrested. Some, like the Manipur brow-

antlered deer (*Cervus eldi*) with only fourteen individuals left, seem almost beyond redemption. In this case protection has not been enough; it is the loss of the very specialized habitat which is the main factor in their decline. The Indian rhinoceros (*Rhinoceros unicornus*) appears to be doing well in the sanctuaries of Kaziranga (Assam) and Jaldapara (West Bengal). The World Wildlife Fund and other international bodies have played a sterling role in saving this animal by providing arms and walkie-talkies to the sanctuary staff to deal with poachers who were the biggest threat to this animal, because of the allegedly aphrodisiac qualities of its horn.

The carnivores, critically placed at the top of the food chain, suffer the most when wildlife populations decrease; so the tiger was seriously endangered until very recently. Being the magnificent animal that it is, its predicament caused worldwide concern, and it was clear that unless some extraordinary steps were taken the population of 2,000 as against the estimated 40,000 in the earlier years of the century would not be able to survive. The World Wildlife Fund and the International Union for Conservation of Nature and Natural Resources must take great credit for having stimulated the government of India to formulate Project Tiger, which got under way in April 1973, principally because of the interest of the Prime Minister, Mrs. Indira Gandhi. Nine tiger reserves comprising the best tiger habitats in the country have been established, and the annual reports of the project indicate that the population has increased. This project will cost approximately 6 million U.S. dollars during its five-year period, and it is rightly acclaimed as the largest conservation effort in the cause of any single species ever undertaken in any country. The added advantage is that large stretches of India's magnificent forests and several other species inhabiting these areas will also be rehabilitated in the course of this undertaking. Under the chairmanship of a cabinet minister, Dr. Karan Singh, the Directorate of Project Tiger has made commendable progress. Every attempt is also being made to involve international expertise in this enterprise. Recently Paul Leyhausen, Chairman of the Cat Group of the Survival Service Commission of the IUCN, was invited to visit the reserves and offer his comments. His report is now before the Steering Committee, and many of his suggestions are being implemented. A course in tranquilizing animals has also been given to selected forest officers and others, and the expertise acquired will be valuable in translocating animals from denuded areas to more promising habitats to ensure their survival. An international symposium on the tiger will be held in New Delhi in April 1977, and this will be a good opportunity for the pooling of all scientific knowledge available about this elusive creature characterized as the "phantom of the forests."

One of the problems of Indian wildlife is that well-trained ecologists are not available for manning the sanctuaries. To remedy this shortcoming it is proposed to introduce university courses in wildlife management at the Ph.D. level. After these students emerge as qualified wildlife ecologists, our sanctuaries will hopefully be managed not by foresters whose principal interests are connected with silviculture, but by people who understand the significance of maintaining wilderness for wild animals. Then will India's wildlife truly come into its own.

*Zafar Futehally is vice President of World Wildlife Fund—India, and a member of India's National Committee on Environmental Planning and Coordination. This article is reprinted with permission from National Parks and Conservation Magazine, March 1977. Copyright © 1977 by National Parks and Conservation Association.*

Francisco Ortuño Medina

# Spain's National Parks Policy

Spain was one of the first countries in Europe to adopt a national parks policy similar to the one the United States started in 1872 when Yellowstone National Park was established. Spain's legislation pertaining to national parks was issued in 1916. In 1918 its two first parks were established—the Montaña de Covadonga or Peña Santa National Park, located in Asturias, and the Valle de Ordesa in the Pyrenees mountains of Aragon. With respect to national parks, the only European countries that acted before Spain were Sweden (in 1909), Russia (in 1912), and Switzerland (in 1914).

The idea behind the creation of the two parks in Spain was as selfless and generous as that which brought about Yellowstone. The man whose initiative it was, Don Pedro Pidal y Bernaldo de Quirós, Marquis of Villaviciosa de Asturias, who became Spain's first commissioner of national parks, was familiar with the national parks of the United States and persuaded Spain to devote some thought to preserving the country's most outstanding geographic sites.

However, Spain was not the United States, nor was the situation in Covadonga and Ordesa the same as that of Yellowstone. As happens in any nation whose culture spans thousands of years and where there has been intense human activity since ancient times, it is no easy task to find lands where the original features have remained unchanged and which have not been subjected to a large number of economic and social impacts. In this sense there were particularly important obstacles in Spain owing to the small amount of nationally owned lands. The disentailment or expropriation laws enacted in the 19th century, under which most of the lands of the country that formerly had been held under *mortmain* title passed into private hands, also had an entirely negative effect.

In 1918 there were two further factors which also worked against any programs for preservation of natural areas. One was the country's largely agrarian economy and large rural population. Another was that, to a great extent, the ruling classes were owners of large agricultural tracts and were sensitive to any measure that might restrict their using the land.

These circumstances were reflected in the law enacted in 1916. Prevailing conditions molded considerably the criterion that was adopted: although natural scenic beauty was in itself a part of the nation's heritage, the lands wherein that beauty is to be found were to remain the property of their owners. Furthermore, those owners should be taken into account in any attempt to ensure and accomplish preservation, although it was not stated how this was to be done. This basic reason that Spain's national parks are not "national" in the sense of being owned by the country itself—a condition which stems from a lack of sufficient legal power and the financial means to acquire the lands on which the parks are located—has been the decisive factor in shaping Spain's national park policy.

There did exist legal means for imposing a number of restrictions on the use of natural resources inside the parks, and the owners cooperated willingly in this sense. The lands at Covadonga and those at Ordesa were mostly municipal property and were not

subject to disentailment or expropriation and they were therefore included in the *Catálogo de los Montes de Utilidad Pública* (List of Woodlands of Particular Value to the Public). These lands were under special control by the national government and, in fact, were managed by its Forestry Service. Thus the rational ordering of anything those lands might offer was included among the powers of the authorities to whom management of the country's forests was entrusted.

The other broad aim envisioned in the 1916 law was to provide the national parks with a means of communication that would make possible their becoming known and enjoyed. Because of the lack of adequate means, this was not achieved to any appreciable degree. However, that objective has been among the principal ones and was far-reaching. The decree which created the Ordesa National Park set forth that it should be protected and equipped "not only in order to draw thereto a flow of tourists from abroad, which is economically beneficial for countries, but also to promote a trend toward the countryside, which is helpful indeed for rendering the population more vigorous through improved customs and through study."

However, as we have pointed out, very little was actually accomplished in this sense. The intended cultural aims failed to make any deep mark upon national awareness. The truth of the matter is that the country's economic, political and social conditions were hardly the most favorable for such a policy. Things had not ripened sufficiently for projects which had been thought up by persons whose ideas were half a century ahead of their time. They foresaw what could come about at some future time—a time not as close at hand as they believed—when national parks might become an important tool for economic development.

