

THE MANAGEMENT OF
NATIONAL PARKS AND WILDERNESS
IN THE WESTERN USA
WITH SPECIAL REFERENCE TO VISITOR SAFETY



BY JOHN WATSON

OCCASIONAL PAPER 2/88

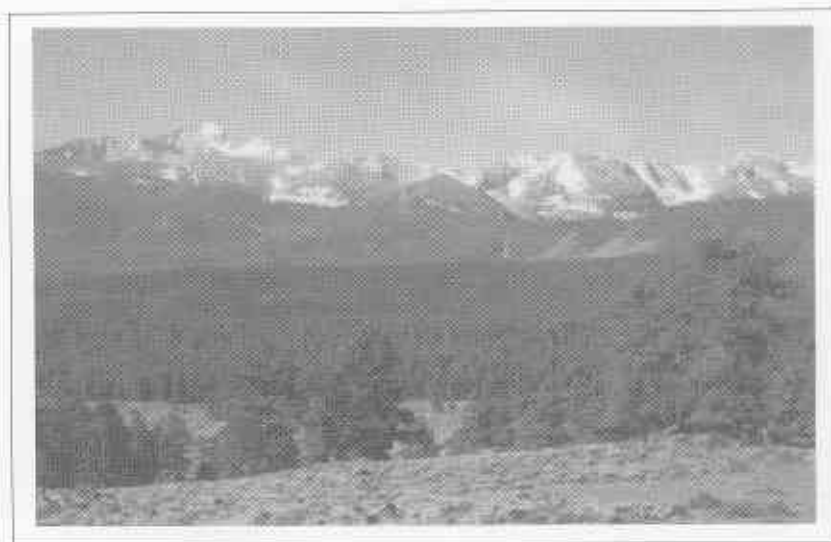


DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT,
WESTERN AUSTRALIA.

CONTENTS

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AND WILDERNESS IN THE WESTERN USA

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EXPLANATORY NOTE

At the time of the study fellowship a proposal was under consideration by the Western Australian Government to amalgamate into a new "Department of Conservation and Land Management" the National Parks Authority, the Forests Department and the wildlife sections of the Department of Fisheries and Wildlife.

Arrangements for the proposed amalgamation were not approved for implementation until December 1984 by which time, under the conditions of the Churchill Fellowship, the bulk of this report had been written. At the time of completing the report in mid 1985 no changes in policy direction towards national parks had occurred within the new department and hence the original text was left basically unchanged.

Furthermore, the expansion of national park management from a former staff of around 100 persons under the National Parks Authority to a pooled staff of over 1 200 persons in the new department may increase the relevance of many of the observations and recommendations that I have made.

Prior to the amalgamation, as the Southern Regional Superintendent of National Parks, I held responsibility for the day to day management of all national parks in the south of Western Australia including Western Australia's only formally designated wilderness. Following creation of the new department and the subsequent establishment of new regional boundaries my responsibilities with regard to national parks were considerably reduced. As a result, management of the Nuyts Wilderness at Walpole and several other areas mentioned in the report (Leeuwin-Naturaliste National Park, Pemberton National Parks, D'Entrecasteaux and Shannon National Parks) is no longer my responsibility.

The report has been prepared on the basis of personal observations, literature reviews and direct discussions with over 100 persons involved in national park or wilderness management and use in the Western USA and Canada. The opinions and interpretations expressed here are my own made in the context of my experience from 1978 to 1984 as the Regional Superintendent of National Parks in the Southern Region of Western Australia. They do not necessarily represent those of the US National Park Service, the US Forest Service, the WA Department of Conservation and Land Management, or any other agency.

J.R. Watson

July, 1985.

1. ABSTRACT

The report describes the findings of a three month study tour of Western USA and Canada undertaken by the author in 1984 under the auspices of a Winston Churchill Memorial Fellowship. Churchill Fellowships give opportunity to enable Australians from all walks of life to undertake overseas study of a kind that is not fully available in Australia. It is a condition of the fellowship that new knowledge brought back from overseas should be disseminated as widely as possible in Australia for the benefit of the Australian community. This report helps to meet that requirement.

The aims of the study tour described were to assess general management of national parks and wilderness areas in the Western USA for comparison with management of similar areas in Western Australia. Special emphasis was placed upon visitor safety management including technical search and rescue operations.

The report is presented in four major sections. The section on national park management includes comment on policy, visitation levels, administration, staffing, park interpretation, volunteer programmes, management of concession operations, planning and development, visitor facilities, buildings, trails and boardwalks, and research. Some brief observations on aspects of national park management in Canada are also included.

In the second section, the historical development and subsequent management of US wilderness areas are reviewed. Comment is also made upon the management of visitors and visitor safety in such areas.

The third section discusses more detailed management strategies for visitor safety in national parks and national forests including the use of safety signs, design of facilities, safety literature and accident reporting.

In the fourth major section, detailed comments are made on aspects of technical search and rescue operations including volunteer groups, rescue organisation and control, equipment and training, coastal safety and the funding of search and rescue activities.

During the study tour, visits were made to several caves open to the general public. In addition, one week was spent as a participant at the National Cave Rescue Commission seminar on managing cave rescue. At appropriate points in the report the safety of visitors to caves and the technical aspects of cave search and rescue are addressed.

Throughout the report comparisons are made with the management of national parks and wilderness within Western Australia. Where considered appropriate, suggestions are made for enhancing these management practices based upon the observations of the study tour. In some instances, for example, the choice of rescue stretchers, such experience has already been put into practice by the author in the South Coast Region of Western Australia.

2 .INTRODUCTION

The world's first national park was established at Yellowstone in 1872. Other countries followed closely and in Australia the Royal National Park was established near Sydney in 1879. In Western Australia John Forrest National Park was established in 1895.

Now in the 1980's the concept of national parks is accepted internationally and the Western Australian system has grown to some 50 areas totalling 4.4 million hectares and which are distributed throughout the State. The principles of national park management involve a defined dual purpose - on the one hand to conserve unimpaired the natural landscape, flora and fauna for present and future generations - but on the other hand to provide for access so that the public can enjoy their national parks and participate in compatible recreational activities.

The formal designation of areas as wilderness is a relatively recent phenomenon, marked in America by the introduction of the Wilderness Act in 1964. This act provides for a national wilderness preservation system and in particular defines the administrative and legislative procedures required to allocate public lands as part of the system. The concept of wilderness preservation has not been accepted internationally. In many countries there is very little 'pure' wilderness remaining, for example England. In other cases the country in question is so vast and the population so relatively small that protection of wilderness has appeared unnecessary, for example Canada and Australia.

There has, however, been a growing pressure for wilderness allocation within Australia, especially in the eastern part of the mainland and in Tasmania. In the central and western parts of the country public pressure for wilderness allocation has not yet emerged forcefully.

The managers of public land have always had a concern for visitor safety especially in the USA where there is a history of public liability action against the Government. With increased education and nationwide media coverage it is possible that the Australian public will become more legally aggressive towards government with regard to safety and accidents. Indeed this potential trend has already been recognised in Western Australia.

In the Western USA there are numerous opportunities for outdoor activities within national parks and wilderness - these include back packing, rock climbing, canoeing, caving, hang gliding, all of which are practised in national parks of South Western Australia. In the USA, however, the participation levels in such activities are very much higher. For example, there may be as many as 1 000 rock climbers regularly in action per day during summer at Yosemite National Park whereas in the whole of Western Australia there would rarely be more than 20 people per day climbing, and then only on a few days of the year.

Nevertheless, accidents have happened, and will continue to happen, in outdoor adventure activities in Western Australia where search and rescue capabilities are either nonexistent or very basic.

In America the far greater frequency of accidents has produced some of the most advanced search and rescue techniques and organisation in the world.

The study described in this report had the following aims:

- To assess the general management of national parks and wilderness of the Western USA for comparison with existing and future management of such areas in Western Australia.
- To specially study visitor safety management including technical search and rescue operations used in outdoor adventure activities.

My previous experience in many outdoor adventure activities, including some knowledge of technical search and rescue, enabled the study to include not only professional discussions and reading but also direct involvement with technical rescue operations at the field level.

3. METHODS AND SCOPE OF STUDY

The study report comprises information from two broad sources:

- My existing experience and from the reading of relevant publications mainly prior to tenure of a 1984 Churchill Fellowship.
- Experience and information gained during a three month visit to the Western USA and Canada under the auspices of the fellowship.

During the ten months between the award of the fellowship and departure for the USA extensive background reading was undertaken as well as considerable exchange of correspondence with officers of the US Forest Service and the US National Park Service.

On arrival in the USA a short period was spent with orientation and briefing at one centre (Missoula, Montana). The remainder of the fellowship period comprised a 9 000 mile (14 400 km) tour by road through various regions of the Western USA and Canada, as indicated in Figure 1. At each major national park formal discussions were held with relevant staff. In addition visits were made to four regional offices of the National Park Service and to two regional offices of the Forest Service. These discussions were complemented by field inspections, either alone or with local personnel, of as many national parks, national recreation areas, national monuments and national forests as possible. One week was also spent attending a National Cave Rescue Commission seminar on managing cave rescue. A full list of places visited is given in Table 1.

Table 1

Places visited on study tour

USA	CANADA
Bandelier National Monument	Paul Lake Provincial Park, British Columbia
Crater Lake National Park	Mount Revelstoke National Park, British Columbia
Custer State Park	Glacier National Park
Death Valley National Monument	Yoho National Park
Devil's Postpile National Monument	Banff National Park, Alberta
Eldorado Springs State Park, Colorado	Kootenay National Park, British Columbia
Glacier National Park, Montana*	Fort Steele Heritage Park, British Columbia
Golden Gate National Recreation Area	Waterton Lakes National Park, Alberta*
Grand Canyon Caverns	
Grand Canyon National Park	
Grand Teton National Park	
Great Sand Dunes National Monument	
Ice Caves, Sandia District, Cibola National Forest	
Inyo National Forest	
Jewel Cave National Monument	
Lava River Cave, Deschutes National Forest, Bend, Oregon	
Lewis and Clark Caverns State Park, Montana.	
Madison Buffalo Jump, Montana.	
Mono Lake Tufa State Park	
Mount Rainier National Park	
Mount Rushmore National Monument	
Mount St Helens National Volcanic Monument	
Mt Sanitas, Boulder, Colorado	
National Bison Range, Montana	
Oregon Caves National Monument	
Oregon Dunes National Recreation Area	
Petrified Forest National Park	
Quake Lake Visitor Centre	
Redwood National Park	
Rocky Mountain National Park	
Sea Lion Caves, Florence	
Wind Cave National Park	
Yellowstone National Park	
Yosemite National Park	

*These two parks comprise the Waterton - Glacier International Peace Park.

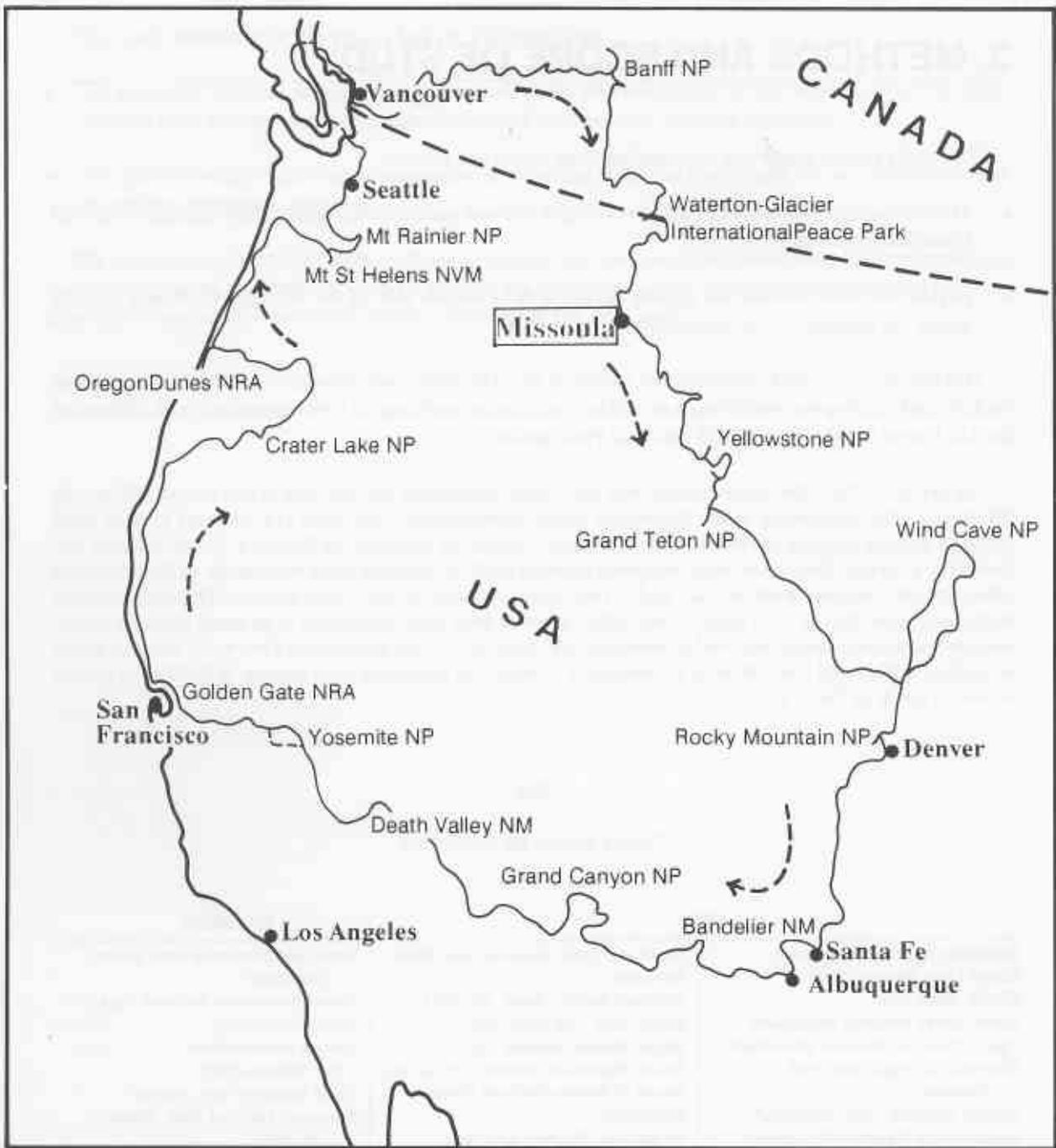


Figure 1

Route taken on study tour

Discussions and field visits were further complemented by continued reading of both general and specific publications and other written material during and after the study tour.

Notes were taken during all interviews and field notes were also prepared after each park visit. Numerous photographs were taken - often this was the easiest way to record the wording on signs or the design of technical equipment.

In the relatively short study period available it was considered to be more sensible to visit a selection of relevant areas and people rather than attempt to visit every national park or wilderness within the study area. However, the study did encompass varying terrain, rugged mountains, gorges, rock faces, prairie lands, caves and deserts, and the weather encountered varied from snowfalls through to temperatures of 110 degreesF plus (44 degreesC).

Special note must be made of the valuable briefing and later discussions with staff of the Wilderness Unit of the Intermountain Forestry Sciences Laboratory, Montana, especially Dr George Stankey.

Although Dr Stankey has not yet visited Western Australia he is very aware of the situation with regard to wilderness and national park management in the remainder of Australia. This experience proved invaluable in planning the study tour and in subsequent analysis of the findings.

In this report the findings are presented under four major headings which collectively comprise the guidelines of the fellowship study:

- national park management
- wilderness management
- visitor safety
- technical rescue

There is inevitably some overlap in these divisions. For example policy towards visitor safety is a crucial aspect of wilderness management and hence it is mainly discussed in the wilderness section of the report.

Where possible comparisons are made with the situation in Western Australia. In some instances comparisons are made with the situation in Australia as a whole but this is limited, firstly because the management and control of public land is a State responsibility in Australia - hence general comparisons are hard to make - and second, because the author has only limited knowledge of current management and safety programmes outside the southern areas of Western Australia.

4. NATIONAL PARK MANAGEMENT

From the moment of entering the first national park on the study tour itinerary it was almost like being "at home". Signs were neat, routed in wood and painted brown on the back. Road verges were neat and tidy, no litter was seen. This feeling on entering a national park was experienced many times during the study tour underlining the general similarity of national park management between the USA and Western Australia.

The US National Park Service manages not only national parks but also many other associated areas including:

- national monuments
- national recreation areas
- national seashores
- national historic sites
- national battlefields, etc.

The study tour included visits to examples of many of these categories but the "crown jewels" of the system are certainly the large and long established national parks. However, some of the most valuable information on visitor safety and rescue was derived from national recreation areas and national monuments.

The US Forest Service also manages several national recreation areas and national monuments but no national parks. One spectacular area visited, which undoubtedly has the attributes and potential for national park management is the Mount St Helens National Volcanic Monument currently within the Gifford Pinchot National Forest in Washington State.

In this report where the term "national park" is used, unless otherwise stated, it should be taken to include national monuments, national recreation areas and national seashores managed by the National Park Service.

4.1. POLICY

The general management policies for national parks in the USA and in Western Australia appear to be very similar. Both managing agencies attempt to conserve the natural landscape and component features of the parks while at the same time providing the means for the public to visit and enjoy them.

In the USA there appears to be variability from park to park in the balance between conservation management and park development for public use. By comparison in Western Australia, with some exceptions, there is a much more homogeneous management approach in which protection of park resources is the primary consideration. The staff would certainly like to see more visitor use and appreciation of Western Australian national parks but the previous lack of adequate funds and staffing has caused the staff to tread with extreme caution in the development of new facilities. Only where such developments are clearly within current management capability or where they will improve management efficiency have they been instigated. In the USA there appears to be less awareness or possibly less concern for this issue despite government cutbacks in funding and staffing levels.

This is probably due to two major factors. First, as will be discussed shortly, individual park superintendents have much greater control over the day to day management direction of their parks than do the rangers in charge of Western Australian national parks, and of course the management backgrounds and perceptions of the many superintendents will inevitably be different. Second, the US National Park Service is so large with employment of almost 12 000 personnel and an annual budget of around \$600 000 000 that there has to be a better chance of retaining existing quality of management following cutbacks than in a much smaller management organisation.

The US National Park Service has published a detailed set of management policies (1978) but it is not appropriate to review these in detail here. However three policies which are of particular interest concern dogs, horses and fishing. In Western Australia, and indeed all of Australia, dogs are not permitted even on a leash or in a vehicle in most national parks. In the USA dogs are permitted in a vehicle and on a leash, but may not be taken on walk trails or into visitor centres. Whereas few problems were seen with dogs in parks, there is no guarantee that any relaxation of the 'no dogs' rule in Australian national parks would result in similar responsible behaviour. For example, in the USA ranger staff are very prominent in all major parks whereas in Western Australia the chances of seeing the one park ranger are low and hence visitors are more likely to risk breaches of regulations such as the 'no dogs' rule. Furthermore, in general the impact of dogs on native fauna is less significant in the USA than in Australia, in fact the "boot is on the other foot" so to speak as many of the native animals in US parks are aggressive towards dogs. Nevertheless, most Park Service employees with whom the issue was discussed were quite envious of the Australian ruling.

