

**The Management of Wilderness Bushwalking
in the Tasmanian Wilderness World Heritage Area**

By

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This thesis contains no material which has been accepted for the award of any other higher degree or diploma in any tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person except where due reference is made in the text of the thesis.

N.A. Savage.

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Abstract

This thesis examines the management problems relating to bushwalking in the Tasmanian Wilderness World Heritage Area.

Some background information is provided on the World Heritage Area itself, the development of bushwalking in the area, the concept of wilderness and the existing management structures and policies.

The problems caused by bushwalking are examined in some detail. The most obvious physical problem is the deteriorating state of many of the walking tracks but there are many others including the loss of wilderness quality of remote areas as tracks evolve in previously untracked regions, campsite deterioration, campsite proliferation, fire, litter, disposal of faecal waste, pollution and the spread of *Phytophthora*. Social concerns include possible overcrowding and the impact of unnatural disturbances such as track work, views of distant roads or forestry operations and low-flying aircraft. All may result in a loss of "wilderness experience" to users of the WHA.

The management guidelines for the area are examined in the context of the significance of the World Heritage listing and recommendations made on the priorities for management. In particular, the conflict between preservation and use is examined.

The various management strategies relevant to the management of wilderness recreation are examined. These include the more sophisticated applications of the concept of "carrying capacity" as well as the Recreation Opportunity Spectrum and Limits of Acceptable Change (LAC) methodologies. The limitations of the LAC are considered and it is used as a basis for much of the subsequent discussion of available management actions and monitoring techniques.

The management actions relevant to the problems caused by bushwalking are considered. Four broad categories are used as a framework for discussion: the control of distribution of use, regulation of use, education of users and physical works.

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A consequence of adopting the LAC methodology is the need to monitor key indicators of environmental and social change to ensure that the acceptable levels of impact are not exceeded. The most appropriate techniques for monitoring environmental change are considered as are the methods for obtaining information about users.

Major conclusions include consideration of the practicality of the LAC for both environmental and social monitoring, the need for use limitation in two distinct circumstances, the need for better control of the information available to users and the ongoing need for education of users.

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Dedication

To my parents. Without their support this project would have come to an abrupt halt when it had barely started.

Acknowledgments

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Introduction

Scope

This thesis considers issues relevant to the management of wilderness bushwalking in the Tasmanian Wilderness World Heritage Area. For this purpose wilderness bushwalkers are defined as all recreational walkers in the World Heritage Area except for those on roads or short, highly developed walking tracks such as nature trails or tracks to lookouts (the main users of which are bus or car-borne tourists). By this definition, most wilderness bushwalkers are making overnight trips (trips which require staying out overnight), but walkers on day-walks (trips which do not involve staying out overnight) are not excluded unless they are only using the short, highly developed tracks referred to above.

This thesis does not address the management of non-bushwalking wilderness recreation such as skiing, rafting or caving. Non-recreational issues such as fire, flora and fauna management are considered only to the extent that they relate to wilderness bushwalking.

This thesis is mainly a discussion of the practical options relevant to the management of wilderness bushwalking. It makes some use of the Limits of Acceptable Change System for Wilderness Planning (LAC) and discusses some of its shortcomings. However, it is not intended to be a complete LAC planning exercise or a critique of the LAC concept.

Tasmanian Wilderness World Heritage Area

This thesis mainly considers conditions in the Tasmanian Wilderness World Heritage Area which is the area nominated for World Heritage Listing in September 1989. It includes and expands upon the Western Tasmania Wilderness National Parks World Heritage Area which was placed on the World Heritage List in 1982.

The wilderness area of Western Tasmania has often been referred to as "the South-West" but since the World Heritage Area extends well into the northern half of Tasmania it is clearly inappropriate to refer to this as "the South-West".

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Studies of the Mount Anne Region

The author conducted field work in the Mount Anne Region during the summer of 1987/88 with financial support from the Department of Lands, Parks and Wildlife. The data resulting from this work provided the basis for many of the arguments used in this thesis. Two reports were produced; one on track conditions, the other reporting the results of a survey of users of the area. These reports are reproduced as appendices to this thesis.

National Park Management Authority

The name of the Tasmanian Government Department responsible for National Park management has changed several times in recent years. In 1986 the National Parks and Wildlife Service (NPWS) was merged with the much larger Lands Department to become the Department of Lands, Parks and Wildlife (LPW). In 1989 it was re-established as a separate department under the new name of the Department of Parks, Wildlife and Heritage (PWH). In this thesis the Department is generally referred to by its current name but the older names have been used where appropriate.