Regulations to control operation of the national parks at Covadonga and Ordesa were issued in 1918. They provided for the services of wardens and merely set up, along very strict lines, conditions regarding the development of parks' forests, livestock, hunting and fishing resources as well as industrial exploitation and any activity whatsoever that might cause a change in the existing situation. Notwithstanding, those activities were not forbidden altogether, inasmuch as the aim sought was to bring about coordination between production and the conservation of the most outstanding scenic features.

Although this policy might seem a concession purely out of expediency in the face of situations which were difficult to change, it was a policy that really was not entirely unwarranted.

The sites chosen for the world's earliest national parks were in areas that man had changed hardly or not at all. Hence the notion of the parks as nature's laboratories and the prohibition put on any human action that might impinge upon them, or deny their preservation for future generations to enjoy. In the case of Spain's parks these assumptions did not apply. At the time when they were established they already had been modified by human action. If it was truly intended to preserve them exactly as they were when they were declared, the radical, absolute elimination of one of the



*Left, Spain's Valle de Ordesa National Park in the Pyrenees contains some of the wildest terrain and most spectacular scenery on the Iberian Peninsula, but the area has been used by man for generations. Valle de Ordesa was made a national park in 1918. Above, sheep graze on a plateau in La Montaña de Covadonga National Park, a beautiful mountainous area in northern Spain. Covadonga was Spain's first national park. It is fully protected, although some pasturing of stock is still permitted.*

elements that had molded them might have brought about an imbalance, perhaps a positive one from the ecological standpoint, but a modification that might have been somewhat disputable from the standpoint of scenery and the preservation of existing beauty. This undoubtedly was not taken into account in the drafting of the Regulations which we have mentioned, but it is something that has been taken into account in the subsequent legislation, specifically in connection with *natural parks*, about which we shall deal later, with a notion somewhat similar to the present one of *protected anthropological areas*.

The results brought about by the legislation were far different from those that had been intended originally. The national parks, instead of becoming dynamic factors contributing to a region's economy, were reduced to being places subject to a very strict control in so far as utilization of the resources contained in them was concerned, which involved a burden that the property owners and the area's inhabitants endured without any indemnity or other reward being given to them.

Such was the state of affairs during a long period in which political circumstances and the country's general condition prevented more attention being given to these problems. It was only much later, when a sufficient degree of stability and economic development was attained, that these questions again became current. In 1954 two more national parks were established, both of them in the Canary Islands—at Teide, on Tenerife, and at Caldera de Taburiente, on La Palma. The land on which the former is located was municipal property and that of the latter was private property, but this did not pose any serious problem as the owners had given implicit approval. There has always been in the Canary Islands a strong sentiment in favor of protecting their forests, and moreover the economy of those islands is closely linked to the tourist trade. In 1957 another new park was established in the Pyrenees, that of Aigües Tortes y Lago de San Mauricio. Its site was questioned somewhat, since it was located exclusively on lands that were either municipal or privately-owned, instead of on national property, and, furthermore, the area had important hydroelectric developments.

At that time the Forestry Administration, which had charge of

the national parks, was carrying out a wide reforestation program and was unable to avail itself of any broad means to pursue a more dynamic policy regarding the parks, for which reason the principal aim remained, as in previous years, that of merely preserving the areas.

Later on, as the national standard of living rose, other points of concern began to show up.

A swampy area at Las Tablas de Daimiel, where interesting waterfowl have their habitat, was declared a national park to preclude the owners of surrounding lands from draining and turning them into croplands. A similarly conservationist motive was behind the establishment of Doñana National Park in 1969. In both cases the legislation invoked was that provided in the Forest Law, enacted in 1957, which maintained substantially the same principles that were contained in the 1916 law. To a certain extent, the proposed immediate objective—consisting of forestalling situations for the waterfowl communities that might bring about changes which could not be undone subsequently—was achieved, but undoubtedly that did not offer a perfect solution, inasmuch as the opposition on the part of the landowners (in the case of Daimiel) or of interests in the outlying areas (in the case of Doñana) continues to this day and has precluded any clear-cut action by the Administration with regard to those highly problematical locations.

Owing to all these circumstances, it was deemed necessary to change the political approach as well as the legal basis upon which action with regard to national parks might rest. A new Law on Protected Natural Areas, similar to the regulations prevalent in most countries and which are based upon the setting up of different types of areas, was drafted, and a new classification was drawn up, including integrated reserves of interest, natural parks, and natural sites of national interest. The law was approved with certain changes, but, in any event, it is a useful instrument for developing a dynamic policy, provided that the financial wherewithal is forthcoming.

Although the new law does not spell out explicitly that the national parks must be national property, and authorizes the utilization of their natural resources under strict technical controls,

it does make it possible to follow a system that is in keeping with established international standards through payment to their owners of indemnity for loss of income or forced expropriation of their lands.

At the present time the reclassification of the already existing national parks, sites, and monuments which the new law requires is being undertaken with a view to bringing them up to the newly established categories. This involves a lengthy process, since the integrated reserves as well as the national parks will have to be declared such in a special law.

What is beyond question is the new spirit with which the Forestry Administration proposes to carry out the policy regarding national parks in order to turn them into a dynamic force in keeping with the conservation of the values they contain and with the public understanding of and enjoyment of their features. It is felt that the country has reached an adequate cultural and economic level, and that the public has become aware of the problems we have pointed out. Among the actions contemplated, outstanding importance is attached to a gradual acquisition of the lands constituting parks or, failing that, entering into use arrangements with the owners. Master plans will also be set up and whatever

installations and development may be necessary will be done in accordance therewith. It is expected that, as in other countries, the national parks will contribute to promotion of economic and social development of the areas wherein they are located.

However, the possibilities for short-term action seem rather constrained. The effects of the worldwide economic recession which began in 1974 also have been felt in our country. Moreover, the new political conditions are monopolizing the attention of the authorities and of the people in general.

The programs and procedures which have already been looked into call for investments that are relatively high, at least if one compares them with the amounts normally allocated for such purposes. It may turn out, therefore, that the new policy cannot be put in operation at the pace that was originally thought, but whatever delay may be necessary will be only because of the need to abide by whatever amounts the budgets will allow. In the six decades since 1916, the situation in Spain has reached a point of maturity that makes it possible to devote attention to these matters.