The US park system also has heavy use from horses and mules, and again those personnel involved with resource management issues were somewhat envious of the limited use of horses in Western Australian National Parks. Probably the worst public impact of pack animals was witnessed at Grand Canyon National Park where the few trails down into the canyon are shared by pedestrians and mules. The smell and condition of the track underfoot are hardly conducive to pleasant or safe walking. However, the Park Service itself has to make extensive use of pack animals for management of the back country. In Western Australia horses are only permitted on public roads or on specially designated bridle trails so as to avoid potential conflicts with pedestrians. Cross country use of horses is not permitted as they are proven vectors of weeds and jarrah dieback disease *Phytophthora cinnamomi*.

Another specific policy difference is that fishing is allowed in most lakes and rivers of the US national parks. In Western Australian national parks fishing is restricted to the ocean with the exception of marron and trout fishing which are permitted during the annual open season. The more restrictive policy in Western Australia probably reflects the relative scarcity, and hence the special conservation value, of freshwater lakes and rivers.

4.2. VISITATION

Despite the worldwide renown of the US national park system it appeared that major visitation is from the local domestic market. Only at three locations were car number plates from non-adjacent states observed in any great numbers, viz at Yellowstone, at the Grand Canyon, and to a lesser degree at Yosemite. It was also at these three parks that foreign languages were frequently heard being spoken.

This pattern is relatively similar to the situation in Western Australia where park visitation is mainly from local domestic markets but where the major parks also attract visitors from the Eastern States and overseas.

The total recorded visitation to US national parks and other areas controlled by the Park Service was 331 455 176 people in 1982 and was predicted to be approximately 365 553 900 by 1984 (National Park Service, 1984). There has been an increase in visitation every year since 1974 when 209 251 200 visits were recorded.

More recent data for some of the parks visited during the study tour are presented in Table 2. From these figures it is clear that there is an enormous difference in visitation levels between the national parks of the USA and those of Western Australia. However, that is not to say that the ratio of visitors to management staff and the impact of visitation on fragile park ecosystems by the proportionately fewer visitors is any lower in Western Australia.

For example, the visitation at Torndirrup National Park near Albany is at least 300 000 persons per annum (Watson, 1984). This park was managed by only one ranger until the appointment of an assistant ranger in 1984. By comparison from Table 2 it is clear that Bandelier National Monument has only in the order of 200 000 visitors per annum. Nevertheless, the monument has a permanent staff of around 30 and a seasonal staff of around 50 extra persons.

Whereas the validity of the comparison is, of course, limited because many other factors are involved such as relative sizes of parks, relative fragility of ecosystems, and types of facility provided, nevertheless it gives some idea of the very real management difficulties facing national parks in Western Australia. The findings of studies such as the present one should therefore be considered seriously as we cannot afford to waste our very limited resources of manpower funding. We have the opportunity in Western Australia to learn from the history of parks in other parts of the world such as the USA. This is especially true for the newer parks in Australia and those that have remained sufficiently undeveloped, allowing for various options to be considered for the future.

Table 2
Visitation at four national parks, 1974 - 1983

Year	Yellowstone National Park	Grand Teton National Park	Bandelier National Monument	Grand Canyon National Park
1974	-	2 591 256	-	2 028 194
1975	-	2 807 027	-	2 754 711
1976	2 525 174	3 856 838	-	3 026 235*
1977	2 487 084	3 973 672	137 530	2 848 519
1978	2 623 141*	4 159 490*	154 623	2 984 138
1979	1 895 169	3 466 350	162 146	2 275 712
1980	2 018 852	3 489 034	177 220	2 618 713
1981	2 549 307	3 598 454	198 374	2 674 117
1982	2 404 862	3 446 270	210 844*	2 499 799
1983	2 405 653	2 571 204	199 775	2 448 545

(Data obtained from parks) - Figures not obtained * Maximum level recorded (to 1983).

N.B. Only Bandelier National Monument shows visitation levels in the same order of magnitude as Western Australian national parks.

4.3. ADMINISTRATION AND CONTROL

In Australia control of land is undertaken by individual states. By comparison, in the USA both the National Park Service and the Forest Service are federal agencies and the states generally have no formal control over land management within the national parks and national forests. Most states do, however, also have their own state park system and there are also county parks and city parks which cater for more intense recreational use.

The role of the National Park Service in particular encompasses law and order and traffic control as state police have no jurisdiction in many national parks unless an interagency agreement has been reached.

Frequently, as in some areas of Western Australia, there is a juxtaposition of national park and land controlled by the forestry agency. During the study tour there were several instances where either a road or a footpath led out of land controlled by the National Park Service into land controlled by the Forest Service and then back again. Some examples encountered were the Montville Nature Trail at Great Sand Dunes National Monument, the Big Tree Trail at Oregon Caves National Monument and the Stevens Canyon Road at Mount Rainier National Park. However, there did appear to be good liaison between management staff and the superintendents responsible for adjacent lands controlled by the different agencies. It would seem that any difficulties with foot trails could be overcome by minor formal boundary modifications, interagency agreements whereby the management boundary might be mutually accepted as slightly different from the cadastral boundary, or by simply re-routing the trails so as to keep them entirely within land controlled by one agency.



*Waterton-Glacier International Peace Park:
Canada/US border. Note cleared swathe through
forest*

At an international level there also appears to be excellent local liaison and management compatibility between staff of the US National Park Service and Parks Canada stationed at Waterton-Glacier International Peace Park, which spans the 49th Parallel between Canada and the USA. Here the boundary is marked by a six metre wide swathe cleared of vegetation - a strip which is technically outside the jurisdiction of either agency. Staff of both parks argue strongly that such a blatantly marked boundary is unnecessary, indeed an embarrassing environmental impact on the park. Although doubtless there are complex legal difficulties involved, it would seem desirable that the boundary be maintained in a less blatant manner where it passes through the park and that appropriate staff from each side of the border should have jurisdiction to uphold park regulations in both countries - at least within an overlap zone of several kilometres width. This is especially desirable for those staff in the Waterton Lake area where boats travel up the lake several kilometres into the USA where people are able to disembark.

There is also a fair amount of pedestrian through traffic along trails which cross the border and in recent years some staff have been exchanged on secondment between the two agencies on a trial basis.

The principles involved here will certainly have direct bearing on Western Australia in the future. There are several proposals for national parks or nature reserves to be gazetted on both sides of the border between Western Australia and South Australia.

The US national park system has three tiers of organisation: national HQ in Washington DC, regional offices distributed throughout the country and offices at the local level for each park or for a group of parks. Broadly speaking the roles of each tier are as follows:

- National HQ – general policy direction and overall planning
- Regional Office - co-ordination of parks within the region; provision (on request) of specialist services to individual parks
- Park Level – management of the park; local public relations.

In Western Australia there are three similar tiers of organisation with headquarters in Perth, regional offices throughout the State and individual park offices. However major differences are:

- in WA the regional officers are directly responsible for the management and administration of parks within their regions;
- the specialist services are usually provided from Perth HQ and are not generally available at the regional level.

The scale of operations is much greater in the USA than in WA.

4.4 STAFFING AT THE PARK LEVEL

There is much variation in the staffing levels within areas under Park Service control. In the smaller reserves there may be one or two full time staff as in Western Australian parks, but in large parks with high visitation and a long history, for example Yosemite, Grand Canyon and Yellowstone National Parks, a large staff numbering several hundred people at the height of the visitor season may be encountered. Within this large staff there is a breakdown into various divisions such as Resource Management, Visitor Protection, Interpretation and Maintenance, with further specialisation into, say, fire control, search and rescue, and international affairs. In the smaller parks officers typically hold several responsibilities. For example, the Chief Ranger may also be the Safety Officer.

In Western Australia a system of mobile rangers is used whereby resident park rangers are assisted by one or two mobile rangers at busy times of the year or for particular projects. The mobile rangers also manage the parks when the resident rangers are away on annual leave. Most of the 15 or so mobile rangers work in the north of the state during the busy winter season (May-September) and then assist in the south during the summer season (October-April). By contrast, in the USA the main visitor pressure is felt only in summer (there are some exceptions where winter sports are popular activities) and consequently a system of part-time seasonal rangers is used. Generally between June and September the staff of a park may increase two or even three fold as the temporary employees become operational. Many are young graduates for whom the four months work may complement formal university studies. Also, many, as in the case of permanent employees, are females. The interpretation programmes in particular rely heavily upon seasonal staff for the guided walks and evening "campfire programmes".

Whilst the mobile ranger system used in Western Australia is particularly suited to a park system where gross climatic variation produces public pressure throughout the year in different parts of the State, there is clearly a case for introduction of some seasonal employees, at least on a trial basis, in the

busy spring wildflower season at parks such as Cape Le Grand, Stirling Range and Torndirrup, and during the summer holiday period at parks such as Cape Le Grand, Torndirrup, Walpole-Nornalup and the Leeuwin-Naturaliste. The seasonal staff could complement the work of the rangers by providing better interpretation and information services in spring and by assisting with maintenance of facilities such as walkways and trails during the hectic summer season.

Another interesting issue with regard to deployment of staff is the concept of putting staff in all areas to which visitor use extends. Possibly the best example seen during the study tour was at Grand Canyon National Park where, in the past few years, because of the recognition that the canyon is the prime attraction of the park, more staff have been stationed down in the lower canyon areas. It appears that this has already reduced visitor deaths - basically because the extra rangers have added to the *in situ* medical capability in the lower canyon - hence in several incidents where visitors would previously have perished due to lack of immediate medical care, more recently lives have been saved. Of course, the concept of putting management staff where the visitors are is the basis by which rangers are sent into the backcountry and into wilderness zones. This type of management presence is currently lacking in Western Australia, not because it is unrecognised but rather because of the low staffing levels. However, in the Leeuwin-Naturaliste National Park, which is the State's major caving area, a specialist cave ranger has been operational now for just over two years. Although this ranger has normal management responsibilities for a section of the park, he is required to maintain good contact with speleological groups, especially at weekends. There is clearly a requirement for increased backcountry ranger patrols in several national parks of the south of the state, in particular Cape Le Grand, Fitzgerald River, Stirling Range, Porongurup, and Walpole-Nornalup National Park (Nuyts Wilderness).

4.5. PARK INTERPRETATION

In the US National Park system there is a great emphasis on park interpretation, with over 300 centres and museums, a multitude of brochures and literature on each park, regular programmes of guided walks led by "naturalists", evening camp fire programmes (usually illustrated slide talks held in outdoor amphitheatres) and even some park radio stations.



Ranger Induction, Rocky Mountain National Park. Seasonal Interpretative Staff are learning about stream ecology.

Interpretation began early in the US and even in the 1880's geyser talks were being given at Yellowstone. By 1920 a year-round naturalist was appointed at Yellowstone, and nature walks, evening camp fires and museums were all developed during the 1920's. Today visitor centres appear to fulfil a dual purpose, that of provision of information on the park - places to go, what to see, accommodation available, and so on, and interpretation, usually through displays on the park, films and slide presentations.

Most visitor centres also provide an outlet for sales of such items as maps, books and colour slides relating to the park, and many also house gift shops and cafeterias run by private businesses ("concessions").

In Western Australia there are, as yet, few interpretive trails for the reasons previously given. However, where they are provided the presentation and style of interpretive brochures used is generally superior to most of the examples seen in the US. It may be that the US National Park Service should take a greater role in production of such leaflets as it appeared that many were actually produced by co-operating amateur associations or natural history societies, and they consequently lacked a professional finish. Some excellent examples of nature trails, however, were seen in both national parks and national forests and in many cases excellent *in situ* information was presented. For example on the Tundra Trail at Rocky Mountain National Park the trail markers were small posts driven into the ground and the "message" at each stop was given on a small plate mounted onto the top of the guide post. These plates were approximately 10 x 7 cm in size but the lettering was quite adequate for up to three people to read simultaneously with ease.



Bear Valley Visitor Centre, Point Reyes National Seashore.



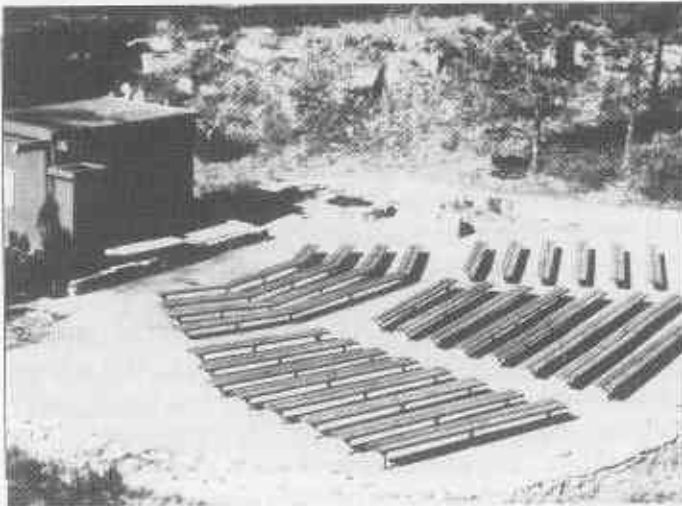
Interpretive programs, Grand Canyon National Park. Such programmes are typical at all major visitor centres.



Interpretive sign, Tundra Trail, Rocky Mountain National Park. These small plaques are 10 cm x 7 cm, and are attached to posts about 0.5 m high.

Visitor response to the various forms of interpretation appears to be very positive. All the programmes were observed to be extremely popular and it was not uncommon to see an audience of 300-500 people gathered at the outdoor amphitheatre for the evening camp fire programme.

Due to funding and fiscal restraint there has been no option in the past but to curtail any realistic move towards the provision of visitor interpretation services in Western Australia. However, an immediate increase in interpretation emphasis to the extent that every park has its own visitor centre, naturalist staff and camp fire programmes is not realistic or even desirable. However, in Western Australia we are presently unable to fulfil our obligation to provide for visitor appreciation and understanding of national parks through education and interpretation programmes, and efforts must be made to change this.



Campfire programme amphitheatre, Bandedier National Monument. At dusk over 200 people may attend a slide show talk given by an interpretation ranger. The campfire is lit in the fire ring to the right of the building. The screen and projector are housed in the building.

At the very least, consideration could be given to small visitor centres in the Esperance District, probably at Cape Le Grand National Park, at the Fitzgerald River National Park, at Albany for the parks of that district, and in the Leeuwin-Naturaliste area. These centres would need to have good quality static display, be staffed by seasonal employees during periods of high visitor use and have the ability to supply information on parks of the district and region as necessary.

Another innovation which could be used in Western Australia is that of "park newspapers". In the US these are produced jointly by "co-operating organisations" and the Park Service, and they supplement the glossy park brochures by giving easily readable, up-to-date information and stories about each park. They are extremely cheap to produce and are more readable to a greater number of visitors than high quality brochures. In the South Coast Region of Western Australia, newspapers could be introduced on a trial basis at, say, Albany and Esperance to serve groups of parks within each district. They could be used to disseminate current information on trails, management problems, safety messages, for example.

Despite the great emphasis in the US on park interpretation and the existence of many excellent visitor centres within national parks, many of the lower key interpretation facilities are either poorly designed, poorly interpreted or just run down. This was particularly noticeable at Yellowstone National Park where, of all places, the stories to be told are numerous in what is virtually a landscape of living geology. There appeared to be little use by the public of self-guide leaflets available at most of the nature trails here. This was largely due to poor location of some of the leaflet holders and lack of eye-catching signs to encourage public use of the leaflets. Many of the leaflets were poorly presented. Moreover, full use was not made of alternatives such as simple yet attractive information boards at each point of interest. During the peak visitor season there are many interpretive rangers on site at such areas but clearly significant numbers of visitors use the nature trails at other times of the year when, because of the lower visitor numbers, it is easier to appreciate interpretation of the landscape anyway.

4.6. VOLUNTEERS AND UNEMPLOYMENT PROGRAMMES

Volunteers play a major role in many of the programmes within US national parks. There are many schemes in operation, some of which are funded through the park service and others which are undertaken with the assistance or supervision of service staff, but which are funded by outside organisations. Similar schemes operate in national forest areas.

The main service programme is the VIP scheme (volunteers in parks), under which the agency can reimburse out-of-pocket expenses to volunteers or even pay for services. The volunteers are covered by workers compensation insurance. An interesting category within the VIP programme is the 'camp host scheme'. Under this scheme an elderly couple stay in their own caravan, free of charge, at a popular camp ground and in return keep the area clean and tidy, and help other campers with enquiries. The hosts do not collect fees and do not wear a park service uniform but they are identified by a sign at their caravan site and by a badge. This scheme clearly has potential value in Western Australia where frequently the valuable time of a mobile ranger with multiple skills is solely taken up with helping run camp sites or caravan parks at busy periods. The scheme may have value at Lucky Bay and Le Grand Beach (Cape Le Grand National Park), Coalmine Beach (Walpole-Nornalup National Park), and Moingup Springs (Stirling Range National Park). If successful, short periods with hosts might also be useful at Cape Arid and Stokes National Parks.

A significant step in the development of many US national parks was the work undertaken in the depression years of the 1930's under the CCC scheme (Civilian Conservation Corps). This scheme provided jobs for thousands of unemployed persons and resulted in the construction of numerous buildings, trails, bridges, roads and even new walkways and tunnels in show caves (the term 'show cave' is generally used in the US for publicly open 'tourist caves'). Generally this work was of an excellent standard and most of the buildings and trails are still in use today and are in excellent condition. There were some problems with rapid development of visitor facilities structures but in general the programme provided a great boost to park service and provided facilities which would now be prohibitively expensive to construct.



In 1980 a small volunteer programme was introduced in Western Australian national parks of the Albany region. This programme has seen the involvement of many volunteers with park projects, especially on coastal and mountain trail projects. From the evidence seen in the US, there is no reason to alter the basic philosophy behind this scheme but some recognition of the efforts of volunteers through, for example, issue of badges might be worthy of consideration. Furthermore, if Australia follows trends in the US then there will be an increasing demand for people to volunteer their services in national parks and other reserves - hence schemes such as that introduced in 1980 should continue and be expanded in response to public support.

Volunteer helping to clear snow from footpath, Rocky Mountain National Park. Note volunteer badges.

4.7. CONCESSIONS

The US has a long and, according to some, a sad history of concessions (private business operations) within national parks. There are various arrangements whereby the businesses operate, usually providing visitor services such as gift shops, food, accommodation and transport (for example shuttle buses, coach tours, raft trips, mules/horses for hire, and so on).