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Glossary

The following acronyms are used in the text:

ANPWS - Australian National Parks and Wildlife Service

LAC - Limits of Acceptable Change

LPW - (Department of) Lands, Parks and Wildlife

MIB - Minimal Impact Bushwalking

NPWS - National Parks and Wildlife Service

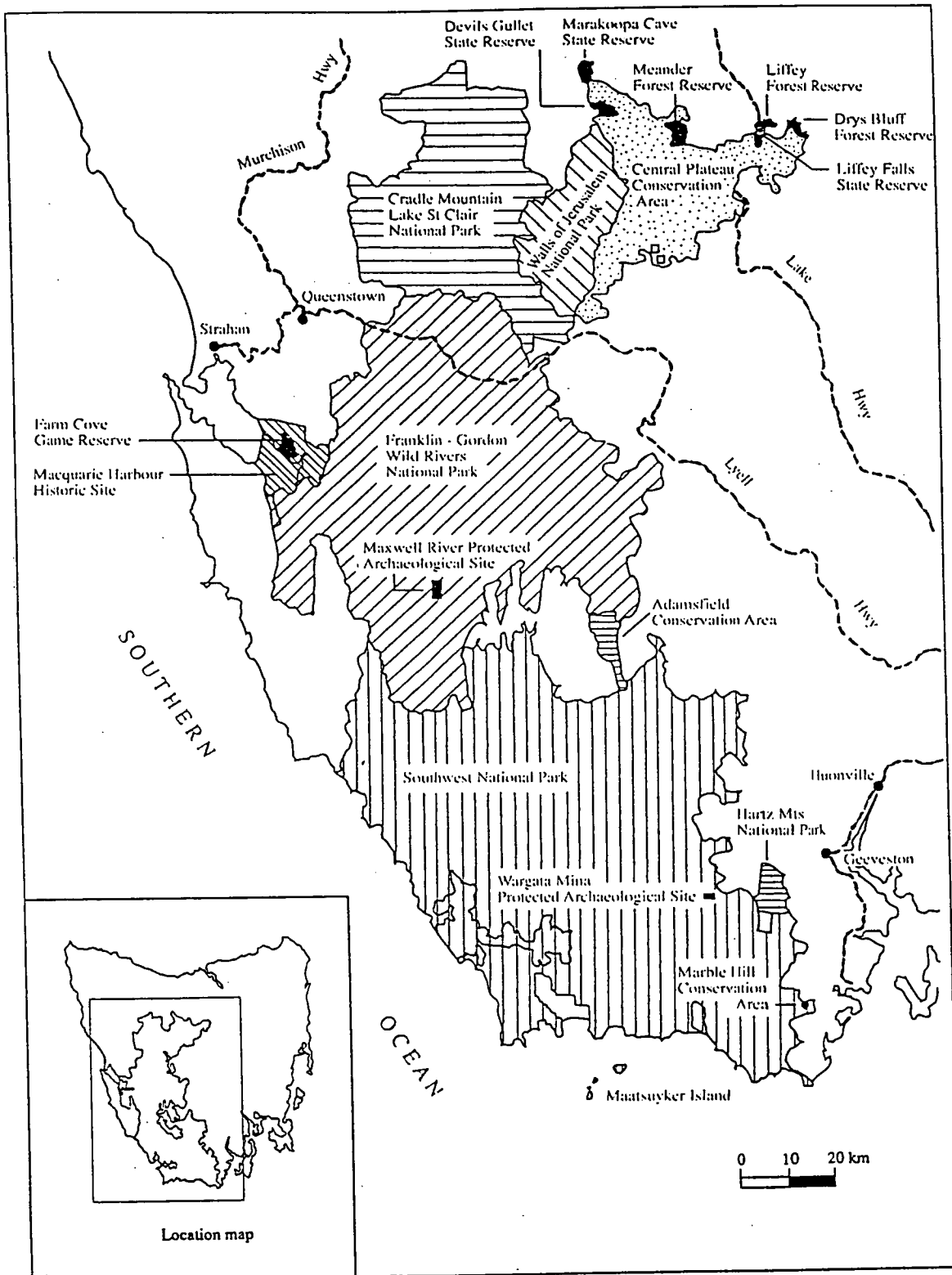
PWH - (Department of) Parks, Wildlife and Heritage

ROS - Recreation Opportunity Spectrum

WHA - (Tasmanian Wilderness) World Heritage Area.