*Dr. Francisco Ortuño Medina is Chief of Spain's National Parks Service (ICONA), Ministry of Agriculture, Madrid.*

### National Parks

Name	Province	Hectares	Authorization
Parque Nacional de la Montaña de Covadonga	Oviedo y León	16,925	Ley 22-VII.1918
Parque Nacional del Valle de Ordesa	Huesca	2,046	R.D. 16.VIII.1918
Parque Nacional del Teide	Sta. Cruz de Tenerife	11,866	D. 22.I.1954
Parque Nacional de la Caldera de Taburiente	Sta. Cruz de Tenerife	3,500	D. 6.X.1954
Parque Nacional de Aigües Tortes y lago de San Mauricio	Lèrida	9,851	D. 21.X.1955
Parque Nacional de Doñana	Huelva y Sevilla	39,225	D. 2412/16.X.1969 (1)
Parque Nacional de Las Tablas de Daimiel	Ciudad Real	1,875	D. 1874/28.VI.1973
Parque Nacional de Timanfaya	Las Palmas	5,107.5	D. 2615/9.VIII.1974

Ley: Law R.D.: Royal Decree D: Decree

### Natural Sites of National Interest

Name	Province	Hectares	Authorization
San Juan de la Peña	Huesca	245.00	R.O. 30.X.1920
Dehesa del Moncayo	Zaragoza	1,388.91	R.O. 30.VII.1927
Ciudad Encantada	Cuenca	250.00	D. 239/11.VII.1929
Torcal de Antequera	Málaga	1,200.00	D. 240/11.VII.1929
Picacho de la Virgen de la Sierra	Córdoba	0.99	D. 241/11.VII.1929
Pedriz de Manzanares	Madrid	1,450.00	R.O. 30.IX.1930
Pinar de la Acebeda	Segovia	1,000.00	R.O. 30.IX.1930
Cumbre, Circo y Lagunas de Peñalara	Madrid y Segovia	522.00	R.O. 30.IX.1930
Región Central de la Sierra de Espuña	Murcia	5,084.00	R.O. 7.IV.1931
Monte del Valle	Murcia	159.00	R.O. 7.IV.1931
Cumbre de Curotiña	La Coruña	50.26	O.M. 31.X.1933
Promontorio del Cabo Villano	La Coruña	6.50	O.M. 31.X.1933
Parte culminante del Cabo de Vares	La Coruña	0.90	O.M. 31.X.1933
Lagunas de Ruidera	C. Real y Albacete	3,000.00	O.M. 31.X.1933
Monte Alhoya	Pontevedra	200.00	O.M. 5.VII.1935
Lago de Sanabria y alrededores	Zamora	5,027.00	O.M. 7.XI.1946
Hayedo de Riofrio de Riaza	Segovia	87.00	D. 2866/30.VIII.1974
Hayedo de Montejo de la Sierra	Madrid	250.52	D. 2868/30.VIII.1974
Hayedo de Tejera Negra	Guadalajara	1,391.00	D. 2868/30.VIII.1974

O.M.: Ministerial order R.O.: Royal order D.: Decree

# PARK VIEWPOINTS

## Comments from Australia

*Parks*, Vol. 1 No. 3, contained an article by Dr. E. C. M. Roderkerk, *Visitor Control at Kennemerduinen*, which described studies and observation of visitor behaviour patterns which were used in determining management policies to enhance visitor enjoyment whilst protecting the park resources.

The visitor observation studies at Kennemerduinen highlighted the dilemma facing many park managers, namely the degree to which changes to management policy are made in response to changing visitor use patterns.

The study found that 'more than 90 per cent of the people who visit this national park seldom do so specifically to look at the flora and fauna but rather because it provides an opportunity to be in the open air together with other visitors, to play, to sunbathe or simply to be lazy'.

A recent survey of the perceptions of rangers assigned to duty in Yosemite National Park revealed that 'rangers felt that about 50 per cent of the visitors did not need to come to Yosemite to do what they did in the park—that is, they could have participated in the same activities elsewhere' (Wicker and Kirmeyer 1976).

Similarly a visitor use study of Tidbinbilla Nature Reserve, an area of 4,658 ha, located 32 km from Canberra in the Australian Capital Territory, showed that many groups were visiting primarily for picnicking. The writer found that only 27 per cent of groups used one or more of the four nature trails provided even though these are readily accessible, clearly signposted and information about them is available at the Information Centre which is visited by about one third of groups. A reason that only one third of groups visited the Centre may have been because 46 per cent of groups had visited the reserve at least once previously and were familiar with the available facilities.

In the case of Kennemerduinen, Dr. Roderkerk indicates that 'it has been possible to offer visitors all the room and possibilities for leisure that they want and also protect the vulnerable landscape from destruction'. Obviously this has been achieved by the introduction of innovative design and management but there must be limits to the amount which can be achieved in this way. Dr. Roderkerk does not indicate the management options if visitor numbers continue to increase.

## Remarks of the President of Costa Rica

The following remarks were made by His Excellency, Daniel Oduber Quiros, President of the Republic of Costa Rica, on the occasion of his acceptance of the Schweitzer Award for 1976 on February 9, 1977, in Washington, D.C. President Oduber is the twenty-second recipient of the Albert Schweitzer medal, which is presented annually by the Animal Welfare Institute for an outstanding contribution to animal welfare.

In the Tidbinbilla study visitors were asked their views on future development and 17 per cent indicated a preference for development for picnicking. The nature reserve is ideal for this type of recreation, for which there is a large and growing demand in the Canberra regions, but the extent to which it can, and should, be met in the nature reserve is debatable.

The Kennemerduinen, Tidbinbilla and similar studies emphasise the preference of visitors to picnic in open lightly wooded areas or at the boundaries of wooded and open spaces. This 'edge effect' described by de Jonge (1969) for humans also applies to wildlife and, in Australia, particularly to kangaroos and wallabies which shelter in wooded areas and in the evenings move to graze in grassy areas nearby. In such cases expansion of recreational facilities is often sought in areas of major significance to some wildlife species.

Studies such as those at Kennemerduinen, Yosemite and Tidbinbilla raise many questions for park managers faced with the problem of the growth in recreational uses for which natural and seminatural areas are not essential and indeed which may be threatened by such uses. A solution is to encourage recreational use of urban and regional parks or of other areas such as commercial forests where wildlife protection is less important.

Whilst this solution may assist in protecting the resources of the national parks it may mean the loss of some public support which is vital to the national parks movement. Thus it is important for park managers to evaluate carefully the implications of various options available to them in attempting to meet the needs of conservation and recreation.—*R. W. Boden, Assistant Director, Australian National Parks and Wildlife Service, Canberra.*

## References

- de Jonge, D. 1969. "Human relationships with modern environments." 5th International Congress, International Federation of Park and Recreation Administration, Berne, Switzerland. 9 pp
- Wicker, A. W. and Kirmeyer, Sandra L. "What the rangers think." 1976. *Parks and Recreation*, Vol. 11, No. 10, pp. 28-34.

President Oduber's remarks follow.

"The honour which you do me today is a real and valued tribute to the Costa Rican people and an encouragement to us in our efforts to preserve and maintain our country's natural heritage.

"For me the significance of this occasion goes even further. While honouring what Costa Rica has been able to do in the field of preservation of the natural environment you are also vindicating

and honouring something which I can only call the philosophy and convictions of our nation. In an age in which violence dominates the news from much of our hemisphere and in which brute force seems to be the basic arbiter of conduct both among and within nations, our Costa Rica strives to maintain something at the same time priceless and unsensational: a deep and heartfelt abhorrence of violence. This is translated, at the most obvious level of institutions, in our deep respect for democracy and the rule of law, in our maintenance of a clear separation of constitutional powers, and in our rejection of militarism (the armed forces having been abolished since 1948). Concern for human rights is a cherished value of the Costa Rican people. Our respect for nature, and our willingness to take concrete steps to preserve our natural heritage from human depredation, follows naturally from this philosophy. A political tradition which honours diversity and respects dissent leads naturally to a rejection of violence and anarchy in the protection and development of the natural environment, and to measures which safeguard and protect that heritage. Our respect for our people today extends to future generations and our respect for diversity within human society extends to a desire to maintain and preserve the diversity of nature.