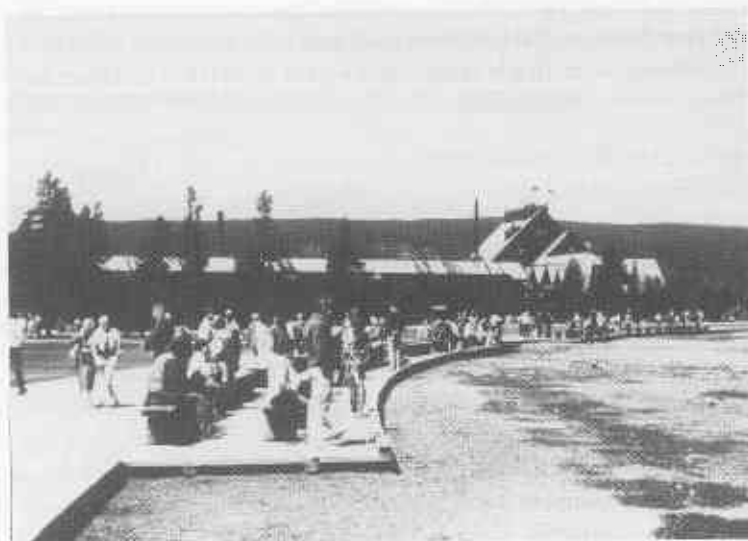
The concessions fall into three broad categories:

- "commercial use licence" - covers a business operation such as river raft trips through a park
- "permits" - generally covers the renting of space in a building owned by the Government. The period of the permit is less than 5 years and the annual turnover of business is less than \$100 000
- "contracts" - various arrangements generally covering periods greater than 5 years and annual turnover greater than \$100 000.

When one considers that the primary objectives of concessions and the park service differ it is not surprising that the relationship between the two is often fraught with difficulties. The concessionaire is primarily concerned with running a successful business, making a profit, and preferably but not necessarily also having satisfied customers.

By comparison the Park Service is a publicly accountable agency primarily concerned with managing the national park, that is protecting the resources and providing the means for people to enjoy the parks. The facilities provided by concessionaires may have to be accepted by the Park Service, largely for historical and political reasons, but they are not generally regarded as essential.

In the old established national parks such as Yellowstone, Grand Canyon and Yosemite some of the services provided by concessions have become part and parcel of the historical development of the parks - indeed some of the old buildings such as Old Faithful Inn are now rated as worthy of heritage protection.



Old Faithful, Yellowstone National Park. Note the effectiveness of the low barrier in keeping visitors off the geyser field.

Whereas in larger parks such as Yellowstone it is reasonable that overnight accommodation is available within the park, the precedent has led to all manner of concession activities even in quite small parks. The legacy of concession activity at Grand Canyon and Yosemite has to be seen to be believed and makes the prudent observer realise how fortunate the Western Australian National Park system is not to have the concession 'circus'.

Ironically, concessions were strongly encouraged by Stephen Mather, the first Director of the Park Service, because he considered that the future of the parks lay in strong public support and at the time that was more likely to be realised through quality accommodation within parks and easy means of travel to the parks. It is no accident that the early parks were well serviced by the major railroads. The sad thing is, however, that nowadays concession prices which are "approved by the National Parks Service" and clearly described as such to visitors are all too frequently excessive. The quality of accommodation and service is what one would expect for about half to two thirds of the price charged. The concessionaires argue that they have a short summer season and high transportation costs and therefore prices charged must be higher. On the other hand, the market is guaranteed and nearby facilities just outside the parks, for example at West Yellowstone or Gairdner, should have the same seasons and transportation problems, and yet this is not as apparent in their prices.

Whereas individual officers of the Park Service recognise and may agree with these comments, they generally are powerless to act because the concessionaires have no hesitation in using their superior business skills (including full time lawyers in some parks) and their political allies to veto any moves by the Park Service or Park Superintendent that could conceivably affect their profit margins.

To quote one National Park Service employee "...concessions can absolutely engulf a government operation..."

In Western Australia there are some business operations within the national parks but fortunately they are on a relatively small scale and relations are good between the parties. However there are regular complaints about some businesses and quite frequently the public does not appreciate that the business is not being run directly by the Government.

The potential problems posed by large concessions may have quite innocent looking beginnings. Within the space of a few years control of the concession at one national monument in the US passed from a local board of directors to a subsidiary company of a major multi-national corporation.

There are signs that the US Government would like to see the role of concessionaires further expanded into such areas as collection of park entry fees, becoming involved in park interpretation and running the Park Service campsites. It is no surprise that National Park Service staff generally view such proposals with alarm. If concession activities are to become more firmly established within Western Australian national parks then it is essential that:

- strong, very carefully drafted legislation be developed with a view to management control being effective and not subservient to political whims at a later date
- the managing agency be provided with sufficient trained staff and the necessary funds to manage concessions in a professional and responsible manner.

In Western Australia the provision of visitor facilities such as overnight accommodation is encouraged outside national parks either in nearby towns or adjacent to the park boundary. In the US such development has also developed as evidenced by towns such as Gairdner, Cooke City, West Yellowstone (Yellowstone National Park), Jackson (Grand Teton National Park), Estes Park (Rocky Mountain National Park). The appearance of some of these towns is a sobering reminder of what some people will do for a "quick buck". Most of the accommodation houses compete against each other with large neon signs and there are 'National Park railways', 'National Park villages', 'National Park fun fairs', and so on.

There is clearly no necessity to compromise park values by tolerating similar developments within national parks.

4.8. PLANNING AND DEVELOPMENT

In the USA there appears to be a strong belief in the development of management statements for parks and in the involvement of the public in the preparation of such plans. Provided the necessary planning and administrative staff are available this seems to be an admirable approach. In Western Australia there are clearly insufficient staff to encourage and administer meaningful public involvement at present, although this situation will hopefully improve under the Department of Conservation and Land Management.

The US National Park Service produces two types of plan - "general management plans" (master plans), and specific "implementation plans". The general management plans review the overall management direction, security of tenure, and suchlike, for each National Park. They also develop appropriate zoning. The implementation plans deal with specific aspects of park management - for example, fire management, bear management, search and rescue, backcountry use, and so on. During the course of the study tour examples of both types of plan were obtained. In Western Australia both types of plan are used. Here, however, with the closer juxtaposition of many parks and with stronger regional control it is likely that a third planning level will be required, that is regional plans. These may be either general management plans or specific implementation plans - for example, dealing with coastal management or search and rescue.

Planning at the site level within parks does seem to have been as well if not better handled in Western Australia. This is probably because of the small number of people involved. The actual work is either done or supervised by the Ranger who certainly is responsible for ongoing maintenance of the facility.

By contrast in the US the process seems to involve people in several branches or divisions. The actual work may be done by a work crew or a maintenance crew and the ongoing maintenance is not as regular as in Western Australia where the Ranger is a generalist rather than one of many specialists.

In the US park system there are some outstanding examples of good site development and planning but there are many examples of poorly maintained and neglected sites even in the major parks.



Heavily impacted site at Petrified Forest National Park. Note braided trails, trampling of vegetation, and soil compaction.

The design and alignment of roads is one of the biggest single contributory factors to the impact of the public on park resources and landscape. In general roads in the US park system lie lightly on the land and the Park service has not fallen into the trap of continually widening roads and enlarging car parks in response to peak seasonal demands. This is partly due to the enormous costs associated with road construction in what is often very rugged terrain but also to a conscious effort on behalf of the service to resist pressures from the Federal Highway Administration (equivalent of Main Roads Department) for improvements based on engineering standards. The Park Service has made some compromises - for example, it generally uses standard road traffic signs for traffic control and only uses routed wood or brown and white reflective signs for park/facility information. With regard to guide posts and crash barriers, national park roads in Western Australia are much more "protected". In the USA it is usual to find roads with only a white line to deter motorists from driving over the edge of a precipitous slope. From the park accident records it is clear that motorists have a great sense of self preservation for driving accidents on these roads are quite rare.



Trail Ridge Road, Rocky Mountain National Park. Note complete lack of guide posts and crash barriers. Only a white line delineates the edge of the road.

4.9. VISITOR FACILITIES

The Park Service provides both day visitor facilities and camping areas in most parks. The day use facilities generally comprise picnic facilities and "restrooms" (toilets) either at a specific location for that purpose or as an adjunct to car parking areas at major features of interest and at trailheads. As previously mentioned numerous examples of poor site development were seen and the majority of these were at day use areas. By contrast overnight facilities tended to be much better planned and maintained - possibly because people are paying extra fees to camp and therefore they expect and will "demand" acceptable facilities in association with camp sites. Most campsites are laid out as a defined area containing a picnic site. Generally water taps, rubbish bins and small toilet blocks are shared by several such sites. In some instances visitors self-register at some central point and display a receipt stub written by themselves on a small clipboard arrangement at the selected site. As most areas are designed upon circuit feeder roads the ranger staff simply drive around slowly and check from their vehicle that a valid receipt stub is on display. This system clearly has merit during peak visitor periods or for very busy camping areas. However, in most instances the system would not save management time in Western Australia and it would have the further disadvantage of reducing the face to face contact opportunities between park rangers and visitors. (In the US there are plenty of interpretation staff around to retain the personal contact, whereas in Western Australia there is usually only one ranger per park).

As may be anticipated these well maintained campsites tend to fill up quickly especially during peak holiday periods. This problem may be overcome by the visitor pre-booking in most instances. Sometimes the parks have an "overflow area" available for use at peak times.

4.10 PARK BUILDINGS

As in Western Australia where possible accommodation for all full time personnel is provided within each national park. However, for large parks with high staffing levels this results in mini-villages of park housing, storage sheds, vehicle compounds, etc. These communities really burst at the seams when all the seasonal rangers come on stream and most seasonals have to live in small transportable units which are frequently of a very poor standard.

Furthermore, whereas visitor centres have generally been architect designed and are often lavishly furnished and maintained, more basic, yet essential buildings like toilets are often allowed to become run down. However, one has to sympathise with the Park Service because of the sheer numbers of people using toilets. It is not unusual to find that toilets are hosed down and cleaned out at least twice a day at peak visitor times. Many of the toilets are unisex and in some instances solar energy powered oil flushed toilets are utilised (e.g. Trail Ridge road, Rocky Mountain National Park). The Park Service also faces a difficulty in many locations because the ground is rocky, waterlogged or frozen for much of the year. Hence use of septic systems with leach drains as is the norm in Western Australia is not generally viable. Instead sewage is simply held in large sub-surface tanks which are pumped out as necessary with the sewage then being transported to carefully located oxidation ponds, or preferably being taken out of the park completely. Overall we have nothing to be ashamed of in Western Australian national parks with regard to either our water flushed toilets or the more common borehole toilets.

However, there is no case for relaxation in building maintenance. It is essential that where possible quality buildings or facilities be provided in the first instance and that funds be used to maintain them to the same high standard on a regular basis.

4.11 TRAILS AND BOARDWALKS

The terms "trail" and "boardwalk" are favoured by management staff in the US but are essentially synonymous with "track", "path", and "footpath", "walk" (eg "nature walk") as used in Australia and Europe. Generally a trail indicates a walking route of some distance and boardwalks refer to short heavily used walks through fragile areas, typically interpretive walks. However, boardwalks are occasionally located at trouble spots, such as swampy terrain on popular long distance trails.

Many of the problems of track erosion due to compaction by walkers, subsequent gullying and water erosion are all too common in the US. Generally there is a much heavier volume of pedestrian traffic in the US and many areas suffer badly from seasonal snow cover, especially the slushy conditions of spring when many people want to visit the parks with the first fine weather but when the trails are totally or, worse still, partially snow covered. Throughout the study tour many examples of management staff struggling with this problem were seen. Usually small orange marker flags were placed in the snow to define the route which lay under the snow. At the Tundra Trail in Rocky Mountain National Park visitors were requested by signs to stay on the marked trail but this became hard when up to 15 cm of water and slush lay across the trail and there was relatively dry ground a few metres to either side. Most people were not wearing boots or waterproof shoes and so they tended to take the drier option. Of course the pattern of snowfall and snowdrifts varies from year to year so it is not simply a case of identifying low spots, that is a simple drainage problem, but a problem which occurs at different points along a given trail each year.



Spring snow over paths, tundra zone, Rocky Mountain National Park. Note temporary track markers and wet conditions at edge of snowdrift.



Sensitively designed boardwalk, Logan Pass area, Waterton-Glacier National Park.

There was extensive use of boardwalks at Yellowstone National Park especially through the geyser fields. Many of the boardwalks did not have side rails and as a result their visual impact on the flat open geyser basins was significantly reduced. Comments on the safety aspect of these particular boardwalks follows in Section 6.4 of this report.

Similar sensitive yet functional low design was also seen at Waterton Glacier National Park on the Hanging Gardens Self-Guiding Trail, near the Logan Pass Visitor Centre.

At Yellowstone the Park Service is experimenting with different types of timber/treatments in terms of durability and possible pollution of the thermal features through the leaching out of the wood protection chemicals. In one experiment seen at West Thumb in Yellowstone three treatments were being compared:

- untreated timber
- CCA treated pine (water based)
- pentachlorophenol treated Douglas Fir (oil based)

As yet no data is available on the experiments, although previous studies indicate that untreated timbers begin to rot noticeably within about 5 years. The importance of boardwalks at Yellowstone cannot be underestimated. At least 1 million visitors use them annually and without them entry into the geyser basins would be both dangerous and environmentally damaging.



Boardwalks at Yellowstone National Park. Note experimental use of different timber treatments.

The Park Service also has many miles of bitumen footpaths generally radiating from the more popular visitor nodes in the more heavily used national parks. Examples were encountered at Yellowstone, Rocky Mountain, Bandelier National Monument, Grand Canyon, Yosemite and Mount Rainier National Parks.

After the natural or gravel surface trails of Western Australian national parks, it was a bizarre feeling at first to walk in boots along a bitumen path through magnificent mountain scenery. At Mount Rainier National Park there were examples of alternative trail stabilisation to be seen. One method involved the edging of the track with boulders which were moveable by one person, with the boulders buried to about half depth and the path being back filled with earth and finally gravel sheeted. However there have been some problems with subsequent water erosion.

Whereas trail construction and design is clearly well advanced in the US National Parks, the system was definitely not immune from damage at points any significant distance from roadheads. Also the usual problems of visitors cutting the corners on zig-zags were apparent in most parks visited. Interestingly the zig-zag trails construction by CCC programmes at Bandelier National Monument, for example, were so well constructed in the first place that now, some 50 years later, there has been minimal short cutting. The moral is probably to build paths well and use good alignments in the first place. This approach is currently being used in the Stirling Range National Park in Western Australia where a long overdue good quality path is being constructed up Bluff Knoll, the highest peak in the south of the State.



Attempts to control path erosion, Mount Rainier National Park.

4.12. RESEARCH

Most of the larger national parks have their own biological research teams which undertake scientific studies designed to assist ecosystem management within the park and the surrounding region. Many of the influences to be monitored are external - for example, air and water quality are uncontrollable at a regional or larger scale, also much of the native fauna is very broad ranging with migration patterns beyond cadastral park boundaries. This latter consideration has led, for example, to a Grizzly Bear Management Zone which extends well beyond the boundaries of Yellowstone National Park into the surrounding national forests. The Yellowstone Bear Management Programme will be discussed later in section 6.5 of this report.

Social science research appears to be lacking in the Park Service. There is much statistical data on visitor use levels, accident figures, etc. but there are very few internal studies on visitor perceptions and attitudes, for example. Studies are of course undertaken by tertiary institutions often as research towards higher degrees. By contrast the Forest Service appears to have much greater emphasis on social science and recreation research. For example, the publications on wilderness management produced by Wilderness Research Unit at the Intermountain Forest and Range Experiment Station in Missoula are prolific and have certainly influenced wilderness and backcountry management in both national parks and national forests. The apparent lack of social research by the Park Service is surprising especially when one considers the enormous visitation experienced by national parks and the great emphasis in interpretation services.

4.13. PARKS IN CANADA

Towards the end of the study tour a short period was spent in two provinces of Canada - British Columbia and Alberta. The region visited contains the spectacular and world renowned national parks of the Canadian Rockies.

Some time was also spent with officers of the Parks Branch of the British Columbia Ministry of Lands, Parks and Housing. Whereas it is well beyond the scope of this report to review in detail national parks and provincial parks in Canada a few brief comments may help to place the Canadian system in context with the Australian and US systems.

First, national parks in Canada are run by a federal agency called "Parks Canada". The agency has its headquarters in Ottawa and has five regional offices in Calgary (Alberta), Winnipeg (Manitoba), Cornwall (Ontario) Ste-Foy (Quebec) and Halifax (Nova Scotia).

However, in addition to federal national parks each Province (i.e. State) has its own provincial park system and it seems that in British Columbia at least many significant areas are reserved as part of that system rather than as federal national parks. However, the basic management philosophies of the provincial parks agency, for large



Interpretive sign, Bow Summit Nature Trail, Banff National Park, Canada. Note bilingual presentation and "observation hole" near base of sign.

scenic areas at least, appears to be very much along traditional national park lines. So in Canada there is really a mixture of the US system, i.e. federal national parks, and the Australian system, i.e. State (or provincial) parks run as national parks.

Ironically the great Alpine national parks of the Rockies are all transected by major highways such as Canada Highway 1. This probably results in a false impression among most visitors who really see the parks from the security of a vehicle on a four-lane highway. All major park education services are located on these through routes or in associated towns. (In Canada the term "education" is used in preference to "interpretation" to avoid confusion with the linguistic meaning of interpretation. Indeed all signs, brochures and films in Canadian national parks are presented in both English and French in accordance with official federal government policy).

It was found that the style of site development in Canada was more similar to that used in Western Australia with low key signs, emphasis on self-guiding nature walks and fewer ranger led excursions than in the US. Whereas in the US national parks the chances of seeing rangers was relatively high even at some distance from major attractions, in Canada this was not so. This probably results in a more relaxed feeling amongst visitors.

The Canadians also appear to aim for fewer facilities or attractions but try and manage these well. Some of the boardwalks and nature trails were the best seen on the whole study tour.



Sensitively designed boardwalk, Giant Cedars Trail, Mount Revelstoke National Park, Canada.

5. WILDERNESS MANAGEMENT

5.1. THE US NATIONAL WILDERNESS PRESERVATION SYSTEM

After eight years of debate in Congress the US Wilderness Act was finally passed in 1964. This was the first document in world history to specifically protect wilderness (Nash, 1978). Under Section 2(c) of the Act, Wilderness was defined as follows:

"A wilderness, in contrast with those areas where man and his own works dominate the landscape is hereby recognised as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value".

Some eleven years later, in 1975, the Eastern Wilderness Act was declared by Congress. This Act provided for addition of further national forest lands to the National Wilderness Preservation System in the more populous eastern half of the United States.

Finally, in 1976, the Federal Land Policy and Management Act enabled the designation of appropriate public lands administered by the Bureau of Land Management to be included within the National Wilderness Preservation System.

In the foreword to the book "Wilderness Management" (Hendee, Stankey and Lucas, 1978) the Secretary of the Interior and the Secretary of Agriculture reviewed the situation in early 1977 as follows:

- 167 wilderness areas in 39 States totalling 14 million acres
- Areas proposed to Congress for Wilderness classification 24.4 million acres
- Areas being studied for wilderness classification 23.7 million acres
- numerous proposals for additional wilderness areas being introduced to Congress, including vast additions in Alaska.