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Tasmanian Wilderness World Heritage Area
(Map by courtesy of Department of Parks, Wildlife and Heritage)



The Management of Wilderness Bushwalking

Chapter 1 - Background

1.1 General

The main management problem relating to the management of wilderness bushwalking in the Tasmanian Wilderness World Heritage Area (WHA) is to reconcile the preservation of natural and wilderness values with the ever-increasing numbers of visitors who wish to experience these values. Conflict is already apparent; the number of bushwalkers is apparently increasing every year and their impact is "loving the wilderness to death" by degrading the very qualities which they come to experience.

The most obvious problem is the muddy and eroded state of the walking tracks. This is largely a reflection of the climate, soils and topography of the area. The WHA is the wettest region in temperate Australia and many of the soils are waterlogged peats which do not hold together for long under the impact of heavily laden bushwalkers. Skeletal mineral soils and the soft crumbly nature of some bedrock also cause problems. Much of the area is very rugged with walking tracks on steep slopes. In combination with the high rainfall this leads to substantial erosion as the "tracks" become drainage channels.

The eroded, muddy tracks are probably the most obvious problem but they are certainly not the only one. Remote campsites suffer similar degradation to tracks and have the additional problem of creeping expansion as ever increasing numbers of walkers try to squeeze into them. Overcrowding of popular areas at peak periods degrades the "wilderness experience" of all concerned. Dead wood does not rot but fuels walkers' campfires and the long term impact of human wastes on the ecology of nutrient poor soils is only just starting to be seriously considered.

1.2 Background - World Heritage Area

The 1.374 million hectare Tasmanian Wilderness World Heritage Area was placed on the World Heritage List in December 1989. It extends the 796 355 hectare Western Tasmania Wilderness National Parks World Heritage Area (listed as World Heritage in 1982). It includes several National Parks and other land of varying conservation status (this is explained in more detail in chapter 3). It is approximately 220km from North to South and covers approximately 20% of Tasmania (see map).

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A major attribute of the WHA is that it remains in a largely undeveloped state with little obvious evidence of human activity apart from two major roads (the Lyell and Lake Highways) and a large hydro-electric scheme (Lakes Gordon and Pedder and associated roads). Substantial regions around the area's boundary also remain largely undeveloped and may eventually be added to it.

Aborigines were largely removed from south-west Tasmania by 1834 and the only direct evidence of their presence is archaeological. Their major impact on the land was their use of fire and it is likely that the present vegetation patterns, to some extent, reflect aboriginal burning practices (Gee, 1979).

Early European visitors were mainly whalers, sealers and piners. The sealing and whaling industries had largely collapsed by the turn of the century due to unregulated killing (Luckman and Davies, 1979). The piners cut Huon pine (a valuable timber) on many of the western rivers, removing the logs by floating them downriver. The most accessible stands had been cut by the late 1870s (Luckman and Davies, 1979) but the industry has continued on a small scale to the present day.

Prospectors had explored even the most remote parts of the South-West by the turn of the century but no major finds were made (King and Fenton, 1979). Most of the major mines in Tasmania lie in the Mount Read Volcanics belt. These are the major host rocks of mineralisation in western Tasmania and lie in an arc to the west and north of the WHA (Tasmania Department of Mines, 1987). Some mining operations have occurred within what is now the the WHA but little evidence of these remains. These were mostly conducted between the 1890s and 1940s and most were very small scale operations (King and Fenton, 1979). The Jane River gold and Oakleigh Creek wolfram mines have operated more recently than this but both are now closed, and the Jane River mine site rehabilitated.

The soils of much of the WHA are "shallow ... strongly acid, leached and infertile". They have "little potential for agriculture or forestry" (Nicolls and Dimmock, 1965).

The poor soils and lack of mineralisation explain the minimal evidence of human activity in the area: it has low potential for agriculture or mining and few trees large

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enough and accessible enough to attract commercial forestry operations except in a few areas near the boundary.

Tasmania is located between latitudes forty and forty-four degrees south. It therefore lies in a region of prevailing westerly winds from the Southern Ocean (Langford, 1965). This results in the elevated regions in the west of the State (most of which are included in the WHA) receiving a very high rainfall, typically 2500mm per year (Langford, 1965).

The major resource of the region which has been exploited is its hydro-electric potential. The Gordon River Power Development Stage One is located largely within the WHA. This comprises the artificial Lakes Gordon and Pedder (which flooded the natural lake of the same name) and the associated access roads. The Gordon River Road was constructed in 1965-67 and the scheme itself in 1967-78.

The WHA lies largely in the region where the landscape has been modified by Pleistocene glaciation (Davies, 1965). This has resulted in some of the most rugged and scenically spectacular topography in the state. It includes the highest mountain in Tasmania, the 1617m Mount Ossa.