"This is why Costa Rica firmly and emphatically rejects the view that preservation of the natural environment is a concern of the privileged and wealthy nations, and a luxury which poor and developing countries cannot afford. We are a developing nation, and yet we see the preservation and protection of the natural environment as vital to our country.

"Conversely, I believe that where nations have shown little or no respect for the environment and where the natural environment has been ruined or lost in an over-hasty and uncoordinated exploitation of the Earth's resources, human relations inside those nations are also likely to be characterized by a lack of respect for individuals and for human rights.

"We need no violence against people or nature in order to develop our country and defeat poverty. On the contrary, respect for protection of the environment is as essential to our policy for development as it is inherent to our philosophy.

"We see practical benefits from nature conservation in the raising of the quality of life of our people and the improvement of education and culture, including the pursuit of scientific research.

"We began our efforts in 1970 with a programme to establish national parks and reserves to preserve representative woodlands;

this programme now includes twelve units encompassing a total of 126,000 hectares, or 2.5 percent of our national territory. We estimate, however, that in order to preserve an inviolate sample of each of the country's twelve life zones no less than 5 percent of the Costa Rica territory must be set aside as national parks. Together with the already declared and to be declared forest reserves, this would bring the total of preserved areas in Costa Rica to 25 percent of the national territory, a figure which coincides with the advice of our ecologists.

"Some of Costa Rica's national parks are of great international significance because of the uniqueness of their ecosystems and natural resources, or because they harbour endangered species of plants and animals. The Volcan Poas National Park has one of the world's few active volcanoes accessible to visitors year-around by road up to the crater; the Santa Rosa National Park is the only protected area representative of tropical dry forest vegetation in Central America; the newly established Chirripo National Park is the most westerly-lying paramo in the American tropics; the Monteverde Cloud Forest Reserve protects mid-altitude rain forests of extraordinary biological diversity and scenic beauty; the Tortuguero National Park includes the last important nesting beach of the Caribbean green turtle; and the recently established Corcovado National Park is one of the few regions in the world that effectively protect a large area of undisturbed tropical rain forest and its associated wildlife. Among the endangered species that find shelter in these and other parks in Costa Rica are the manatee, Baird's tapir, jaguar, hawksbill turtle, giant anteater, titi monkey, the lovely quetzal and many other species.

"To continue this work, and to reach our target of conserving 25% of our national territory can be expensive. Nevertheless we are determined to press on with our programs. \* \* \*

"My friends: I am convinced that the pressures and demands on the natural environment in the next decade will be enormous, especially in the developing world. This is why it is essential that we should face the challenges of the future with clearly thought out policies and philosophies, policies to increase co-operation and justice and promote order in the conservation and preservation of our planet.

"This award to me recognizes the steps we have taken in Costa Rica and is an enormous encouragement to us. We are truly grateful. But we harbour no illusions about the work that still remains to be done. Thank you."

# PARK PRACTICE

## The Broadland Conservation Centre

Nearly 2,000 years ago, when the Romans occupied Britain, much of what is now East Norfolk and Suffolk formed a great river estuary. The Romans' defensive forts still stand but the estuary has long since disappeared with the falling sea level, natural accretion and colonisation of the land, and man's drainage of the land for farming. During the Middle Ages the naturally formed peat was ruthlessly exploited for fuel, more than 2½ million cubic metres being extracted over 500 years. Subsequent flooding of these peat workings and their further colonization by marshland vegetation created the unique wetland habitat known as "The Broads".

Today the 23,500 ha of alluvial land, including 3,250 ha of unreclaimed fen and 700 ha of open water, display a remarkable diversity of habitat with great variety of flora and fauna. The area also suffers increasing pressures from many sources. Agricultural fertilizers and sewage effluent drain into the slow flowing rivers; over 100,000 anglers and 250,000 visitors annually use nearly 10,000 boats on the 200 kilometres of navigable waterways. On the one hand aquatic life is being "suffocated" by nutrient enrichment and increased turbidity of the water; on the other hand riparian accretion has diminished the area of open water by over 40 percent in the last 100 years. Man

and nature made the Broads. Man and nature are in danger of destroying them!

Realizing this, the Countryside Commission is currently seeking the views of interested parties on whether the Broads should be added to the 10 National Parks so far designated in England and Wales. Already 899 ha of Broadland are protected as National Nature Reserves and another 11 areas are safeguarded as local reserves.

One such area is Ranworth Broad where the Norfolk Naturalists' Trust has created a centre to interpret to visitors the problems now facing Broadland and possible ways of solving them.

### The Broadland Conservation Centre, Location, Design and Construction

The site selected for the Centre lay within the Bure Marshes National Nature Reserve on a spit of marshland separating a busy public waterway from the secluded nature reserve. This provides a sharp contrast between public and private Broads and emphasises the need for conservation. Land access to the site is by a 450 m boardwalk through the Reserve. Visitors arriving by boat are able to moor at the specially constructed landing stage (*Photo 1*).

Unstable ground conditions made a conventional building impractical so the architects, Feilden & Mawson of Norwich, decided to float the Centre on pontoons. This protects it against flooding, prevents damage to the Reserve and allows the Centre to be moved if circumstances, weather conditions or maintenance require it.

The pontoons were constructed of maintenance-free "Seacrete", a concrete material being increasingly used for boat hulls, and floated to an accessible site where the superstructure, with a floor area of 74 square m was added. In order to make it harmonize with its surroundings a traditional building style (reminiscent of the Visitor Centre at Varirata National Park, Papua New Guinea, illustrated in PARKS Vol. 1, No. 2) was adopted but used in a modern way. The







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roof structure was supported on external timber columns which ensured total flexibility of infill panels and windows—a great asset to the exhibition designer.

Traditional reed thatch, harvested from the Reserve, was used for the roof. Exposed to view from the inside, the roof itself interprets one aspect of broadland management and one of the crops that the area has yielded for generations (photo 2). Along the outside ridge of the roof runs a sparge pipe which can sprinkle water, pumped from the Broad, down both faces of the thatch in case of fire. Electricity is supplied to the Centre by an under-water cable from the nearby village.

The 450 m boardwalk consists of timber loading pallets staked to the ground and tied with wire netting which aids stability and reduces the slipping hazard (photo 3).

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In winter, when the Centre is closed, one section of the walk across a dyke is removed to create a "security draw-bridge" (photo 4).