"The stage is set for the ultimate designation of a National Wilderness Preservation System exceeding 100 million acres".

In 1984, the most recent data available indicated that the system had grown to a little over 80 million acres, 56 million acres of which is the "vast additions in Alaska" being proposed around 1977.

The historical roots of wilderness and evolution of the concept towards the 1964 Wilderness Act are probably best described by Nash (1978). Some key points in the evolution are:

- the activities of John Muir in Yosemite around the 1890's (see Murphy and Collins, 1981).
- the designation in 1924, of 574 000 acres of Gila National Forest in New Mexico, as a reserve for "wilderness recreation", largely due to the efforts of foresters Arthur Carhart and Aldo Leopold.
- recognition of "wilderness character" in the bills establishing Grand Teton National Park around 1929 and formal designation in 1934 of the Florida wetlands, Everglades National Park, as "permanently preserved wilderness".
- establishment of the Wilderness Society in 1935.
- the activities of Robert (Bob) Marshall, especially during the period 1933-1939, when he was director of the Forestry Division of the US Office of Indian Affairs.
- the commencement in 1948 of a Biennial Wilderness Conference sponsored by the Sierra Club.

By 1984 the US Wilderness Preservation System comprised areas of public land controlled by three agencies within the Department of the Interior (National Parks Service, Fish and Wildlife Service and the Bureau of Land Management) and one agency within the Department of Agriculture (Forest Service).

The relative distribution of wilderness between these agencies is summarised in Table 3. During the study period visits were made to several designated wilderness areas and discussions on wilderness were held with officers of both the US Forest Service and the US National Park Service. As shown in Table 3 these two agencies collectively account for some 97 per cent of designated wilderness in the lower 48 States and Hawaii (i.e. excluding the special case of Alaska), hence the lack of discussions with officers of the US fish and Wildlife Service and the US Bureau of Land Management is probably not a serious omission from the study.

5.2. WILDERNESS IN NATIONAL FORESTS

The large proportion of designated wilderness within national forests is probably due to two major factors.

First, as early as 1929 the Forest Service had introduced its own system of wilderness classification through the so-called L-20 Regulation. During the ten years in which this regulation was in force the total area of wilderness in national forests grew spectacularly to over 14 million acres. In 1939 the L-20 Regulation was superseded by the "U-Regulations" which defined more precisely the classification of wilderness as being suitable tracts of land not less than 100 000 acres in size. The regulation also introduced the concept of "wild areas" being 5 000 - 100 000 acres in size and "roadless areas" which were to be managed for recreational use "substantially in their natural condition". However, with the outbreak and aftermath of World War II the description of areas under the U Regulations stagnated. Thus, at the time of introduction of the 1964 Wilderness Act there was an existing series of areas classified as wilderness by the Forest Service together with many others already identified for their potential as wilderness.

Second, the 1964 Wilderness Act placed much emphasis on the protection of wilderness from both internal and external pressures. The conservation movement, while critical of some management policies within the backcountry areas of national parks, was probably more concerned at the multiple use policies

Table 3
US National Wilderness Preservation System January, 1984

Location	Agency	Units	Area (acres)	Percentage
Lower 48 States and Hawaii	Forest Service	151	20 066 202	84.6
	National Park Service	27	2 985 400	12.6
	Fish and Wildlife Service	49	652 096	2.7
	Bureau of Land Management	6	18 818	0.1
		233	23 722 516	100.00
Alaska	Forest Service	14	5 453 366	9.7
	National Park Service	8	32 355 000	57.3
	Fish and Wildlife Service	21	18 676 302	33.0
	Bureau of Land Management	-	-	-
		43	56 484 668	100.00
US Total	Forest Service	165	25 519 568	31.8
	National Park Service	35	35 340 400	44.1
	Fish and Wildlife Service	70	19 328 398	24.1
	Bureau of Land Management	6	18 818	-
		276	80 207 184	100.00

(Data from US Forest Service Recreation Management Staff, January 1984).

of national forests, for example, reduced protection against logging, grazing and the construction of fire roads ("fire breaks" in WA terminology).

The conservationist priorities were probably seen to require immediate legislative action to create and protect wilderness within the national forest system rather than in the national parks. In fact some compromises to exploitative use were made in the 1964 Act including continuation of grazing activities in some national forest areas and mining on claims established prior to December 31, 1983.

A more recent issue causing internal debate within the Forest Service is the classification of wilderness into further sub-zones of wilderness, for example, in the Indian Peaks Wilderness in the Arapaho and Roosevelt National Forests of Colorado. However, provided all zones meet the minimum requirements as defined within the 1964 Wilderness Act and within Forest Service wilderness policy then this sub-zoning is probably a useful refinement which will further protect the wilderness resource.

5.3. WILDERNESS IN NATIONAL PARKS

Whereas upon the introduction of the 1964 Wilderness Act approximately 9 million acres of land controlled by the Forest Service was immediately brought into the National Wilderness Preservation System, no wilderness was established within national parks until 1970 and by 1976 only about one million acres of national park land had been designated as part of the system. The data in Table 3 show that the area of designated wilderness within national parks had grown by 1984 to just under three million acres in the lower 48 States and Hawaii, a large area but still less than a third of the 1964 immediate designations in national forest.

However, with the 1980 designations in Alaska over 32 million acres of national park wilderness was added to the system with the result that overall national park wilderness accounted for 44 per cent of the system by 1984 compared with a total of 32 per cent being national forest wilderness.

The relatively low areas of national park wilderness in the lower 48 States and Hawaii reflect at least two factors.

First, on the introduction of the 1964 Wilderness Act both the Secretary for Agriculture (Forest Service) and Secretary for the Interior (National Parks Service, Fish and Wildlife Department) were instructed to review over a ten year period all potential areas under their control for possible addition to the National Wilderness Preservation System. Whereas the Forest Service already had classified much of its land as suitable for wilderness, the National Park Service virtually had to start from scratch in reviewing all undeveloped areas over 5 000 acres. Furthermore, the procedure for designation of areas within the National Parks Wilderness Preservation system is quite complex with public involvement required at several stages. Consequently there has built up a back log of assessments due to the sheer administrative requirements involved, even where there has been little controversy over the designations.

Second, as will be explored in more depth later, the national park system contains extensive areas of 'de facto' wilderness, generally referred to as "backcountry". In the twenty or so years since the introduction of the Wilderness Act the National Park Service has been proceeding with its own general park planning programmes and in many national parks has now produced "Backcountry Management Plans". These are very much oriented towards the management of people in order to control their influence on the enjoyment of others and to reduce environmental impact. It is probable that these separate initiatives over vast areas within the national park system have to some extent relieved the agency of any publicly perceived urgency to proceed towards formal designation of many areas suitable for wilderness. In fact during the study tour it was somewhat ironic to note that several of the formally designated wilderness areas appeared to have less of an aura of wilderness, or be less suited as wilderness, than many non-wilderness areas in national parks. For example, in 1984, some 20 years after the introduction of the Wilderness Act and 10 years after the initial review period ceased for additional areas there was no formal wilderness in the following major national parks:

- Yellowstone National Park
- Yosemite National Park
- Rocky Mountain National Park
- Grand Canyon National Park
- Glacier National Park

All these parks are of a huge size, world renowned, comprise spectacular and varied scenery of obvious wilderness character, and have very high backcountry use.

5.4. WILDERNESS MANAGEMENT - POLICIES AND PROCEDURES

The designation of lands as wilderness is only the first stage in their long term protection for this purpose. Next there is a requirement for the preparation of management plans so as to define more accurately the specific attributes of each wilderness and to establish the framework for a management programme that will preserve the integrity of the area for future generations. Finally the framework must be expanded upon in order that the defined management programme can be successfully implemented.

Hendee *et al.* (1978), (Chapter 7), have described in some detail eleven principles of wilderness management, which, they point out, provide the basis for the development of more specific management direction and policy. The eleven principles are as follows:

1. Wilderness is one extreme on the environmental modification spectrum.
2. The management of wilderness must be viewed in relationship to the management of adjacent lands.
3. Wilderness is a distinct, composite resource with inseparable parts.
4. The purpose of wilderness management is to produce human values and benefits.
5. Wilderness preservation requires management of human use and its impact.
6. Wilderness management should be guided by objectives set forth in area management plans.
7. Wilderness preservation requires a carrying capacity constraint.
8. Wilderness management should strive to selectively reduce the physical and social psychological impacts of use.
9. Only minimum regulation necessary to achieve wilderness management objectives should be applied.
10. The management of individual areas should be governed by a concept of nondegradation.
11. In managing use, wilderness-dependent activities should be favoured.

The US National Park Service has published a detailed set of general management policies (1978). On page 2 of the wilderness policy section the following statement is made:

"The Service's wilderness policies may vary from those of the Forest Service and the Fish and Wildlife Service, based on differing missions of the three agencies. All, however, have as their goal the preservation of wilderness character."

This sentiment is also echoed by Hendee *et al.* (1978), who stress that it is the management of wilderness that is important and not which agency formally controls the land in question.

In considering the "nature of wilderness land" the Service recognises that where previous exploitative land use has occurred without extensive developments or alteration to the landscape, then management may be successfully channelled into programmes to restore the former wilderness character. This is an important concept which may have great significance in Australia where former exploitive uses often fall into the above category. For example, in Western Australia much of the D'Entrecasteaux National Park along the south coast was grazed for many years. Grazing and associated activities such as regular burn-

ing to encourage succulent feed have undoubtedly brought about significant and possibly irreversible changes to the vegetation patterns within the area. Nevertheless, the developments from former grazing activities are minimal - a few old huts and some fencelines and watering points - and the landscape impact is also minimal. Hence it is quite legitimate that many former grazing areas within the park have been proposed essentially as wilderness by classification as 'landscape conservation areas' (Shannon-D'Entrecasteaux Planning Group, 1984).

The concept of "use of the minimum tool or equipment" is also addressed by the Park Service. This appears to be a valuable concept in reinforcing within management staff themselves the special and sensitive requirements for wilderness management.



Backcountry warden (ranger), Kootenay National Park, Canada. Warden has just returned from a three-day patrol into the back country.

On page 9 of the wilderness policies it is stated that ranger stations, patrol cabins and storage structures are permitted only to the minimum extent necessary for wilderness management. This is an issue which Australian managers of wilderness will have to face in the future, and this in turn requires a special team of rangers and the necessary minimum facilities for them to undertake management of wilderness effectively. For example, there are up to a dozen backcountry rangers in the Indian Peaks Wilderness of Colorado during the main season of use. The function of these rangers is more to provide advice and information to wilderness users rather than to police the regulations. At Yosemite National Park about six rangers are used in the backcountry. The general objective is that backcountry users would meet or see a ranger on average once a day. It is estimated that approximately 10 per cent of all backcountry users do in fact see a ranger at some stage.

The low figure in comparison to the stated objective reflects high day use of backcountry - many people do short 3-4 hour walks and hence are less likely to see a ranger.

Overall the 1978 US National Park Service Wilderness Policies appear to promote careful management of wilderness and backcountry within the national park system.

5.5. VISITOR MANAGEMENT IN WILDERNESS

Visitor use of wilderness is a major factor in all aspects of wilderness management. In the definition within the 1964 Act, wilderness is recognised

"as an area where the earth and its community of life are untrammelled by man"

and which

"has outstanding opportunities for solitude or a primitive and unconfined type of recreation".

Visitors to the wilderness, especially in large numbers or when concentrated in specific areas, clearly will have an unavoidable impact. For example, in a semi arid area the passage of, say, a group of twenty people across the landscape may leave a trail of trampled vegetation which remains visible for many years - an obvious environmental impact. Similarly, if a wilderness area is occupied by, say, 100 persons at any one time, especially if it is a relatively small area of around 5 000 acres, then clearly there will not be "outstanding opportunities for solitude" for the great majority of visitors.

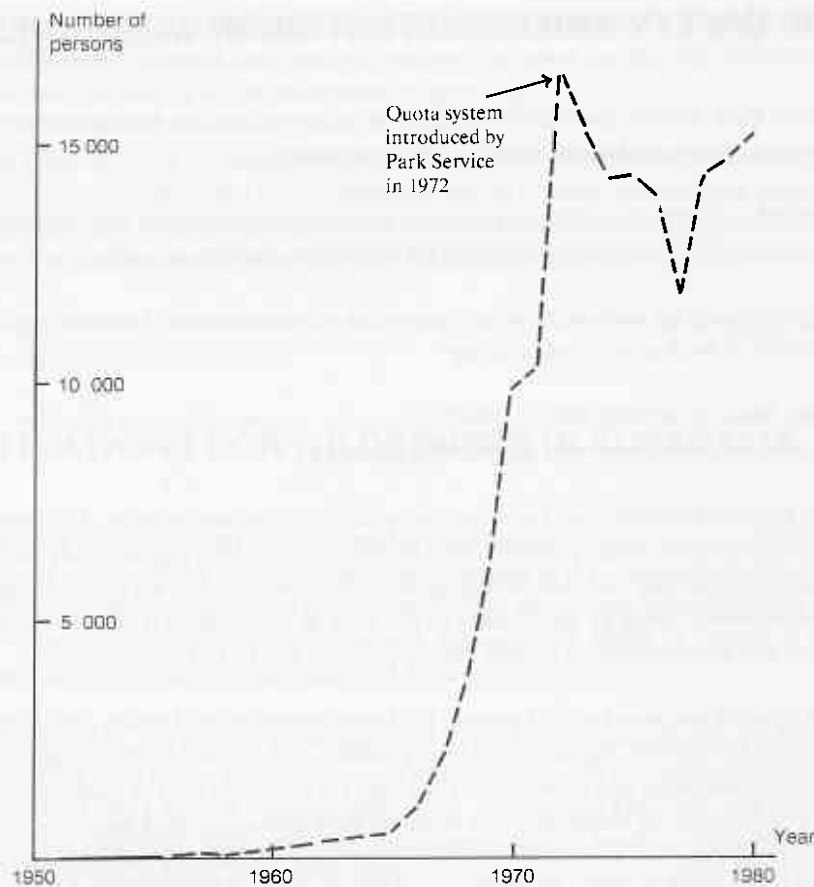
For reasons such as these it has long been recognised that wilderness has a specific "carrying capacity" in terms of both its ecological and social values. The concept of wilderness carrying capacity has been extensively researched, especially by Stankey and co-workers (see Chapter 9, Hendee *et al* , 1978). In order to achieve visitation within the carrying capacity for a wilderness area, there is in North America extensive use of visitor permit systems. These are a form of direct control over visitation as quotas can be set for specific campsites, trails or areas of the wilderness in question.

At Yosemite National Park the trailhead system operates whereby daily quotas are established for entry points to the backcountry and for overnight camping. By comparison at Grand Canyon National Park area quotas are used because here water is the dominating attraction in the arid landscape and in the absence of the area quotas walkers from all entry points would tend to concentrate at the water points. Whereas at Yosemite walkers tend to disperse off the trail system, at Grand Canyon National Park they tend to stay on trails and, of course, plan their itineraries to include available water points subject to the quota limits.

However, Stankey (1973) has argued in favour of the use wherever practical of indirect controls which are more in accord with the principle of minimum regimentation described in the previous section.

Indeed, for many areas not only is there regulation through registration but computer based reservation systems are used. For example, reservations for 75 per cent of the daily quota for Indian Peaks Wilderness in Colorado may be made through a commercial booking agency with offices in Denver, Boulder, Fort Collins and Colorado Springs. Reservations cost \$2.00 per booking. At Mount Rainier National Park the visitor centres are equipped with computer terminals. These provide rapid cross-checks of the current status of quotas and also provide statistical data for the Park Service on previous visitation levels.

Examples of indirect visitor controls include the encouragement of the public to visit the wilderness during "off peak" seasons and provision of educational material on some of the concepts of minimum impact use. This latter approach is currently used in the Nuyts Wilderness, Western Australia's only formally gazetted wilderness. Here a simple set of "ethics" is displayed on a small display board at the self registration booth on the main footpath leading into the area. The ethics request visitors to minimise their impacts upon the Nuyts area and upon the enjoyment of other visitors.



1. First person floated through in 1867
2. A total of 79 persons floated through between 1867 and 1950

Figure 2

Number of persons travelling down the Colorado River, through the Grand Canyon, 1950-1980

The approach is somewhat more sophisticated in the US Park System with special backcountry offices which are permanently staffed and which have displays, information of trail conditions, data on bear confrontations (see below) and much safety advice. During the study tour many such offices were visited, the ones at Jenny Lake, Grand Teton National park and at Canyon Village and Grand Canyon National Park being outstanding examples and a great asset to the parks concerned.

One of the most telling examples of growing use of a remote area and of the effect of direct control is provided by the history of visitation through the Grand Canyon along the Colorado River (Figure 2). Usage increased spectacularly between 1965 (547 people) and 1972 (16 342 people) - a roughly 30 fold increase in only 8 years. During the same eight year period general visitation to Grand Canyon National Park only increased from 1.7 million to 2.7 million people, that is, approximately 60 per cent increase compared with the 3 000 per cent increase in river users.

Since 1972 a quota system introduced by the Grand Canyon National Park staff has retained use at around 15 000 people per annum. In introducing the quotas the National Park Service was responding mainly to the occurrence of ecological damage in the fragile inner canyon area. Rubbish, human wastes, fireplaces and braided trails were developing and many prehistoric and historic sites near the river were being damaged. (Colorado River Management Plan and Operating Requirements, December 1981, p3).

5.6. VISITOR SAFETY AND REGISTRATION IN WILDERNESS

The US National Park Service policies on wilderness preservation and management make it quite clear that visitors must accept wilderness largely on its own terms:

"...the risks of wilderness travel, of possible dangers from accidents, and natural phenomena must be accepted as part of the wilderness experience." (p4)

However, the policies do go on to determine that safety information will be made available in each park having wilderness or backcountry, specifying:

"— the kinds of clothing and equipment necessary. — special dangers of wilderness use and precautions to be observed by the user".

Great emphasis is placed on potential hazards from wildlife, in particular bears. For example, at Yellowstone National Park (where a bear confrontation fatality occurred during the study period) the Service closely monitors bear activity and does not hesitate to close whole sections of the backcountry if an unusual bear problem arises. Even at "safe" times of the year in "safe" areas there are rigid regulations regarding sanitation and food storage to reduce (not eliminate) the risk of confrontation.

With regard to general preparedness of visitors for backcountry or wilderness travel the staff at the backcountry offices tend to "screen" people as much as possible. If they consider that visitors are attempting trips beyond their capabilities and experience, then they try to encourage the party towards planning a safer alternative. For example, at Mount Rainier National Park there is a check list of equipment recommended for those people who wish to venture into the icefields or the summit area. On the list are some items of a technical nature, for example karabiners and jumars, lack of knowledge of which would indicate a person without suitable climbing or crevasse rescue knowledge.

The use of motorised equipment including motorboats and aircraft is permitted in emergencies involving the health and safety of wilderness users. However, following the use of such equipment any damage to the wilderness is to be restored.