### Interpretation

Although the Broads are a wetland habitat of international renown they are also a playground for hundreds of thousands of visitors. The Centre therefore sets out to tell the story of Broadland and explain the threats to the unique environment from man and even nature itself.

The boardwalk approach, along which most visitors come, fortuitously passes through the six stages of natural colonization from open water to oakwood. Each stage is explained by wayside signs, so that on arrival at the Centre visitors are already

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acquainted with the principal Broadland habitats (photo 3). The signs are photocopies mounted on painted marine plywood. They are so cheap that there is no problem over amendment or replacement due to weathering or vandalism.

The site signage and display in the Centre were designed by John Allwood, of Ightham, Kent, with advice from the Norfolk Naturalists' Trust and the Countryside Commission. It sets out to stimulate, involve, and interest visitors in Broadland and its many problems. Although designed as a permanent exhibition, the Centre display was made flexible enough to be updated or changed. When the building is needed for lectures or audio-visual programs the large windows can be blacked out by hinging some of the display panels (photo 11). The free-standing central displays can be moved aside to create an auditorium. The screen unrolls from the gallery beams and chairs are stacked on a single trolley behind a display panel (photo 5).

A number of basic principles were adopted in the design of the interior. In the first part of the display, visitor circulation is controlled and basic information provided at highest density when visitors' interest is highest. Thereafter there is a choice of routes and a correspondingly flexible story-line. Visitors are then channelled once more to pass the thought-provoking displays on Broadland's future and the information/sales point (photo 5).

The interior was laid out so that it is possible for one assistant to see the entire display area; control access to the Centre and the gallery above; receive admission charges; dispense information, publications and sale items; and if necessary, control the projection equipment (photo 6).

A wide range of media and techniques is used to appeal to visitors of all ages and interests. In addition to conventional photo-enlargements and texts there are three dimensional objects, some of which can be handled (such as blocks of Broad-



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land peat and a tank of Broadland water containing algae). Visitors can reproduce the effect of turbidity caused by boat propellers by activating a kitchen whisk suspended in a container of water and sediment. An analogy is then drawn with London smog to emphasize the effect of this turbidity on aquatic life (photo 7).

Naturalists are catered for with three-dimensional displays that portray typical food-webs and how they might be distorted by man's actions (photo 8). Children enjoy an enlarged "happy families" card house which demonstrates the inter-relatedness and fragility of the various interests in Broadland (background of photo 6).

Everyone likes pressing buttons and everyone likes a reward. A quiz-board, with nine questions about Broadland conservation and three alternative answers to each, displays further information on each topic when the correct button is pressed (photo 9). Further visitor participation is encouraged in a display which simulates the transformation of open water into oak woodland. When visitors turn a handle a printed screen unrolls, revealing the succession (photo 10).

Being located in the heart of the environment which it interprets the display in the Centre is linked wherever possible to the landscape outside. For example one ques-

tion on the quiz-board relates to the view from an adjacent window (photo 9) and a picture window overlooks the nature reserve (photo 11). Visitors may view the Broad at their leisure from the opening windows in the mezzanine gallery (photo 12).

#### Cost

The Centre was opened by Her Majesty Queen Elizabeth on November 25, 1976, as part of the Norfolk Naturalists' Trust's Golden Jubilee Celebrations. In total the project cost about £50,000. Of this £25,000 was donated by the Countryside Commission and £17,500 by other outside bodies. The building itself cost about £32,000 (£432 per sq m) and the exhibition about £6,000 (£82 per sq m). Design and construction of the exterior information and interpretive signs cost about £2,000.

Visitors are charged 25 pence admission (children 10 pence). This is justified on the grounds that any profits are used to manage the Trust's reserves in Broadland which many of the visitors also enjoy.

The Centre is managed by a warden who is employed throughout the open season (April 1–October 31). He is responsible for the Centre, the private moorings and the



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approach walk and is assisted in peak times by volunteer members of the Trust.

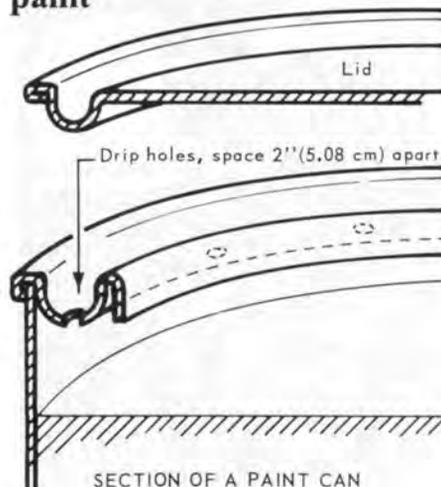
#### Conclusions

Whatever the outcome of the Countryside Commission's deliberations on the future of Broadland as a National Park the problems of the area will remain. But if the Centre engenders a greater awareness among visitors, and a commitment to action in protection of this unique habitat, the project will have achieved the aims of its sponsors.

*Ray Taylor, the author of this article, is an interpretive planner in the Visitor Services Branch of the Countryside Commission (for England and Wales).*

**Acknowledgements:** The author expresses thanks to John Allwood for his help in compiling this article and for commenting on the draft. Illustration credits: photos 2, 4 and 6–12: Crown Copyright, Courtesy of the Countryside Commission; photos 1 and 3: Courtesy of Mary Allwood; photo 5: Courtesy of John Allwood and Jack Fennell.

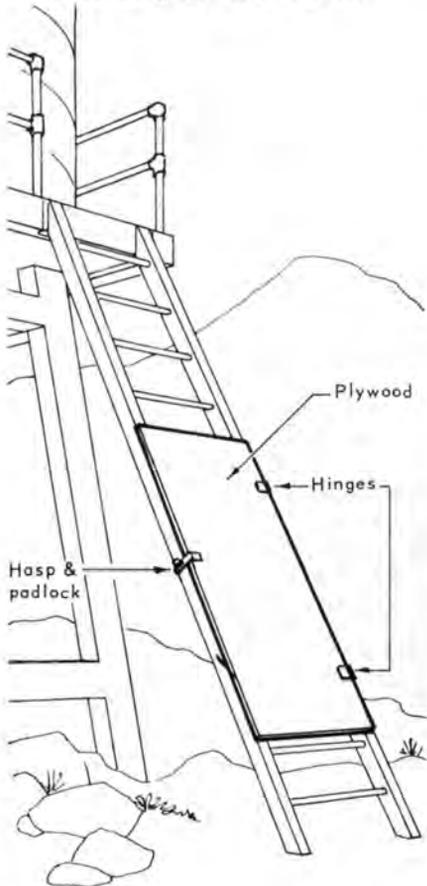
#### Punched dripholes save paint



## How to frustrate young climbers

Elevated structures having fixed ladders for access normally would be located well away from areas where visitors have access. However, as every park ranger or warden knows, visitors often enter forbidden zones, and frequently get into or on structures where they might be hurt or cause damage.

The illustration here shows one easy way to keep people—especially young children—from climbing on a fixed ladder.

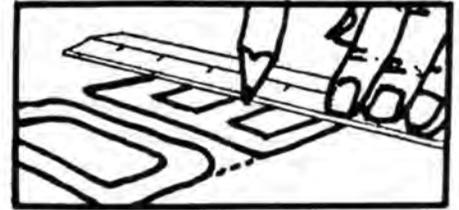
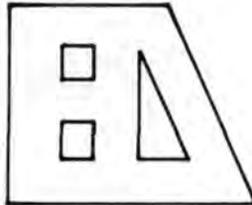


## UNISTENCIL

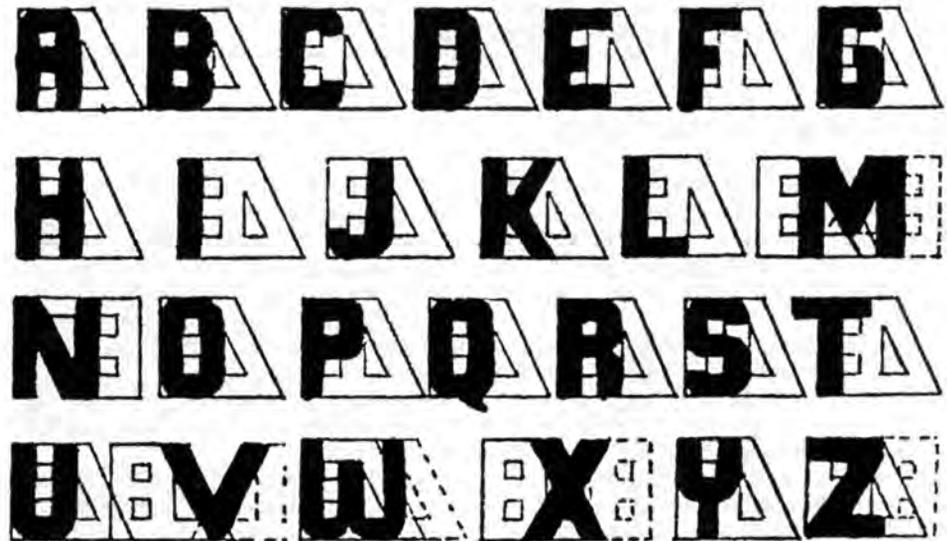
### A cheap and easy way to guide lettering by hand

The Unistencil is a simple lettering device for making block letters. The stencil can be cut from cardboard or x-ray film, or, indeed, from any thin, reasonably firm material.

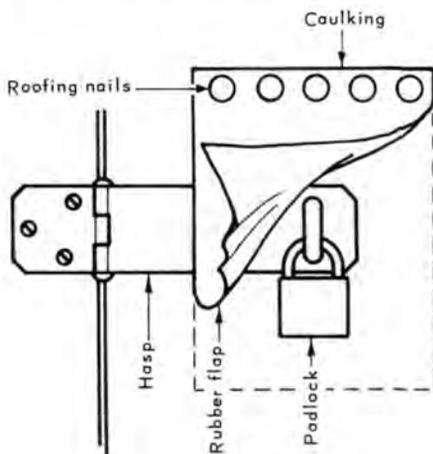
This idea, developed by Lindy Layer and Rosemary Nicholls, is taken from the *Development Communication Report*, Washington, D.C.



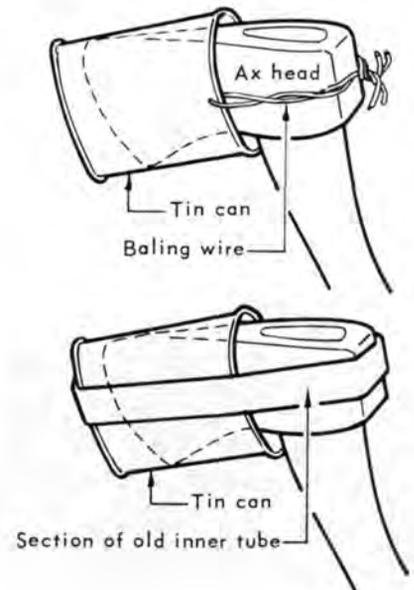
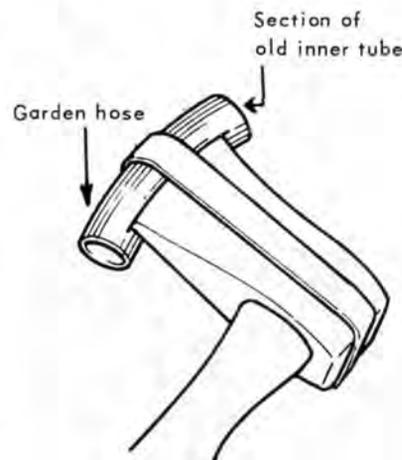
Adapt this pattern to make a stencil for the size letters required. The stencil can be cut from plastic, x-ray film, cardboard, or any thin, stiff stuff. Draw the necessary lines or curves to complete each letter. Finish off the lettering with pen or brush.



## Padlock weather protection



## Simple guards for ax heads



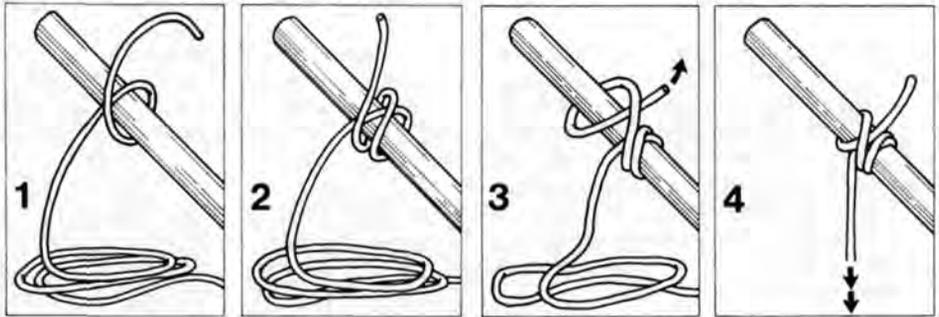
## Knots You Should Know

Rangers, wardens, maintenance personnel and other employees of national parks and reserves often need to use rope and cordage of various kinds in the performance of their duties. Implicit in this is a working knowledge of a variety of knots, hitches and bends, without which rope is virtually useless.

It must be assumed that most park personnel who work in field assignments know how to tie several basic knots, but they may not know a number of others which are extremely useful, and for which there are no easy substitutes.

From time-to-time we will show some of these knots in this section of PARKS, beginning the series with the *rolling hitch*.

The rolling hitch has been called a "maid of all work". When properly made its grip or hold tightens as the load upon it increases. Use this hitch when you want to attach a rope or line to a pole, spar, tree,



cable, wire or other rope with a temporary connection that will not slip when a heavy load is applied.

This hitch is made as follows:

1) Carry the short or free end of the rope over the pole, spar or other form to which it is to be attached.