During the last few years there appears to have been some effort by conservationists to have "no-rescue wilderness", that is, areas in which the management agency is prevented by law from undertaking search and rescue operations for wilderness users (see for example McAvoy and Dustin 1983). During the study tour this concept was discussed with many managers of wilderness and backcountry.

While some managers were sympathetic to the concept of complete self-sufficiency, none considered that it would be practical to introduce. Several managers suggested that if, for example, the daughter or son of a prominent Congressman was lost or injured in a wilderness, then any laws preventing rescue attempts would almost certainly be revoked immediately under political and public pressure. Although permit systems are mainly introduced in order to retain visitation within acceptable carrying capacities, they clearly do have some merit in aiding search and rescue operations as the permit includes a code sequence for the places to be used or footpaths to be used. Assuming that the visitor did in fact adhere to his intentions (and wilderness or backcountry ranger patrols indicate that most users do) then the primary search area for a missing person or party is easily identified. Ranger patrols also indicate that where compulsory registration or permit systems exist then there is almost total public compliance. From observations during the study tour and discussions with both management staff and users it also appeared that where permits or registration were compulsory there was also reasonable public acceptance of the requirement. However, most areas within the National Wilderness Preservation System do not have compulsory user registration or permit controls and in these cases voluntary trail registers at or near major

entry points to the wilderness are favoured. Research on compliance levels at voluntary trail registers is not conclusive although it appears that much depends on the exact positioning of the registration point, its maintenance and the history of the wilderness in question.

In Western Australia, for example, the Nuys Wilderness voluntary registration point is thought (1984) to have in excess of 90-95 per cent compliance which is much greater than the compliance levels found in North America. This high compliance level is attributed to the perceived need of users to justify the quite recent designation of the wilderness (Hamilton-Smith and Watson, 1982).

For a more general discussion on visitor safety the reader is referred to Section 6 of this report and for more technical aspects to Section 7.

5.7. IMPLICATIONS FOR WILDERNESS IN AUSTRALIA

Australia differs markedly from North America with regard to the provision of wilderness. First, in Australia lands are controlled by the individual States whereas in the United States the National Wilderness Preservation System is comprised of federal lands. This means that in the US there is clearly the opportunity for consistency of wilderness status and management which of course is achieved largely through the imposition of a national act, the 1964 Wilderness Act.

In Australia, however, the status and management of wilderness varies markedly from State to State. Looked at in another way, in the US wilderness is almost totally (99 per cent) the responsibility of only three agencies, the Forest Service, the National Park Service and the Fish and Wildlife Service. In Australia, however, wilderness may in theory involve an excessive number of agencies. For example in Western Australia prior to 1985, lands with wilderness potential were managed by the National Parks Authority, the WA Wildlife Authority, the Forests Department and the Lands Department (various vested and unvested reserves plus vacant Crown land). With the passage of a Conservation and Land Management Bill, the functions of the first three agencies have been combined into one department since 1985.

The second major difference between wilderness in the US and Australia results from the relative distribution of the populations of each country in relation to the areas with wilderness potential. In the US most of the population live in the eastern two thirds of the country whereas most of the wilderness lies in the more mountainous western third. By comparison in Australia there is an intermixture of population and wilderness along the eastern seaboard, and especially in the south-eastern corner of the continent. By comparison the central and western portions of the country are physically isolated from major population centres of Australia by a vast system of deserts, and Tasmania is an island state. However, at the state level, especially in the case of Western Australia, Queensland and South Australia there probably are some parallels with the population and wilderness distributions of the US in that in each of these states the bulk of the population lives in one centre (Perth, Brisbane, Adelaide) and is to some extent physically separated from major wilderness areas.

The third difference is that the historical development of the wilderness movement in Australia is many years behind that of the US. For example, a national Wilderness Society has only recently (1984) been formed (up to 1983 only the Tasmanian Wilderness Society existed). The comparative date for the US is 1935 when the US Wilderness Society was established. This "late" development of widespread wilderness awareness in Australia is also undoubtedly due to the low population which furthermore is concentrated into an extremely small, mainly coastal area of the continent (the state capitals and only a few other major centres). Thus there remains a great sense of openness and feeling of wilderness opportunity with such a low population density in and around major outstanding natural areas. Hendee *et al.*

(1978) identify a similar complacency towards the need for wilderness in Canada. However, there is no doubt that in some parts of Australia resource development projects and increasing intensity of public wilderness type recreation have stimulated pressure for formal protection.

One dilemma which will probably face Australian wilderness policy makers is the question of public participation not only in the recognition and designation of wilderness but also in the formulation of wilderness management plans. In Western Australia potential wilderness has such low current use and support that meaningful public input to designation and planning will be hard to achieve and very probably be counter productive, especially with regard to designation. Rather there will need to be firm commitments by enlightened governments to formally recognise wilderness as a legitimate land use and provide for its establishment, subsequent planning and management.

By contrast, where an area has already been established as wilderness, or managed for backcountry use, then the arguments for and against the designation are likely to be much less emotional and the management agency may be better able to involve the public, both wilderness users and the local communities around the area, in meaningful and constructive input to ongoing management of the area.

6. VISITOR SAFETY

6.1. SAFETY IN NATIONAL PARKS

The US National Park Service has a firm commitment to the safety of park employees (including those employed by concessionaires) and park visitors. In its published management policies the Service states:

"the saving and safeguarding of human life takes precedence over all other park management activities, whether the life is of the visitor, concessioner, or park employee".

Concern for visitor safety in parks accelerated in the early 1970s when several serious accidents occurred. For example, at Yellowstone National Park a young boy died of multiple burns when he ran along one of the raised walkways through the hot thermal pools of the Upper Geyser Basin and, not seeing the way ahead through the steam, ran straight on at a "T" junction on the boardwalk, and fell into one of the pools. The US Government was sued for negligence on the basis of not having provided sufficient safety rails at such intersections. Incidents such as this created a greater awareness of visitor safety on the part of both the public and the Park Service itself, with the result that safety officers were appointed for each park. These were specialist officers in the case of the larger parks and regional centres, and nominated safety officers in the smaller parks.

The concern for safety also led to tight control and regulation of backcountry use, for example, with regard to activities such as rock climbing. Not surprisingly the backcountry users and rock climbers "rebelled", and eventually the Park Service was pressurised, through public action, into loosening the new controls. One argument advanced by many conservationists was that it is wrong to overly protect people from dangers in areas which are after all commonly recognised as being potentially hazardous.

Now, in the 1980's, it appears that many of the restrictive safety programs continue to be greatly phased down. In some cases safety signs have been removed and in other cases safety railings have been omitted from walkways where, in the climate of the early 1970's, they would probably have been required. Although claims against the Park Service are still regularly filed, the judiciary now tends to accept that it is reasonable that visitors to national parks should already be aware of most potential hazards.



*Boardwalks at Yellowstone National Park.
Note the effect on visibility of steam from
the geysers.*

6.2. SAFETY IN NATIONAL FORESTS

The US Forest Service recognises three categories of public use within national forests:

1. **"Invitees"** - visitors who come because of a direct or implied invitation through travel guide publications or developed facilities, for example, camping areas, picnic areas or major trails.
2. **"Licencees"** - visitors who come because of their perceived privilege as citizens, without invitations, but with the Government's consent, to engage in recreational opportunities not directly related to developed facilities, for example, hunting, fishing, cross-country hiking, skiing or mountain climbing.
3. **"Trespassers"** - those who come without right or authorisation to engage in wrongful use of national-forest land.

(adapted from Southwestern Region, USDA Forest Service Manual Direction, 1983).

A different level of protective care or "duty of care" is required for "invitees" and "licencees". The main duties adopted for "invitees" are hazard inspections to keep developed sites safe, and the erection of notices to warn of risks and to protect against dangers which may not be apparent to the visitor. In the case of "licencees", warning signs and other safety information are displayed at trailheads. In addition, individual known hazards within dispersed areas might require protective measures such as safety railings, fencing or other barriers if the hazard is well known. "Duties" may include removing the hazard or restricting public access by closure of specific sites.

6.3. SAFETY SIGNS

The Park Service also makes use of safety warning signs - in some instances these are of a general nature and are located at or near the entry area to a park. For example, at Yellowstone National Park a general warning sign about the potential dangers from wildlife is located just inside each park entrance station.



Typical entrance warning sign, Yellowstone National Park.

More specific signs are used at known potential hazard areas. There is no conclusive evidence that warning signs appreciably affect the likelihood of accidents occurring. The opinions expressed by park managers generally support this statement although in some instances they feel that warning signs have made a real difference to visitor behaviour. This is based on direct observation rather than accident figures which, it is generally agreed, are extremely erratic from year to year and which are also subject to non-quantifiable trends in community attitudes and social behaviour.

The main reason for the presence of safety signs appears to be to help protect the agency from legal action as it can be claimed that signs pointing out potential dangers were fair warning to park visitors. Most warning signs used in park management comprise a written message, but in some instances a graphic sign is also used. This may reinforce the written message and is thought to be more effective with foreign visitors. Good examples of such signs are to be seen in Grand Canyon National National Park, Yosemite National Park and at Golden Gate National Recreation Area.

DANGER

Grizzly and Black Bears are found throughout the park. THEY ARE USUALLY SHY AND AVOID PEOPLE, BUT WHETHER THEY AVOID YOU OR DEFEND THEMSELVES AGAINST YOU MAY DEPEND ON YOUR BEHAVIOR.

When Hiking:

1. Do Not Travel Alone. Do Not Hike After Dark.
2. Make Your Presence Known By Noise. Use Caution Where Vision Is Obstructed.
3. Do Not Carry Odorous Foods.
4. Avoid Bears When Seen. Never Approach or Feed Them.
5. If Charged By A Bear, Climb A Tree or Play Dead. You Can't Outrun A Bear, and Will Only Excite Him If You Try.

When Camping:

1. Avoid Areas Frequented By Bears. Watch For Fresh Tracks, Droppings or Signs of Digging.
2. Burn All Combustible Garbage. Carry Out Unburnable Trash.
3. At Night, Suspend Food Packs Between Two Trees And At Least 10 Feet Off The Ground. Sleep Well Away From Food Storage Area.

When Fishing:

1. Dispose Of Entrails By Puncturing The Air Bladder And Dropping In Deep Water In A Stream or Lake. They Will Decompose Naturally Without Odor.

IMPORTANT: Information On Bears Is Necessary To Protect Park Visitors. Report All Fresh Bear Sign, Damage, or Personal Injuries To A Park Ranger. Thank You.

— National Park Service —

Grizzly and Black Bear warning signs, Yellowstone National Park.

6.4. DESIGN OF FACILITIES

Clearly much can be written about basic facility design and safety considerations. However, two main types of facility which illustrate the principles involved and which are used in Western Australian national parks are walkways and protective railings.

Some reference has already been made to the walkways through thermal areas at Yellowstone National Park. Despite occasional accidents the Service has been able to limit the use of safety barriers and railings to those areas where thermal features are really close, where visitation is very high, or where visibility problems arise from the steam. Most of the boardwalks are raised above the ground by about 0.5 m. This in itself is a natural deterrent to people walking close to the edges. The standard minimum width of boardwalks is now 6 feet (1.6 m). Railings are often provided to prevent or deter people from moving onto unsafe or environmentally fragile areas. They also provide a hand rail for elderly or unsteady visitors. Whereas railings appeared to be relatively widely used in the parks visited during this study, there were many sites where applying Western Australian standards, more railings would have been installed. Indeed, the relative lack of railings and other effective barriers at places such as Grand Canyon National Park and Crater Lake National Park was quite surprising. However, there is a great deal more potentially dangerous cliff line to be managed at these two parks than in Western Australian parks and hence the costs and landscape impacts of signs and railings would be unacceptable.

6.5. SAFETY LITERATURE AND INFORMATION

While there may be a comparative scarcity of safety signs and protective railings in the US national parks, considerable emphasis is placed on developing visitor awareness of safety issues through liberal provision of other safety information and interpretive materials.

Any specific dangers in a park are generally clearly pointed out on the park information brochures, and in some instances special brochures on safety issues are available.

Some of the best examples seen during the study tour were the hiking safety brochures at Grand Canyon National Park and coastal safety leaflets at Golden Gate National Recreation Area.

Many parks have special safety displays and the one in the Grand Canyon National Park Backcountry Office is outstanding in this regard.

Static displays and written safety advice are reinforced by oral warnings. For example, reference to safety is usually made during the introductory section of each evening camp fire program and interpretation staff also remind visitors of any special dangers. All backcountry offices place great emphasis on safety, as discussed previously.



Poorly protected footpath, Crater Lake National Park. The ground 3m to the right of the child drops as a steep scree slope some 300m to the waters of Crater Lake (left).

Backcountry office displays, Grand Canyon National Park (below).



Part of Hiking Safety Display, Grand Canyon National Park (Left).

Oral warnings are probably the most effective way of reaching children. For example, at Yellowstone National Park some rangers ask children to hold their parent's hand on boardwalks to stop the parents from falling off - a piece of "reverse psychology" which appears to work.

Special dangers merit special programs. For example, bears and especially the grizzly bear, have potential for extremely dangerous confrontations with park visitors. The Park Service generally adopts a policy that the bears "belong" and the humans are the visitors - thus man must learn to live with the bears and to adapt so as to minimise potential for confrontation. For this reason there are extremely detailed rules which apply to all park users, visitors and employees alike, and which are enforced. These include camping restrictions, controls over the visibility of food containers in cars, and regulation of rubbish disposal, to name a few. The Service closes sections of the backcountry when a dangerous bear is in the vicinity and it also provide statistical information to backcountry users on the likelihood of having a confrontation with a bear in any area. Just as in Australia there will always be deaths or serious accidents due to shark or crocodile attacks and snakes or poisonous insect bites, so too there will always be incidents with bears in North America. However considering the enormous park visitation in the US the record is good, and responsible bear management programs which include public education and information programs are clearly contributing to the success.

6.6. SAFETY IN CAVES

Many of the caves and related karst features of North America are located within national parks or on other government controlled lands. There are three broad patterns of cave visitation, as follows:

- (i) Tourists visiting commercial show caves
- (ii) Tourists and/or amateur speleologists visiting more challenging sections of commercial show caves on what are termed "spelunking tours" in the US.
- (iii) Amateur speleologists and others visiting "wild" caves, that is non-commercial caves.

Each type of visitation presents special problems for the cave managing agency involved. In the case of commercial show caves, safety issues involve both the cave and its associated walkways and the fitness of the visitors themselves. Obviously walkways must be easy and safe to use, with adequate lighting and handrails where necessary. The actual route taken by a walkway can be used not only to protect delicate formations from damage by making sure they are well out of reach, but also to reduce risks of bumped heads by avoiding areas with low ceilings. Often extra lighting or verbal warning from the cave guide may be required to promote safety.

The cave visitors obviously need to be reasonably fit. This is especially important in deep caves, those located in high altitudes, and caves having tight passages and walkways which require much stooping and bending. Where cave guides are present there is usually an opportunity for some discreet screening of visitors and on most tours an opportunity is given early on for persons to decide not to continue. At most show caves visited on the study tour incidents had arisen where elderly or handicapped people had been urged by their families to take a tour against their own better judgement with the result that small accidents had occurred.

Footwear is another important consideration, especially in wet caves where slippery conditions may be encountered on walkways. For example, the Carlsbaad Caverns are a long way from the nearest overnight accommodation in the town of Carlsbaad. However, publicity in the town about suitable footwear allows cave visitors to prepare themselves adequately before their journey to the caves.

One would expect that the more challenging "spelunking tours" would result in more accidents. However, there seems to be little evidence to indicate this is the case. This is probably because the participants on these tours are likely to be fitter and in a younger age bracket than the average tourist. There are also tighter management controls over the nature and quality of equipment and visitor behaviour. For example, at Wind Cave in South Dakota the cave guide spends at least 30 minutes with each spelunking party before entering the caves. In this period the group is provided with overalls, lights (several sources of light are carried by each person), and helmets. The group is also told about the requirement to avoid touching cave formations. Basic safety rules may also be covered. Generally, there is a good guide to participant ratio, with some tours comprising as few as five people. This too undoubtedly contributes to the good safety record of such tours.

In the case of the third category of cave visitor, namely the amateur speleologists and others visiting "wild caves", there is not much that the managing agency can do and safety is highly dependent upon an individual's caving experience and awareness of safety requirements. For those belonging to recognised caving societies there is generally a reasonable level of caving experience, and the groups most at risk are ones with no experience, especially those who enter wild caves without any proper training and without suitable equipment or protective clothing. Knutson (1981) has produced a simple analysis of 80 cave accidents in North America during the period 1976-79. The majority of these accidents occurred with the inexperienced groups but incidents involving experienced cavers of category 2 were almost as numerous, largely because of the more challenging caves tackled by this group.

6.7. ACCIDENT CONTROL

In the major long established national parks the National Park Service has to provide all essential community services, including police and emergency services. Hence at Yellowstone National Park, for example the Park Service has a clearly defined responsibility for the co-ordination and control of all search and rescue or accident situations, including the provision of emergency medical treatment and the transportation of injured persons to hospital facilities.

At most other national parks where concurrent control arrangements exist accident control may be shared by Federal and State agencies as appropriate to the incident. In the case of national forests and smaller areas under Park Service control, the major role in accident control and medical support may be undertaken by local agencies working within each State system.

6.8. ACCIDENT REPORTS

The National Park Service has a system of accident reporting so that within 24 hours of a fatality occurring an internal "board of inquiry" is established by the Park Superintendent. A small group of appropriate officers analyses the incident in detail and their report is circulated through other officers for further input. Accident reports are not publicly available through the Freedom of Information Act but rather they are regarded as personal classified information with protection under the Privacy Act. It appears that the use of the boards of inquiry has helped to increase safety awareness among service employees and that this in turn may have helped to reduce accidents.

6.9. IMPLICATIONS FOR WESTERN AUSTRALIA

Each year serious accidents and deaths occur within Western Australian national parks. Already a high proportion of incidents involve visitors to the coastline and the backcountry, and with growing popularity of adventure-type activities in parks the pattern is unlikely to change. Many of Western Australia's national parks contain potentially hazardous terrain and it is often this terrain which provides the major attraction to visitors, for example mountains, gorges and rugged coastline. To date the general approach towards visitor safety in such areas has been to provide walkways, viewing platforms or lookouts, with the use of safety warning signs at particularly notorious danger spots or in areas where the general visitor might reasonably be unaware of the risks. For example, along the southern coastline freak waves or unpredictable surges of water can occur at any time and the danger is not at all obvious to visitors. Hence several signs draw attention to this hazard and additional educational materials are available.

There are no restricted areas or entry permit requirements in national parks in the south of Western Australia. Instead backcountry users are encouraged to voluntarily register in log books or leave word of their intended movements with ranger staff. Unfortunately not all visitors respond, as evidenced by the large scale search for a missing bushwalker in the Bluff Knoll area of the Stirling Range National Park over New Year 1985. This walker chose not to register in the log book provided and failed to leave a detailed indication of his planned walk with either ranger staff or family. However, compulsory registration or the use of permits would be unworkable and unpoliceable at current ranger staffing levels in Western Australia. Furthermore many people visiting the backcountry oppose bureaucratic regulation and there is a real danger of a backlash occurring against management "interference" if controls were to be introduced prematurely.