2) Wind the short end over the fall two times.

3) Tuck the short end under a third loop.

4) Pull the hitch tight. The connection is now ready to use.

Practice tying this hitch until you can do it in the dark. You may be surprised how useful this knot can be—in routine work and in an emergency when nothing else will do.

## Something for the birds

In many parks and reserves, colonies of nesting waterfowl are a periodic subject of considerable tourist interest. Visitors, however, no matter how well-intentioned, can enormously disrupt the life of a nesting colony.

To help solve this problem the staff of one U.S. reserve has produced a simple mimeographed leaflet which is given to visitors.

Titled "Nesting Terns", its text is as follows: "Colonies of nesting terns are disturbed by the presence of man and animals. To them, intruders are predators, and they leave their nests and rise in a flock to attack:

—leaving their eggs exposed to cold and heat, extremes of which easily destroy them.

—leaving their young chicks exposed to cold and heat when tiny.

—causing their older chicks to run and hide—"go to ground"—by crouching and freezing on the sand amidst vegetation and rocks, or a bit of driftwood or wrack, where their camouflage is so perfect they can be crushed by a careless foot.

—causing the chicks to stray too far from the colony and become easy prey for predators (gulls).

"Don't be an unconscious predator. Stay away from nesting colonies. Keep your dog leashed and far enough away that it will not disturb the nesting terns."

Photo: U.S. Fish and Wildlife Service



## Tree Repair

Conventional pruning, planned maintenance, and the regular training of trees and shrubs have been the subject of numerous articles through the years. However, it is the unplanned pruning—the correction of accidents—that must take precedence in some of our national park areas. It is not our intent to encourage pruning of all damaged trees in the National Park System, for this philosophy would not account for "normal or natural" pruning as a dynamic part of the park ecosystem. The purpose of this paper is to treat emergency situations in which prompt pruning promotes safety or aids in the maintenance of endangered or horticulturally important species.

For regular pruning maintenance, the season of the year and the type of plant are quite important for optimal results; however, with emergency pruning, the chief factor in determining success is the promptness of treatment. For example, a large piece of bark that accidentally has been knocked from a tree can be positioned back in place and growth resumed if the corrective action is taken quickly enough. Prompt care of injured trees and shrubs can often eliminate unsightly disfigurements and will generally prolong the life of the injured tree.

Branches broken either by storms or human activities present the greatest need for emergency pruning in the national parks. If the broken portion is part of a large branch, merely cut it back to the nearest crotch, making the cut as close as possible without weakening the adjoining branch. By making a close cut, and therefore leaving no stub, the callous heals over the injury much faster and there is less danger of decay-causing pathogens gaining entrance. If the injured portion is a main

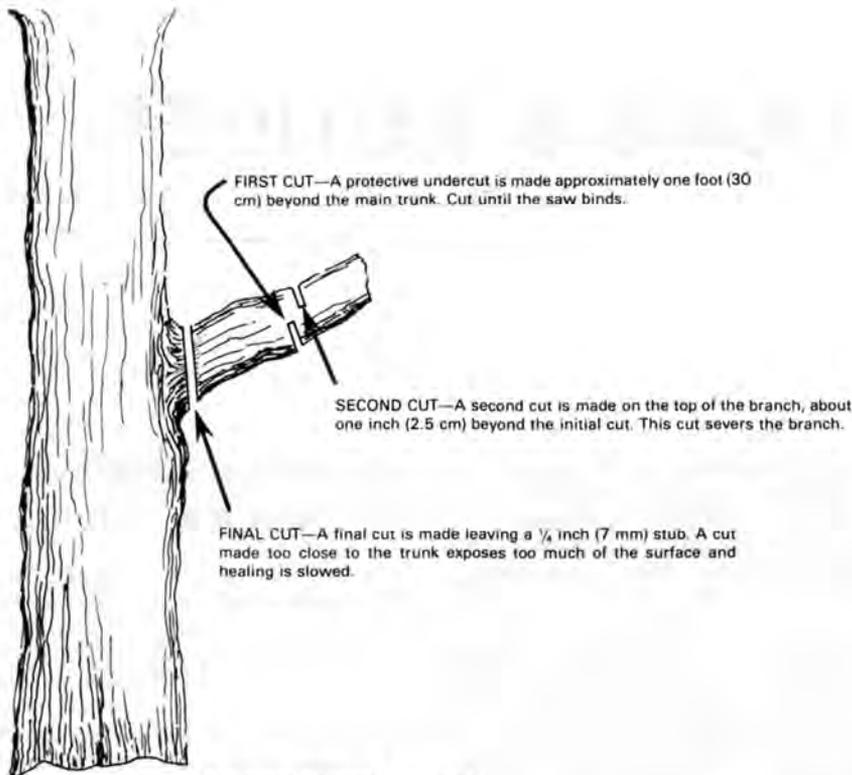


Figure 1. Pruning cuts for large branch removal.

structural branch, it should be cut as close to the trunk as possible. Whenever there is danger of stripping the bark downward by the weight of the branch, cut the branch back to a short stub and then remove the stub (Fig. 1). Remember, the first cut must be a protective one on the bottom of the branch to prevent stripping of the bark down the trunk.

If the bark is already stripped, remove all ragged edges with a heavy, sharp knife. Do this by shaping the wound into a narrow, vertical ellipse by cutting down to the clean, undamaged wood (Fig. 2). This promotes healing. Also, to prevent the entry of decay-forming organisms, some workers advocate painting the wound. In general, small pruning cuts (less than one inch [2.3 cm] in diameter) on deciduous trees do not require painting of the wound, while large cuts are usually so treated. The wounds of many evergreens are sealed with the natural gums and resins present and oftentimes are not painted. Even if painting is not necessary, as some suggest, the paint tends to camouflage the injury and this fact alone may merit its use. If you do paint the wound, first swab the wound and edges of the bark with alcohol or coat it with shellac. When this coat dries, cover the entire wound, as well as the edges, with a commercial tree-wound dressing. If the commercial dressing is not available, coat with an oil base house paint or an asphalt varnish. Most small wounds will completely heal in 2-3 years, and the paints mentioned should provide an adequate seal for that time; however, some of the largest wounds that heal much more slowly will require additional coats of paint.

Although stripped bark, as described above, is usually the result of broken branches tearing the bark downward, automobiles often damage trees in a similar manner except the wounds are generally wider. The same corrective process used for stripped bark is employed. On a smaller scale, lawn mowers are also responsible for this type of injury.

In particularly severe winters, many trees suffer from bark splitting and peeling. It is especially noticeable on unshaded tree trunks where there may be large fluctuations in temperature within the bark, and then the damage usually occurs on the side of the tree receiving direct sunlight. In caring for this problem, once again cut the bark to the healthy, undamaged wood that is still firmly attached to the tree and paint in the prescribed manner.