In Western Australia cave safety is mainly of concern in the 'wild' caves. The main show caves have no major problems and US type "spelunking" tours have yet to be undertaken here. Although caves of the lower south west of Western Australia are generally of a technically easy standard, there are several unstable rock piles and entrance pitches, and high CO₂ levels are also encountered in some systems. There have been many minor accidents in recent years and these have mainly involved inexperienced persons. However, it is only a matter of time before a serious accident occurs requiring a complex rescue operation.

The US experience with 'boards of inquiry' into deaths may not be appropriate in Western Australia. Firstly, control of search and rescue in Western Australia is a Police Department responsibility and not the responsibility of the park managing agency. Secondly, actual management staff involved will usually be only one or two persons (typically ranger staff), whereas in the US numerous persons are involved. However, accident reports should continue to be prepared, if possible highlighting the reasons for the accident and outlining any steps which could be taken to reduce the likelihood of similar accidents occurring in the future. Ideally, the experience gained from such reports should be used to update and improve safety plans. In the absence of formally appointed safety officers in Western Australian national parks, regional management staff should at least prepare safety plans which identify any special safety problems in each park and produce a resource inventory for dealing with emergencies.

7. TECHNICAL SEARCH AND RESCUE

Search and rescue operations involve specialist skills according to the type of terrain, the weather conditions, the time of day (such as increased complexity on a dark night), the nature of the injuries sustained and the pool of expertise available to the rescue controller. It is almost impossible to predict the nature of search and rescue operations, hence techniques and training tend to be geared towards the practical principles involved and towards organisational structure.

Many search and rescue incidents begin as a search and they may or may not involve a rescue. Sometimes no search is required as the accident scene is immediately visible or obvious, for example in the case of a climbing accident on a rock face. Frequently secondary accidents occur to searchers or rescuers due to the inherently dangerous nature of the terrain and because of emotional or other human factors (for example lack of care due to haste in rushing to the scene).

In Western Australia search and rescue operations are a Police responsibility but in a national park it is frequently the ranger who is first on the scene or first alerted to an accident. Furthermore, field control of the search and rescue may be delegated by Police to staff of the managing agency. Hence, it is vital that national park staff at least understand the basic principles of search and rescue and if possible develop skills in more technical aspects.

7.1. SEARCH AND RESCUE IN NATIONAL PARKS

The US National Park Service recognises that it has a duty of care towards its visitors. The agency therefore places a high value on search and rescue preparedness. Indeed national parks often have written search and rescue plans as well as general safety officers and, as will be seen shortly, employ specialist rescue personnel in appropriate areas.

The Park Service has full responsibility for search and rescue operations in the older national parks or in those areas where "proprietary jurisdiction" has been negotiated with State or local authorities. In other areas the Service has "concurrent jurisdiction" which means that Federal and State officers work together either with reciprocal responsibilities or with clearly defined individual responsibilities in search and rescue.

7.2. SEARCH AND RESCUE IN NATIONAL FORESTS

Generally the US Forests Service does not assume a dominant role in search and rescue operations and it is unusual for the agency to have exclusive jurisdiction over national forests. The agency does, however, plan for search and rescue in some areas - for example at Mount St Helens National Volcanic Monument. Agency staff are encouraged to have a basic grounding in search and rescue but the Service tends to rely on volunteer organisations and local authorities to spearhead rescue operations at the field level.

7.3. VOLUNTEER SEARCH AND RESCUE GROUPS

Volunteer search and rescue teams involved in technical rescue are organised at a national level into specialist groups. For example, the Mountain Rescue Association has six member teams in Colorado alone. Cave rescue groups may belong to the National Cave Rescue Commission. Those national bodies in turn belong to the National Search and Rescue Association.

The first Rocky Mountain Rescue Team was formed in 1947. It now has ten competent climbers and three expert climbers. There is a 10-15 per cent annual increase in the number of call outs which currently number around 400 per annum. Clearly in this part of the country, at least, the volunteer groups play a very significant role in search and rescue operations. Volunteers belonging to the rescue team are generally granted up to 40 hours of "administrative leave" each year by their employer. All activities associated with the team are insured, including driving to meetings and participating in practices. This is an improvement upon the situation in Western Australian National Parks where volunteers are generally only covered by insurance on actual rescues under the direction of a ranger. In other words, the practice of search and rescue techniques which is of course essential to the success of real incidents, is not currently covered by agency insurance for Western Australian volunteers. (Volunteers who are members of the State Emergency Service are insured for all official activities under their own organisation's insurance policy).

7.4. CLIFF AND MOUNTAIN RESCUE

During the study tour mountain rescue equipment and search and rescue organisation was investigated at two mountainous areas - the Grand Tetons and at Banff in Canada - and in two canyon type areas - the Grand Canyon and Yosemite valley. In the limited time available at each area the following observations were made:

7.4.1. GRAND TETON NATIONAL PARK

The Grand Teton mountain range is said to be one of the most impressive in North America, rising from the valley floor at an elevation of around 6 700 ft (2 400 m) up to a series of jagged summits around 13 000 ft (4 700 m). The range has excellent rock climbing faces, has seasonal snow and ice conditions and provides mixed terrain mountaineering as well. The main rock climbing season is mid-June to mid-September, when around 8 000 people participate, with around 200 people climbing at any one time. Each season there are around 30-35 technical rescues and these are undertaken by a staff of 14 climbing rangers under "proprietary" jurisdiction by arrangement with the local authorities.

The climbing rangers are all well trained in first aid and emergency medical treatment (to EMT II status). They enrol at their own expense in law enforcement training courses of around 12 weeks duration and their climbing skills are self-taught.

Rescue equipment is stored in a special "rescue cache". The rescue team favours the use of Gibbs ascenders as safety devices rather than Jumars. All ropes are identified by a code and the full history of use is displayed on a chart which is kept with the rope. It was here that the two-piece plastic litter stretcher was first encountered (see section 7.5.3). Overall the rescue unit appears to be very well organised, with good equipment and a tightly knit rescue team of climbing rangers during the main summer season.

7.4.2. GRAND CANYON NATIONAL PARK

The Grand Canyon is renowned internationally as a major landscape wonder of the world. Access by road is provided to the rim of the canyon where accommodation and other major facilities are located. The walk down into the canyon involves a drop in elevation of about a mile, that is, over 5 000 ft (1 800 m). Whereas there are only a few major trails into the canyon, backcountry use extends further along lesser used trails, and of course down the Colorado River which runs through the inner canyon area.

There is some technical rock climbing practiced on the walls of the canyon. However, the majority of accidents involve walkers, frequently relatively inexperienced walkers, who underestimate the elevation drop and water requirements involved in a walk down into the canyon. Lack of water and heat exhaustion are common problems. There are generally around 6-8 technical rescues each year but around 200 medical evacuations with varying degrees of seriousness.

No technical rescue equipment was examined at the Grand Canyon National Park. However, it was here that the "Incident Command System" of dealing with emergencies was first encountered. This system was developed by the State of California primarily for establishing a structured emergency response to complex wildfire situations. It comprises a general hierarchical structure for dealing with emergencies (see Figure 3). The generalised structure is commonly modified to suit local requirements and then a list can be prepared of all the personnel who are able to perform the various functions, from that of the overall incident commander through to any position in the hierarchy. Thus, for example, a person's name may appear in several lists with the final selection being determined largely by the specific emergency arising and by the availability of the listed personnel. For each position in the emergency response structure, detailed responsibilities including written procedures are prepared. These serve to provide a check list of duties and the net result over the whole operation should be that no action of significance is overlooked.

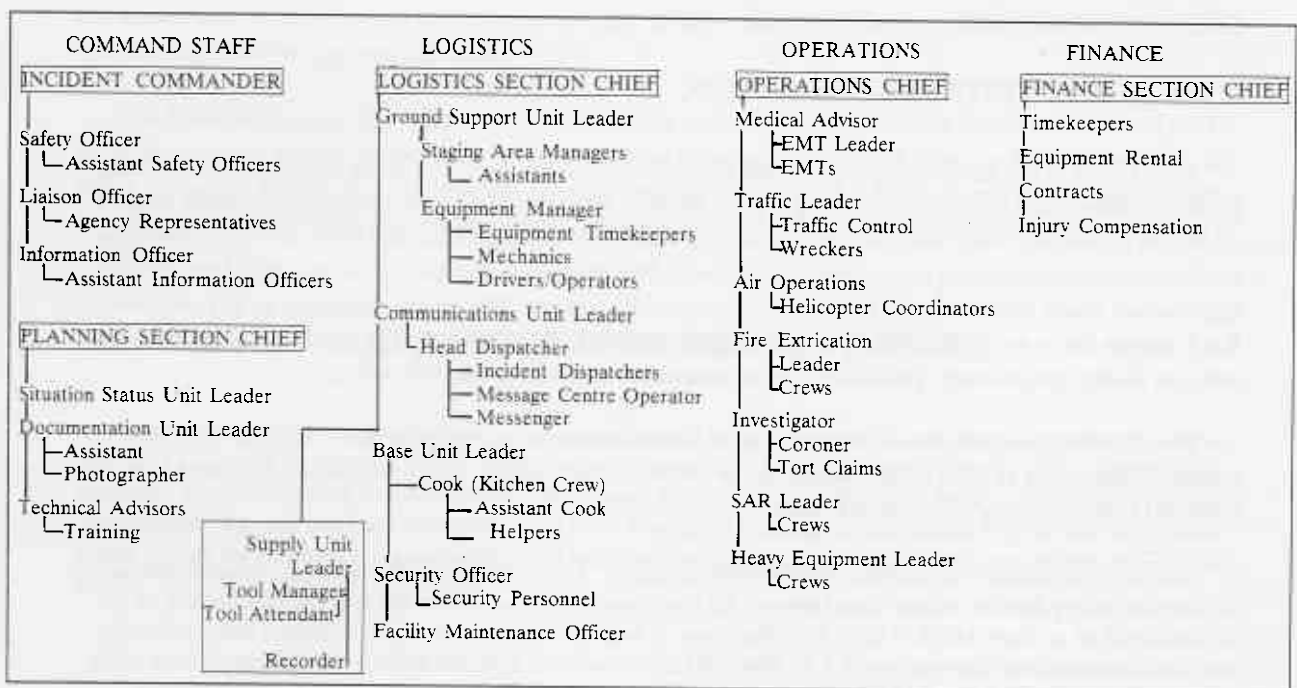


Figure 3

Commonly used incident command system positions

Probably the best example of adapted use of the Incident Command System was found at Yosemite National Park when in addition to a modified structure (Figure 4) and the list of responsibilities for every position in that structure, the emergency operator's manual also included a checklist of activities for twelve different types of incident, including a major search, a plane crash, a major snowstorm and civil disorders.

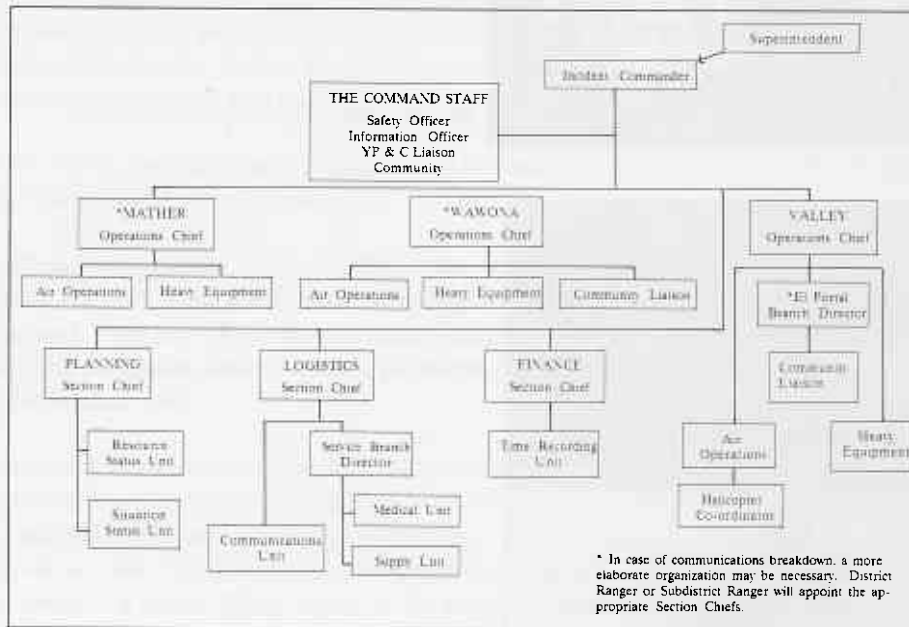


Figure 4

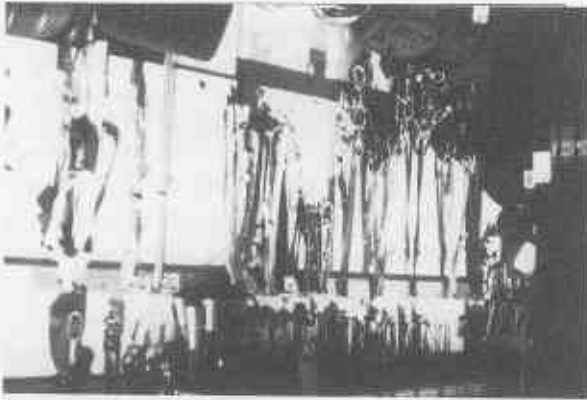
Incident Command System
(typical Yosemite organisation chart).

7.4.3. YOSEMITE NATIONAL PARK

The various rock faces of the Yosemite Valley provide one of the meccas for rock climbers from around the world. Climbing is mainly in the higher technical grades and this has tended to influence the development of a completely different rescue system from that at the Grand Tetons and elsewhere.

The Service has a small Search and Rescue Unit with an excellent rescue cache. Extensive use is made of helicopters and one is contracted on a standby basis during the May-October season. Regular Park Service staff do not have time to train adequately for search and rescue operations and hence the rescue leaders tend to rely heavily on volunteers, that is rock climbers living at the Sunnyside Camp 4. Through the season the reliable and experienced climbers become known to Park staff and they are signed up for rescues under the VIP (Volunteers in Park) program as needed.

In addition to the usual technical rescue equipment the cache also has two copies of a whole series of photographs of all the major rock walls in the valley. These are useful for planning belay points and in simply identifying accurately the position of injured climbers on what are huge rock faces (up to 1 000 m, some four times the height of Bluff Knoll Main Face in the Stirling Range of Western Australia). Another interesting piece of equipment is a Questar telescope with a magnification of x40. When set up



Rescue Cache, Yosemite National Park.



x 40 Questar telescope, Yosemite National Park. Telescope is focused on rock climbers on a major rock wall almost one kilometre away. When used with a loud hailer, the telescope can be a great asset during big wall rescues.

on a tripod this can easily magnify to a usable sized image climbers who are well over a kilometre away. When used in conjunction with a megaphone the rescue controller can communicate with the accident victim and give detailed instructions to aid self rescue or to assist with ropes lowered from above. Such a system could undoubtedly have value on the large rock faces of the Stirling Range and Porongurup National Parks of Western Australia.

The contrast between tight Service rescue control at Grand Teton National Park and the more technical yet more *ad hoc* type of arrangements at Yosemite was quite dramatic. It probably indicates that in technical rescue there is no "right" system and the most appropriate system for each set of circumstances should be established. As mentioned in the previous section rescue operations at Yosemite are part of an overall incident command system which has been drawn up for all park emergencies.

7.4.4. BANFF NATIONAL PARK (CANADA)

There are some seven national parks in the Western Region of Canada which include alpine terrain of the Rocky Mountains: Mount Revelstoke, Glacier, Yoho, Kootenay, Waterton Lakes, Banff and Jasper National Parks. Parks Canada employs two "Alpine Specialists", one at Banff National Park and one at Jasper National Park. They each have responsibility for alpine safety and search and rescue in their own park but they also share these responsibilities for the other alpine national parks. In addition they act as advisers to other national parks in the Canadian system where their skills are needed, for example, at Kluane National Park in the Yukon Territory (near Alaska) and at the Cape Breton Highlands National Park in Nova Scotia on the east coast.

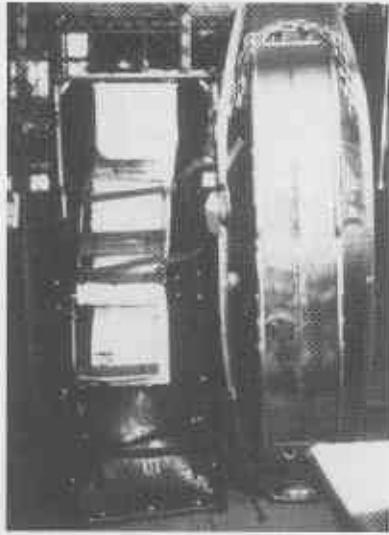
Both the Alpine Specialists are internationally licensed mountain guides and they belong to the Association of Canadian Mountain Guides.

They officially represent Canada on IKAR (the International Committee of Alpine Rescue) which was established in 1948. A total of 14 nations are represented on IKAR but these do not include Australia or New Zealand. Each year IKAR holds a general assembly with four major sub-commissions - medical, aircraft support, avalanche, and equipment/technique - which report to the general assembly on the latest development in each field.

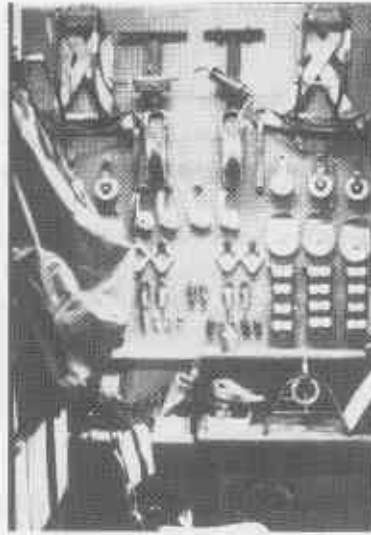
The two Alpine Specialists employed by Parks Canada implement their training and rescue programs as closely as possible to the recommendations of IKAR and it is therefore argued that search and rescue activities undertaken by Parks Canada are based upon the best international standards and advice available for alpine terrain. This is considered to provide the agency and its staff with the best legal protection in the event of a rescue going wrong, or for example, somebody attempting to sue the agency over injuries sustained during a search and rescue operation.

The alpine national parks of Canada comprise what mountaineers describe as "mixed terrain" with additional large walls and rock faces that attract experienced rock climbers. There are many permanent snowfields and glaciers, and of course the area is truly alpine during winter with heavy snowfalls to the valley floors. Of the 200 or so rescues each year about 60 per cent are non-technical and involve people who are hiking in the backcountry. Typically the people are lost, involved in river crossing accidents, injured in bear confrontations, or simply trodden on by horses (apparently a common accident). The remaining 40 per cent are technical rescues which involve evacuation from mountainous terrain including crevasses, large rock faces, snowfields, glaciers and mountain ridges. Technical rescues therefore involve a large range of incidents and require various types of equipment and a broad range of rescuer skills.

Search and rescue training for Parks Canada employees is undertaken by the two alpine specialists. They run a series of rescue training schools using the milder summer months for novices and the harsher winter conditions for more advanced training. In addition to technical rescue procedures (stretcher raising and lowering, etc.) the schools include training in search techniques, avalanche behaviour/rescue, and rescue co-ordination. The training courses are cumulative, with advancement over a five year period to the skills and experience required of a "Field Rescue Leader". Lesser levels of responsibility are achieved more quickly. The "Base Rescue Leader" is typically an ex-field rescue leader with considerable experience and it is he who stays at the base and co-ordinates the rescue operation. Training involves equipment and techniques recommended by IKAR, with equipment also being UIAA (Union Internationale des Associations d'Alpinisme) approved.



Rescue stretchers, Banff National Park, Canada.



Winch equipment, Banff National Park.

Search and rescue caches have been established in special rescue rooms at park headquarters in Banff, Jasper, Yoho and Kootenay National Parks and also at Lake Louise in Banff National Park. The most sophisticated equipment is located at the larger parks (Banff and Jasper). There is also a regional rescue room at Banff which has everything needed for a major operation anywhere within the Alpine parks or in nearby provincial parks. As a result, it is possible for several rescue missions to be run simultaneously.

The equipment held in the two rescue rooms at Banff was briefly examined during the study tour. Following the guidelines of IKAR, the emphasis is very much on European alpine systems including Austrian winches with steel cable, European style stretchers and much equipment which reflects the rescue requirements for snowfields and glaciers. This was in contrast with all other rescue centres visited on the study tour (in the US national parks) where the use of nylon climbing ropes and pulley systems was generally preferred.

7.5. CAVE RESCUE

During the study tour the opportunity was taken to participate in a seven day seminar on cave rescue operations and management under the auspices of the National Cave Rescue Commission (NCRC), a sub-commission of the National Speleological Society (NSS). The seminar was held at Wind Cave National Park in South Dakota and it involved approximately 40 instructors and students from all over the USA, with a small group from British Columbia, Canada, and the author as the only overseas participant. The seminar was a highlight of the Churchill study tour and some impressions of the course have already been published under separate cover (Watson 1985).

7.5.1. ORGANISATION AND CO-ORDINATION

The National Cave Rescue Commission was formed in 1977. It is a volunteer group which co-ordinates cave rescue resources throughout the USA. It is a communications network through which cave rescue resources are located. This is facilitated by a national 24 hour telephone number - that of the National Co-ordinator - who has access to eight Regional Co-ordinators who in turn have their own regional networks of contacts and resources. There are two additional specialists, a Cave Diving Officer and a Medical Officer, who keep up to date with advances in appropriate medical and dive rescue equipment and personnel. The NCRC also undertakes various other functions, for example, developing good working relationships with other rescue-orientated organisations and government agencies, research on new cave rescue equipment and organising training seminars, such as that at Wind Cave in order to increase the number and improve the proficiency of cave rescuers throughout North America. For further details the reader is referred to the "Manual of US Cave Rescue Techniques" edited by Williams (1981).

The co-ordination of a rescue generally requires the establishment of a series of specialist functions. An example of the organisation of a major cave rescue is shown schematically in Figure 5.

The "Responsible Agent" in the US may vary considerably according to various federal, state and local laws. However, in a national park where there is proprietary control (for example the older national parks such as Yellowstone or those such as Grand Teton National Park where certain interagency agreements have been negotiated with the State) clearly the US National Park Service is the responsible agent. However, caves occur on all manner of public and private lands and in practice the responsible agent varies considerably, although it is often traditionally the local sheriff. In Western Australia the responsible agent is easily identified because the WA Police Department is initially responsible for all search and rescue operations.

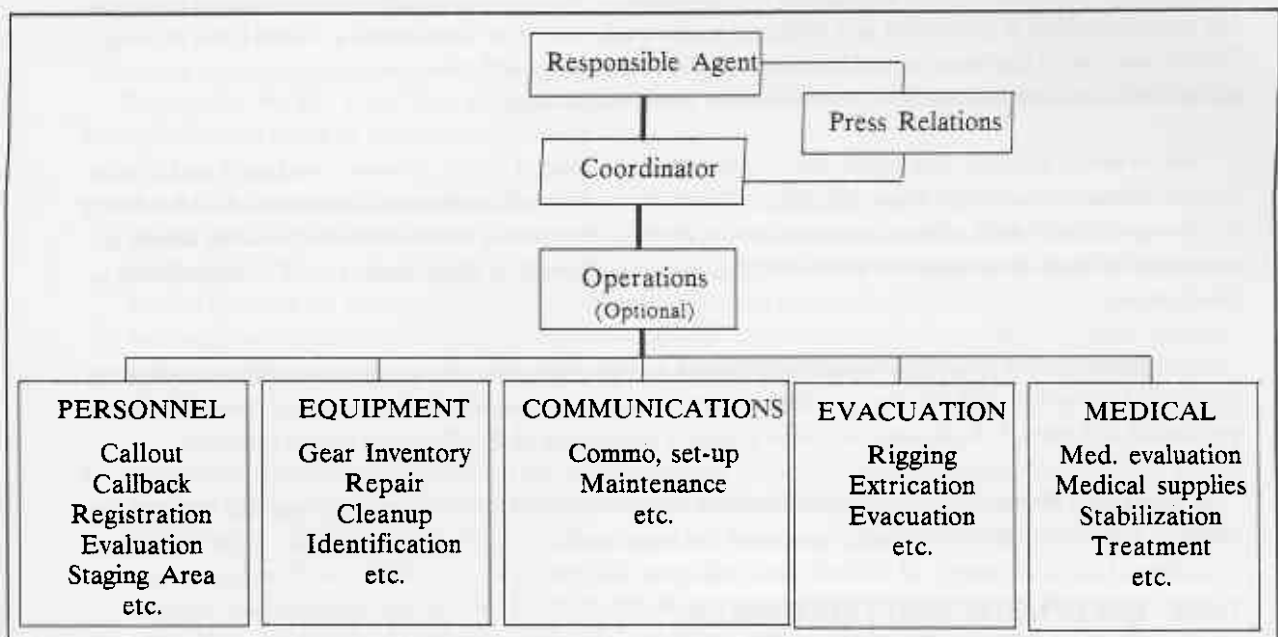
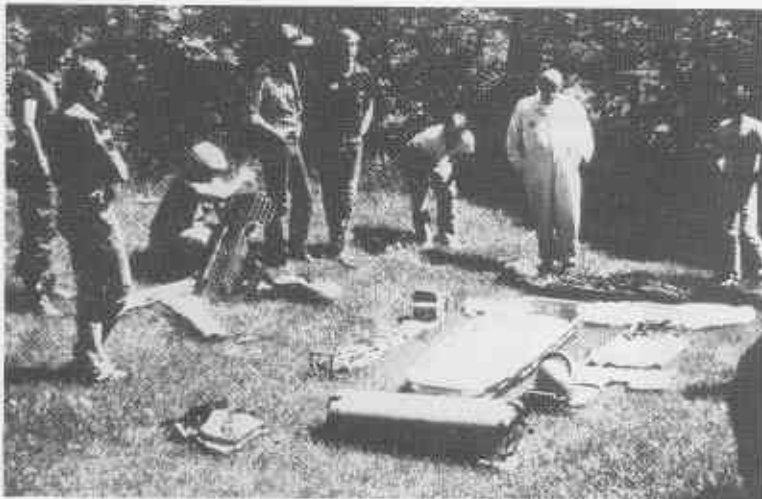


Figure 5 :

Organisation for a major cave rescue (from Williams, 1981)



NCRC seminar, Wind Cave National Park. The stretchers on display are (left to right) the KED, the PMI, the Ferno-Washington, the modified Neill-Robertson (helmet), and in the foreground, a rolled up SKED.

In most instances in the US the responsible agent does not have the experience or necessary skills to co-ordinate the actual cave rescue operation. A person with general skills in technical rescue, communications, personnel management, and so on, is generally appointed to this role and he or she is assisted on major rescue by an Operations Officer. In Figure 5 other major functions in a rescue are identified and these should be self-evident. The overall relevance of this organisational structure to search and rescue operations in Western Australia will be discussed in more detail in Section 7.8 below.

7.5.2. TRAINING

The role of NCRC in encouraging and organising cave rescue training has already been briefly mentioned in the previous section. In practice the commission places its major effort on the annual cave rescue seminar which is presented at a different venue each year. The 1984 venue at Wind Cave in South Dakota was one of the most central locations used in recent years and consequently the seminar attracted a wide and fairly representative spread of cavers from North America.

The seminar lasts for one week and is split into an advanced course (about 6 students) and a basic course (about 25 students). There are about a dozen instructors and staff, several of whom currently hold, or have previously held, official positions in the NCRC. The course involves several sessions which are attended by both the advanced and the basic students, but much of the practical work is undertaken as two groups.

A highlight of the training program is the mock rescue which takes up at least one whole day towards the end of the course. This is run as a major cave rescue operation with definition of responsibilities as presented in Figure 5. Following the mock rescue a critique or "debrief" is held on the final day.

The NCRC also publishes the manual of cave rescue techniques (Williams, 1981) which has obvious value as a basis for smaller training sessions at the local level.

7.5.3. EQUIPMENT AND TECHNIQUES

The range of ropes and associated hardware (karabiners, descenders, and so on) used in cave rescue in the US is almost exactly the same as that available through commercial outlets in Western Australia. There are, however, several manufacturers of specialist cliff rescue equipment in the US and such equipment is not easily obtainable in WA. For example, sophisticated edge rollers have been developed in the US but the cost of importing these items into Australia is somewhat prohibitive.



*Demonstrating the use of a KED backboard,
NCRC seminar, Wind Cave National Park.*



*The use of the SKED stretcher, NCRC seminar,
Wind Cave National Park.*

During the NCRC Cave Rescue Symposium there was an opportunity to examine and work with several different types of stretcher, including:

- the KED (Kendrick Extrication Device) which is a short backboard/mini stretcher combination mainly used for the extrication of persons from a sitting position in motor vehicle accidents. The KED is basically an upper body splint with potential for stabilising the head, neck and full spine. It cannot be used for lowering or raising with ropes unless it is placed within and properly secured to another rescue stretcher. The attraction of the KED for cave rescue is that it can provide some patient stabilisation when passages that are very tight or too confined for a full length stretcher have to be negotiated.
- the standard Neill-Robertson stretcher which is a wrap-around canvas device with cane slats for reinforcing. The patient is held in the stretcher like a cocoon and consequently the whole package is not much larger than a patient, so providing there are no sharp bends, even tight passages can be negotiated in theory. However, on its own this stretcher is too flexible for spinal injuries. In such instances simultaneous use of the KED might be a considerable improvement. This stretcher is manufactured in Western Australia by Trojan-Joyce and is commonly referred to as the Joyce Stretcher in WA.
- modified Neill-Robertson stretchers. The standard Neill-Robertson stretcher is made more suitable for spinal injuries by the addition of a tubular steel frame which gives the stretcher rigidity and provides the option of permanently attaching a protective helmet for the patient's head and a footrest.

At the NCRC course one commercially available modified Neill-Robertson stretcher was used - the PMI Rescue Stretcher.

- the SKED. This is a drag sheet style of stretcher with sufficient rope ties and sufficient strength to be used in conjunction with lowering and hauling systems. The stretcher has several drawbacks, including excess flexibility, which causes the patient's head to tilt forward uncomfortably, and poor protection of the patient due to the relatively thin construction material. This latter drawback would be improved by simultaneous use of the KED. The stretcher is, however, quite good to work with in mud as it slides easily over a smooth surface. To sum up one person's interpretation, "a good stretcher for the rescuers but not so good for the patient". It should be remembered, however, that such comments refer to the context of cave rescue - the SKED may be very good in less demanding situations and would clearly be excellent in snow and where the patient did not have back, spinal or head injuries.
- the Ferno-Washington basket litter. This is a plastic version of the more familiar Stokes litter which is constructed of tubular aluminium and chicken wire. The classic Stokes litter is very popular in Western Australia and is probably as widespread as the Neill-Robertson stretcher. It does have some disadvantages; in particular, the wire catches easily on any rock projection and of course in the bush. The plastic version manufactured by Ferno-Washington Inc. eliminates this drawback. However, the Ferno-Washington has its own faults, including its large size in cave situations and the inability of even large screwgate karabiners to fit over the frame. It therefore becomes necessary to link karabiners to the stretcher with tape, thereby risking failure through abrasion damage to the tape. Ferno-Washington also manufacture a two-piece split version of the stretcher which may have some value in cave rescue. The stretcher breaks in two at its mid-point and can be transported in two separate halves. Thus it may be possible to unload the patient, split the stretcher to negotiate a tight passage and use the KED backboard until the cave passage widens sufficiently to re-assemble the stretcher and continue the evacuation.



Preparation of Ferno-Washington stretcher and "victim", NCRC seminar, Wind Cave National Park.



Two piece Ferno-Washington stretcher mounted to rucksack frame, Grand Teton National Park. (This type of stretcher has subsequently been introduced to several W.A. National Parks.)

As a result of working with these various stretchers at Wind Cave, the existing Neill-Robertson and aluminium Stokes litter stretchers already in use in selected national parks of Western Australia have now been supplemented at some locations by the KED and by the Ferno-Washington plastic litter.

Also at the NCRC seminar there was opportunity to see demonstrated, and to work with, various rope hauling systems. The two favoured systems were the Z Rig which has a mechanical advantage of 3, and the Piggyback (the "Pig") which has an advantage of 4. These are illustrated in Figure 6. Throughout the study tour it was found that rescue teams preferred to use spring-loaded Gibbs ascenders as the haul cams and ratchet cams in preference to Jumar ascenders. Cams are mechanical devices which grip or hold the rope when it is placed under tension in one direction only. The Gibbs ascender is strong, durable and less likely to damage the rope than the Jumar ascender. The Jumar (especially older models) is more likely to fail due to fracturing of the frame, and for this reason it is generally avoided in hauling systems.

American rescue teams appeared to use the same three friction lowering devices as are commonly used in Australia - that is, "Figure 8" descenders, the Whaletail descender and the rappellrack. The latter two devices cause less twisting of the rope but are not quite as simple to use as the "Figure 8" descender. For this reason "Figure 8" descenders are currently preferred in WA national park rescue stores, although the Whaletail has now been introduced to the Stirling Range rescue cache due to its superior frictional heat dissipation on long lowers such as may be required on the large rock faces of the Stirling

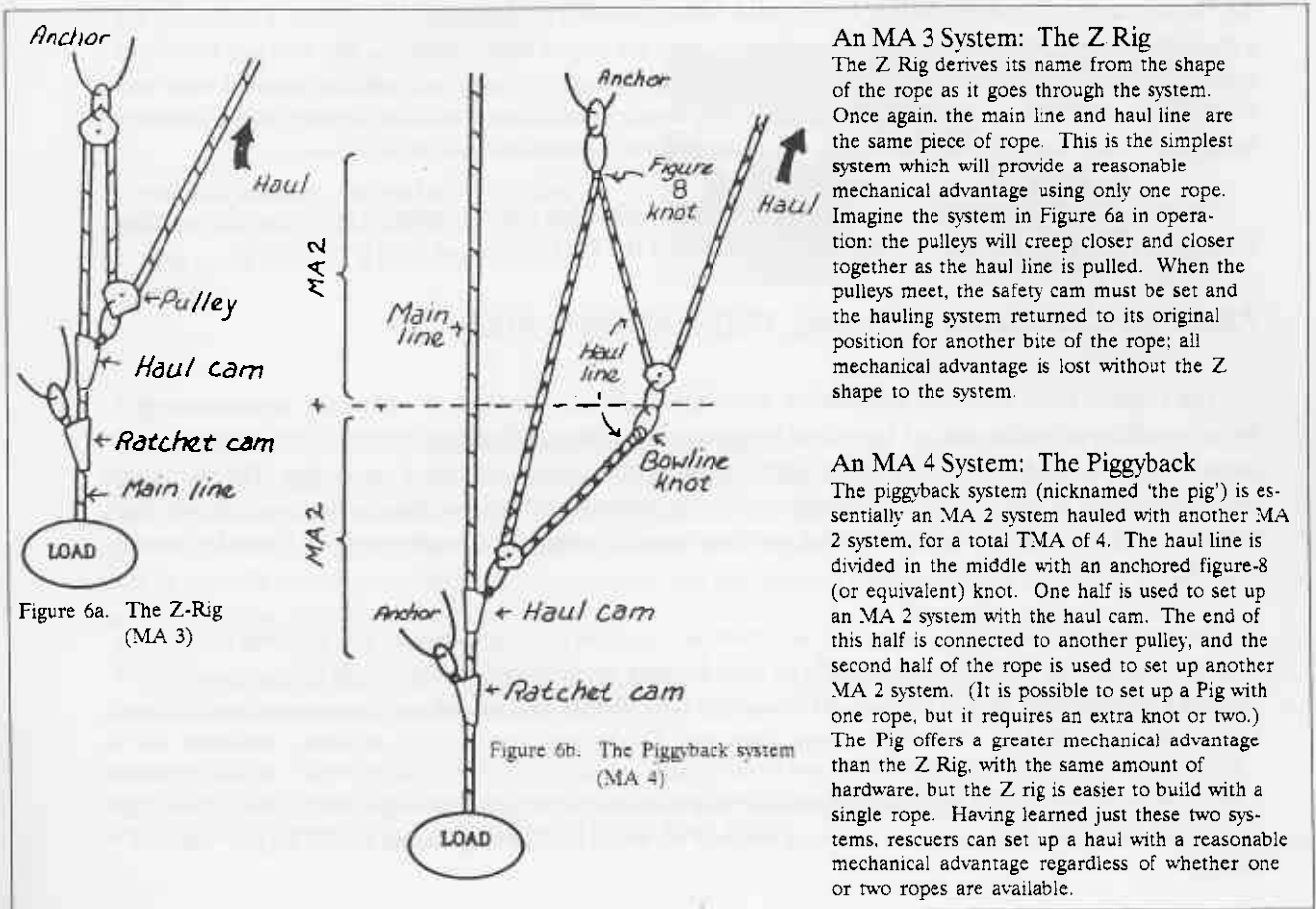


Figure 6

The "Z" Rig and Piggyback hauling systems (from Williams, 1981)

7.6. COASTAL RESCUE

There was only limited opportunity to study coastal safety and associated rescue, due to time constraints and the relatively short section of coastline visited during the study tour. Furthermore, it soon became clear that unpredictable surges of water such as "king waves" do not present such serious threats as those that exist along the southern coastline of Western Australia, although a smaller version "sneaker waves" does occur. Indeed most accidents appear to be caused by slips and falls from cliffs, swimmers caught in riptides and injuries due to logs washed onto beaches. However, as will be seen shortly, fishing accidents in the Golden Gate National Recreation Area around San Francisco do tend to parallel similar accidents along the south coast of Western Australia.