Damage by lightning, though not common, does occur with some regularity on certain exposed locations, i.e., on hilltops and exposed single trees. It usually is not possible to determine how badly lightning has damaged a tree for about a year after it is struck, but treatment should proceed as soon as damage can be assessed. In this type injury, the bark is usually torn in one or more narrow strips from the treetop to the ground. These injuries are treated in the usual manner—working as high as conditions will permit. Take care to remove all shattered and hanging limbs for safety reasons.

Burned branches occur more often as greater numbers of people enjoy camping and other outdoor activities. Campfires frequently cause considerable damage when

there are low-hanging branches. The injuries from any one year may appear only minor, but they accumulate and may haunt the park manager in the future in the form of weakened or broken branches. There is no cure for this injury, but the injured portion should be cut off and treated as broken branches.

In areas where there are high winds, trees may be partly or wholly uprooted. First, it is necessary to cover the exposed roots with materials such as burlap, hay, mud, etc., to retard drying. After the means are available to return the tree to its original position, cut away the shattered roots and treat them as if they were pruned branches. Once in place, install the guide wires (at least three) to hold the tree in place until the root system generates. Position the wires about two-thirds of the way to the top of the tree so that adequate support will be maintained. Protect the bark by covering the wire with a piece of garden hose and by using a loose loop on the tree trunk. The supporting wires should never restrict normal tree growth. Insure adequate moisture, maintain high fertility levels, and in one or two years the wires usually may be removed.

The foregoing article was taken from *Tree Repair, Ecological Services Bulletin No. 3, 1975, U.S. Department of the Interior, National Park Service. Joint authors were G. Jay Gogue and Edwin F. Steffek.*



Figure 2B. Represents the necessary shaping of the wound to allow continuous drainage and rapid healing.



Figure 2A. Represents an incorrect pruning cut that resulted in the stripping of the bark, leaving a jagged, deep wound.

# BOOKS & NOTICES

**The National Trust for Scotland Guide.** 1976. Compiled and edited by Robin Prentice. The National Trust for Scotland, 5 Charlotte Square, Edinburgh. 316 pages, 284 illustrations, 35 in color. £4.95 plus postage.

This is the first official comprehensive guide to the properties of the National Trust for Scotland. The Trust was founded in 1931 to promote conservation of the 'whole environment' in Scotland, and this guide demonstrates what a remarkable job the Trust has done. As diversified as Scotland itself, the guide tells in very readable prose about castles and country houses, gardens, historic sites, 'doocots', waterfalls, mountains, islands, dramatic coastlines and ancient battlefields. Significantly, it reveals how great is the love of the Scots for their land and its history.

The book is much more than a guide. Two introductions give a thoughtful review of why Scotland deserves the Trust, and how it came into being and grew to fulfill its noble purposes. Beyond that, each of the chapters is introduced by an essay from the pen of an authority on each of the eight basic types of properties, which are described individually. These essays are rich in knowledge of both the people and the landforms that shaped and were shaped into the Scotland of today, at once rugged, beautiful, and serene. One essay tells of the Little House Improvement Scheme which has been so successful in preserving and restoring a vernacular architecture of a modest kind; another traces the evolution of the countryside and explains its amazing diversity. Each one is a gem of understanding for the reader.

If one wants to visit and really see Scotland, this guide is indispensable. But its value does not stop there. Any country or organization that contemplates preparing a guide to describe and interpret its natural and historic places will do well to study this book as a pattern to follow.—*Gordon Fre-dine*

**Ecological Guidelines for development in tropical rain forests.** 1976. Duncan Poore. International Union for Conservation of Nature and Natural Resources, 1110 Morges, Switzerland. 39 pp., illustrated. US \$4.50 plus postage.

Tropical rain forests, which often are fragile and generally are disappearing rapidly under the human onslaught, offer great potential as national parks or reserves. There are, fortunately, a number of splendid rain forest areas already under park management and more should be given official protection.

This small booklet is the product of many years of study and experience with the problems of development in the humid tropics (and two specific conferences on the subject). Park managers and all decision-makers concerned with rain forests in such areas could benefit from the guidance it offers.

A variety of potential uses are considered, covering such uses as protected areas, timber production, agriculture, water resource development, fisheries, settlements and industry. Thirty basic principles are set forth, and 72 specific guidelines are presented to develop more completely the options available to the land manager.

## European Park Management Conference

"Planning and Management in European National Parks—Naturparke, Parcs Naturels, National Parks (UK)" is the title of an informal conference for local managers and staffs of Europe's protected landscapes. Aim of the meeting will be to exchange information and seek answers to management problems in these areas.

The conference will be held September 26-30, 1977, at the Peak National Park Study Centre, England. Cost will be £48., which includes full board and field trips.

Further details are available from Peter Townsend, Principal, Peak National Park Study Centre, Losehill Hall, Castleton, Derbyshire, England.

## Information Sought on Arid Zone Research

In cooperation with UNESCO, the Instituto de Investigaciones Sobre Recursos Bióticos, A.C., of Mexico (INIREB) is circulating a questionnaire to elicit data on current ecological research projects in arid zones. The objective of this survey is to obtain a general view of the depth, extent, and subject spread of current research, and to establish communication with scientists or institutions working in the field.

The survey is directed by Dr. Arturo Gómez-Pompa, Director General of INIREB, and Chairman of the International Coordinating Council of UNESCO's Man and the Biosphere (MAB) Programme.

At the request of Dr. Gómez-Pompa, PARKS is pleased to list the survey questions. Those who do not have the questionnaire may respond by sending the appropriate answers to:

Ing. Francisco Vela Campomanes, Centro de Informacion, Instituto de Investigaciones Sobre Recursos Bióticos, A.C., H. Colegio Militar No. 7, Jalapa, Ver. Mexico.

The questions are:

- 1) Name
- 2) Country
- 3) Country and region where research is carried out.
- 4) Title of project.
- 5) Objectives of project.
- 6) Date of initiation and probable date of completion.
- 7) Name of institution responsible for the research.
- 8) Names of scientific personnel.
- 9) Address
- 10) Citation of most recent contribution of the subject (Please send reprints).
- 11) Suggestions or additional information.
- 12) Key words.

## Index of training courses for cultural conservation

The 1977 supplement for the International Card Index on Training in Conservation of Cultural Property is now available for distribution. It contains about 120 photocopied cards giving basic details of course programs in the various fields of conservation. Some of the cards are revisions of cards in the first edition of the Index and others are new listings collected during 1975 and 1976.

Copies can be purchased at the cost of U.S. \$4.00 each from the International Centre for Conservation, Via di San Michele 13, Rome 00153, Italy.

The first edition (1975) of the Index is also still available. The boxed set of 200 cards costs \$8.00, or \$12 if you wish to order the original Index and the supplement together.

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*This splendid Indian elephant was photographed years ago by E.P. Gee on a forest path in Assam. Reduction of extensive wild country needed to support their prodigious appetites for browse and grass (estimated at about 250 kilograms per day), has resulted in reduced elephant numbers.*



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