7.6.1. THE US COASTGUARD

The US Coastguard is a federal agency which co-ordinates search and rescue operations in coastal areas but which also has a rescue capability over mainland areas. The country and adjacent oceans are divided up into a series of districts.

Agency staff come from a variety of backgrounds including recruitment of civilians, for example from the Department of Transportation, and in times of war from the Department of Defence. The agency has a local network of volunteers called "Auxiliaries", who are issued with a uniform, but who use their own boats and equipment. The auxiliaries are paid for any damage to their boats and for general wear and tear. The local volunteer network is therefore very much the civilian arm of the agency which provides local knowledge and local capability for search and rescue operations over inshore waters.

There is close co-operation with local sheriffs and with other federal agencies with regard to coastal rescue operations, including areas under the control of the Park Service or the Forest Service.

7.6.2. GOLDEN GATE NATIONAL RECREATIONAL AREA

The Golden Gate National Recreation Area was established in 1972. It comprises approximately 5 km of coastline extending up to 3 km inland on either side of the southern end of the Golden Gate Bridge, together with a much larger area to the north and west of the northern end of the bridge. The park serves a population of around 5 million people in the San Francisco Bay area, plus visiting tourists, and the southern section of the park, in particular, is very accessible, being only 15 minutes drive from the central city block.

Not surprisingly, the park, especially the coastline, receives enormous public use, not only during the daytime but during evenings and at night as well. Fishing is one popular activity and this occurs in both the San Francisco Bay area to the east of the Golden Gate Bridge and also along the section of park fronting the Pacific Ocean.

It is here in particular that several fatalities have occurred, typically due to people slipping down the shale cliffs into the ocean, or due to being washed off rocks and fishing ledges by the larger "sneaker" waves.

The Park Service has approached the safety problem as follows. First, large warning signs have been erected at known danger spots. Personnel claim that the signs have had an effect and that accidents at these areas have decreased. Second, the Service has a good cache of technical rescue equipment such as would be typically found in a mountainous area. In other words, technical cliff rescue techniques are used to reach and rescue people, including those injured in slips down the cliffs.

Fishermen in an area prone to "sneaker" waves, Golden Gate National Recreation Area, San Francisco. The fishermen have passed several safety signs in order to reach this ledge.



EXTREME DANGER
DON'T LET A WAVE
CATCH YOU OFF GUARD!

STAY OFF THE ROCKS - DEATH IS NEAR



An excellent warning sign used at the Golden Gate National Recreation Area, San Francisco. The arrow points to a fisherman standing on the rock.

Third, there is an excellent liaison with the US Coastguard, and the Service itself has rescue boats. Helicopters are frequently used and, of course, are readily available due to the proximity of a major city. Fourth, the Service produces a series of safety brochures warning of the dangers. Fifth, in the event of serious accidents or deaths, boards of enquiry are set up to try and determine the cause of the incident and to identify any improvements in management that may help to reduce the risk of similar accidents occurring in the future.

Although only a short time was spent at the Golden Gate National Recreation Area, this was one of the highlights of the study tour because of the obvious relevance of safety and rescue management to that of the southern coastline of Western Australia. There were many similarities with the problems encountered at the Torndirrup National Park, near Albany, and it was encouraging to find that a very similar approach to that being developed at Torndirrup, namely safety signs and public education materials, was the frontline management strategy adopted by the Park Service.

7.6.3. THE OREGON COAST



Figure 7

"CAP'N BEWARE" - Mascot of the Oregon State Parks and Recreation Division beach safety awareness campaign.

The State of Oregon has an extensive system of State parks, many of which are located along the Pacific coastline. In recent years the Oregon Parks and Recreation Division has made a concerted effort to publicise potential hazards along the coast as widely as possible. This has involved the upgrading of warning signs, the establishment of local advisory committees, and the launching of a major public awareness campaign based on a theme character "Cap'n Beware" (see Figure 7). The public awareness campaign involved the printing of posters, distribution of car bumper stickers, television and radio announcements, and the use of the Teddy Bear character "Cap'n Beware" to promote warning messages about the various hazards of the coast. As the safety program was only commenced in June 1984 it is not clear yet how successful or effective it has been.

7.7. SEARCH AND RESCUE FUNDING

Search and rescue equipment, training and manpower capability, do not come cheaply. Equipment must be carefully logged, stored, examined after use and discarded if considered at all suspect. Training is time-consuming but has to be of the highest standard available as it involves the safety not only of those who will need to be rescued but also of the trainee rescuers. Furthermore, unless agency staff have an existing knowledge of correct rope management techniques and the limitations of mechanical devices, then skills acquired in training sessions must be reinforced by refresher courses to maintain familiarity with technical rescue procedures. Moreover, search and rescue operations do not generally fall neatly into a standard working day. They frequently occur at weekends, especially late on Sunday, and they require total commitment by rescue personnel until the mission is completed. This may take only a few hours for a simple rescue but it may also take many days in the case of a complex search. The agency costs in terms of manpower, overtime payments and provision of time *in lieu* for extra hours worked may be very high.

Whereas the community expects that search and rescue operations will be undertaken by "someone", and whereas the US National Park Service and Parks Canada accept their moral and legal obligations in this regard, throughout the study tour two issues relating to the funding of technical rescue were raised, namely the lack of predictability of accidents, particularly in relation to the relatively short fiscal year, and the extent (if any) to which the "user pay" principle should apply. That is, should those being rescued contribute to the costs involved?

7.7.1. LACK OF ACCIDENT PREDICTABILITY

Accidents are, by definition, non-predictable. In Western Australia, where park visitation levels are much lower than in the US, serious accidents have occurred in most major national parks, but their occurrence has been highly erratic from park to park and from year to year. Some American accident data is presented in Table 4. The situation is similar in Western Australia, for example, in the Stirling Range National Park a major bushwalking and rock climbing area, there was a spate of relatively minor incidents in the early 1970's and one major search in 1972. Since 1978, despite a slight increase in backcountry use in the park, there have been only two minor incidents until New Years Eve, 1984, when a solo bushwalker was reported missing in the Bluff Knoll area. An extensive ground and air search was mounted and the walker was located and safely evacuated on the third day of the operation, by which time around 150 people were totally involved in the search. The actual costs of this incident were absorbed across several government agencies and by numerous voluntary organisations and individuals.

However, quite apart from the man hours involved (probably in excess of 1 000), the costs of using, and simply having available, the necessary equipment such as vehicles, two-way radios, fixed-wing aircraft, stretchers and rock rescue equipment was enormous. So after more than a decade of minimal budget requirement for technical rescue, in 1984/85 a major incident occurred at a cost (mainly "hidden") of several thousand dollars to the land managing agency. A few months later in May 1985 a similar incident occurred in the same national park when a boy scout was lost overnight on Toolbrunup Peak. Although the boy was quickly located once again a full mobilisation of available rescue resources had been undertaken and the financial costs of the incident were high to all agencies concerned.

Table 4

Annual accident figures from three areas

Year	Yellowstone National Park		Grand Canyon National Park	Oregon Coast	
	Search and Rescue	Deaths	Drownings	Accidents	Deaths
1972	-	-	1	-	-
1973	-	-	3	-	-
1974	-	-	0	-	-
1975	-	-	0	-	-
1976	33	2	0	-	-
1977	15	5	2	-	-
1978	41	5	0	-	-
1979	36	3	0	-	-
1980	45	5	0	30	10
1981	38	7	0	52	8
1982	48	9	1	15	3
1983	51	5	4	9*	15*

* January to August data.

- Data not obtained.

(Data obtained from agency records).

This lack of predictability of accidents also occurs in the US park system. Even at areas like Yosemite and Grand Teton National Parks where several hundred rescues are undertaken each year, there are gross fluctuations in the costs involved from year to year. The Park Service therefore budgets for rescue operations largely at a regional level in order to balance out these fluctuations over several parks. In 1981 the Service responded to 2 405 search and rescue incidents involving 3 061 visitors. Of these, 821 visitors were injured and there were 178 fatalities. In 1983 the Service sought a 1984 budget allocation of \$1 266 000 out of its total request of \$574 347 000 - that is 0.22 per cent.

7.7.2. WHO SHOULD PAY FOR RESCUES?

Whereas there is general agreement that the frequency and nature of technical rescues is highly erratic there is no general agreement over who should pay the costs involved. Some personnel consider that those rescued should pay at least some of the costs of technical rescue whereas others feel that rescue is a clear community responsibility and should therefore be paid for by public taxes.

One can understand the disappointment of agency staff when no thanks are given by the rescued persons (or worse still when staff are criticised or abused for not doing a better job). Also, so called "bastard" searches, where there is no missing person at all, caused by forgetting to sign out on safely returning or caused by practical jokers, are extremely annoying.

Similarly, the Park Service also rescues many people each year who either do not have a valid backcountry permit or who undertake some adventure activity against the advice of Service staff. Such incidents strengthen the case for management agencies attempting to recover some of the costs.

On the other hand, most people do not purposefully put themselves in a life-threatening situation. It is argued that if they ignore advice it is because they consider their own judgement about the advisability of the activity to be more reliable than that of Park Service employees. Indeed, for more technical adventure activities such as caving, rock climbing and hang gliding this may often be the case. It is then frequently bad luck that precipitates their accident. One officer suggested that people visit parks to get away from the stresses and regimentation of day to day life. He argued that it was therefore the community in its broad sense that caused people to escape into the backcountry or into adventure activities. He therefore considered that the community is ultimately responsible for the welfare of such people during their "escape" and so it is a community responsibility to assist if things go wrong, irrespective of the experience and safety margin in judgements made by the participants.

Overall, there appears to be more support for the agency absorbing costs of rescue, irrespective of the circumstances, especially when the accident involves backcountry or adventure activities. There is, however, less sympathy towards those involved in non-essential rescue. For example, in the event of an accident occurring to a participant in a commercial mountaineering course, the Park Service claims the costs of rescue with the knowledge that course participants are required to have suitable insurance cover arranged. The Park Service therefore recoups the expenses of rescue from the insurance company.

Examples of non-essential rescue were encountered at Grand Canyon National Park. Apparently, despite clear warnings many people go down into the canyon without adequate preparation and become exhausted during the return journey. With adequate rest, food and water they would usually be able to return to the top of the canyon rim slowly but under their own steam - but this, of course, might be a nuisance, for example if they had planned to travel on elsewhere that day. A helicopter could lift them out to the rim in a matter of minutes - more convenient for them but not essential. Not surprisingly, in such instances the Park Service expects the user to pay.

7.8. IMPLICATIONS FOR TECHNICAL RESCUE IN WESTERN AUSTRALIA

In theory, search and rescue activities in Western Australia should be well catered for because one agency, the Police Department, has overall control. However, in practice there is much room for improvement in the more specialised field of technical rescue in rugged terrain. This is largely because within the Western Australian community there is very little perception of the rough terrain and weather conditions that may be encountered, particularly in the south of the State. Consequently there is generally much sub-standard outdoor clothing and equipment and a poor appreciation of the dangers of hypothermia. There is also a poor understanding of basic mountaineering skills, a fact which, for example, has contributed to most major search and rescue operations within the Stirling Range National Park. Unfortunately the various agencies with a role to play in technical search and rescue are no exception to the above comments, and the small advances in community attitudes that have been made have been largely due to the efforts of experienced climbers, bushwalkers and speleologists.

The study tour highlighted quite clearly that there is no one standard way of managing search and rescue organisation. Planning should therefore be largely restricted to the principles of search and rescue, in particular the organisational structures required, together with an "aide-memoire" or set of operational principles to assist the incident controller and practice in the use of available equipment. Of the various systems seen in the USA the simple model proposed for a generalised cave rescue is probably the most appropriate for adoption in Western Australia. Whereas the Incident Command System may have value in a large or complex mission, it is considered to be too complicated, certainly for the south of Western Australia where only a small number of rescue personnel are available. Some aspects of the system could be adopted, such as the multiple listing of persons with appropriate skills to fill the various roles in the preferred generalised cave rescue model.

Technical cliff rescue techniques and equipment currently in use in Western Australia are very similar to those used in the USA. However, one scarce resource in WA appears to be medical personnel who are also competent in technical rescue techniques. By comparison, in North America many rescue personnel are paramedics with skills far more advanced than those held by the Western Australian "first-aider".

In the case of technical cave rescue there has not yet been a major incident in Western Australia by which to really gauge the current state of preparedness of rescue personnel. Sooner or later, due to increasing popularity of caving and the wide distribution of caves from the Kimberley and NW Cape in the north of the State to the South West corner and the vast Nullarbor Plain area, a serious cave incident will occur.

Just as there is no one standard way of conducting a search and rescue operation, so too there is no one perfect stretcher. The range of specialist stretchers encountered during the study tour was quite large and the opportunity to work with some of these has already resulted in the importation of Ferno Washington plastic litters and the Kendrick Extrication Device. Trials to date indicate that the split two piece litter will be very useful for above ground evacuations in the South Coast Region of the State. As discussed earlier this stretcher has large dimensions which reduce its versatility in tight cave situations.

Evidence from the safety approaches used in coastal parts of the Western USA is that public education and warning signs are the most valuable methods for combating accidents. This is reassuring because it strongly supports the strategies already being developed in national parks along Western Australia's south coast. However, public awareness programs such as the 'Cap'n Beware' campaign being used in Oregon would probably be more appropriately developed at a regional coastal community level rather

than only in those sections of coastline that happen to be national parks. Adoption of such a scheme by a State Government department or by a voluntary community service organisation would be ideal.

The progressive program of search and rescue training used by Parks Canada is probably the most logical way to develop technical rescue skills, at least in specific agencies such as the Department of Conservation and Land Management. However, to run progressive training courses would require personnel with adequate skills plus an ongoing commitment by the managing agency. Funds would clearly have to be made available for training purposes. The funding of actual rescues in Western Australia should be accepted as a community responsibility with all costs being borne by the agencies involved. However, one exception may be concessionary activities. These appear to be on the increase, especially in adventure activities such as caving, abseiling, rock-climbing and canoeing. In these cases there may be a case for the costs to Government being offset by obligatory accident insurance for course participants. Whereas the costs of rescue training can be anticipated as an ongoing or recurring budget item, the costs of actual search and rescue operations cannot. As discussed earlier in the chapter, even at Yosemite National Park with its high predictability of climbing accidents the actual costs involved vary dramatically from year to year. In Western Australia where the occurrence of technical rescue situations is erratic, it will be even more important for the Government to recognise this factor and ensure that adequate contingency budgeting is provided for search and rescue operations.

8. CONCLUSIONS

The study tour was invaluable in introducing me to many new concepts and management techniques applicable to national parks and wilderness areas. However, many management approaches seen were already in use in Western Australian national parks and in some instances they were more advanced here.

The Western Australian national parks generally receive much lower public visitation which means that it is easier for the park visitor to feel more "at one" with the landscape around him. The level of concession activities at some US national parks was quite excessive and is now, of course, politically beyond redemption. If increased concession activities are to be encouraged within Western Australian national parks it is absolutely essential that we learn from American experience and provide strong legislative protection for park values and obtain commitments from government to provide sufficient staff and funds to professionally administer concessions.

One lesson learnt on the tour was the value of constructing footpaths and walk trails to a high standard right from the start. Although the North American parks do have extensive problems with trail maintenance, there are numerous outstanding examples of excellent trail and boardwalk construction. However, quality path construction is very labour intensive and boardwalk materials are very expensive, so once again the low funding and staffing levels of Western Australian national parks must be overcome before significant advances can be made here.

In Section 4 of this report the low recognition of wilderness values in Australia was discussed. However, there are indications that Australians are rapidly developing an increased appreciation of the needs for wilderness. For example, early in 1985 a position paper on wilderness in Australia was produced by the CONCOM Working Group on the Management of National Parks (a national committee comprising representatives of all major State and Federal agencies involved in the management of Australian national parks). This paper has now been publicly distributed and it is likely that ensuing debate will further heighten the awareness of wilderness issues across the Australian community. There is now an increasing recognition that not only must wilderness be recognised and set aside as a legitimate land use, but also that, once established, it requires management.

However, it is apparent from North American experience that users must accept wilderness on its own terms. Hopefully, Australian land managing agencies will have sufficient foresight to adopt similar principles. Furthermore, until the wilderness concept is more secure, governments may have to ensure tenure of sufficient areas before embarking upon extensive public participation programs. Again, a degree of foresight and commitment will be required.

In the field of visitor safety it appears that although the US Service has had enormous experience spanning many decades, basically the management approaches already adopted in Western Australia are modelled upon very similar lines, although they are not yet formalised. However, whereas there is some evidence that safety considerations are becoming less stringent in the US system, the reverse is probably true in Western Australia. This is possibly because to date there has been no real test of legal liability and negligence in a Western Australian national park. Furthermore, the Department of Conservation and Land Management has already adopted employee safety programs and incentives. It is possible that this will lead to increased safety consciousness regarding visitors in national parks and other public areas under the wing of the new department.

Probably the greatest impact on visitor safety in Western Australian parks will emanate from the rapidly growing popularity of outdoor adventure activities such as bushwalking, rock climbing, abseiling and caving. This growth is occurring at the broad community level and especially in schools.

Already in the first half of 1985 there were two major search operations in one national park (the Stirling Range) whereas there were none in the same area during the previous four years. Those people with an interest or concern in search and rescue anticipate not only more frequent incidents, but also more technically complicated ones which will require the use of specialised equipment and the skills to use it. In Western Australia, almost the full range of technical rescue equipment that is available in America can be obtained, though it is expensive. However, the necessary skills and experience to use the equipment have not been acquired. Only regular practice can correct this shortcoming but this is difficult on several accounts. First, it is hard to train for incidents, the exact nature of which cannot be predicted and, perhaps more importantly, hard for the relevant agencies to justify the costs involved in the absence of frequent search and rescue incidents. Second, there is a real need to extend agency awareness that Western Australia does have hazardous terrain, does require rescue personnel with mountaineering skills, and does require proper clothing and rescue equipment. This is basically a societal problem which will only be changed by education at all levels and (sadly) by reaction to avoid recurrence of missions that have gone wrong.

We have been very lucky in Western Australia that there have been no highly technical cave or cliff rescues to date. Sooner or later one will occur and hopefully those dealing with the emergency will be able to respond reasonably effectively.

It is clear that in North America there are as many approaches to search and rescue planning and procedures as there are rescue teams. There is no "correct" way for any one incident. What is therefore required is the adoption of plans which are based on principles with relatively simple procedures for rescue organisation that can be adopted to the particular situation arising. If we have such plans, have the necessary rescue equipment to hand, train in the use of the equipment, train within the context of simple planning principles and, most importantly, ensure that the various agencies and persons involved work together in a team approach, then really we can do no more.

Once again I extend my sincere thanks to the Winston Churchill Memorial Trust for the opportunity to undertake this study and also to all who have contributed in any way. I only hope that the experiences I have gained and my attempts to disseminate the resulting information will be beneficial to the future management of national parks and wilderness in Western Australia, particularly in the context of visitor safety and technical rescue.

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