The WHA includes most of the major bushwalking tracks in Tasmania. Its main recreational attraction is the number of extended walks available in spectacular, remote areas. Relatively few short, easy walks are available for people who do not have the ability, inclination or time for extended trips. For the non-bushwalker access is restricted to the major roads, river cruises or scenic flights. A major management challenge of the WHA (but not a subject of this thesis) is to make it more accessible to the general public without destroying its wilderness qualities.

1.3 Background - Bushwalking

Most visitors to western Tasmania last century were there for economic reasons yet it is evident that many of them "were keenly appreciative of the wild scenery" and "enjoyed walking and camping in the bush" (Luckman and Davies, 1979). As early as 1895 some recreational bushwalking was reported on the track from Geeveston to the Hartz Range. There was an upsurge in bushwalking after World War I with parties visiting remote

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areas. The increasing interest was reflected in the formation of the Hobart Walking Club in 1929. By 1939 walkers included significant numbers of mainland visitors. After World War II the availability of light aircraft played a major role in opening up the South-West. These landed on coastal beaches and the beach of the original Lake Pedder and also made air drops of supplies which made long, exploratory walks much easier (Luckman and Davies, 1979). The opening of the Strathgordon and Scotts Peak roads in the late 1960s made the heart of the South-West far more accessible. There is no doubt that there has been an enormous increase in the popularity of bushwalking since World War II but the increase is impossible to quantify since it is only relatively recently that the Department of Parks, Wildlife and Heritage (PWH) has started keeping reliable statistics on walker numbers (personal communication, various PWH staff). Kirkpatrick (1979, p21) suggested that, on the basis of the very limited available data, "the late sixties marked the start of an explosion of wilderness use in Tasmania". This increase reflects trends overseas which have been attributed to numerous factors including improved lightweight camping equipment and changes in society such as higher education levels, increased leisure time, increased mobility, rising incomes and growing interest in the natural environment (Hendee, Stankey and Lucas, 1978).

Tasmania is popular with mainland bushwalkers since the extensive, rugged, undeveloped, temperate wilderness area offers opportunities for extended walks (over a week away from any trace of "civilisation") not found elsewhere in the country. During the summer, in contrast to anywhere in mainland Australia, the climate is mild and potable water is readily available in most areas.

Several features of bushwalking in Tasmania are worthy of comment.

- 1) It is a strongly seasonal activity. In the Mount Anne area 67% of registrations in the logbook on the main Mount Anne track occurred in 29% of the year (18/12/88 to 3/4/88). These were concentrated in the period from Christmas to early February with another peak at Easter (Sawyer, 1988). Even in summer bad weather is frequent and often disrupts walkers' timetables.
- 2) The great majority of walkers are concentrated on a few popular tracks (personal observation by the author and confirmed by various PWH staff). There is little off-track walking because, in most areas, the dense vegetation makes it very hard work.
- 3) Visitors outnumber Tasmanians on most of the major tracks in summer. The 1986-87 Wilderness Walker Survey (Department of Lands, Parks and Wildlife, 1987), based

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mainly on Overland Track walkers, found 25% of walkers to be Tasmanians while 65% were from mainland Australia and 5% from overseas (the remaining 5% did not answer this question).

4) The cost of repair and maintenance of walking tracks in remote areas is considerable since this generally requires both workers and materials to be transported by helicopter.

The main recreational attraction of the WHA is the number of extended walks available in spectacular, remote areas. It is not so well provided with day-walks (bushwalks which do not require staying out overnight). There is an extensive network of such tracks around Cradle Mountain, some at Lake St Clair and some in the Mount Anne area. Most other day-walk tracks are neither well known or widely used. There are also some short, high standard tracks to lookouts and Nature Trails but these are used mainly by car-borne tourists and, as such, lie outside the scope of this thesis.

1.4 Background - Wilderness

For many people the wilderness qualities of the WHA are its greatest asset and the most important reason for its existence, even though wilderness is not specifically mentioned as a criterion for World Heritage Listing. It is the wilderness qualities, more than any other, which can easily be destroyed by excessive or inappropriate recreational use.

Godfrey-Smith defines wilderness as "any reasonably large tract of the Earth, together with its plant and animal communities, which is substantially unmodified by humans and in particular by human technology" (Godfrey-Smith, 1979, 309-319). It is these wilderness qualities together with the spectacular scenery and challenging but practicable nature of walking in the area that attract so many bushwalkers to the WHA.

Wilderness means different things to different people at different times. For a walker with much experience of wilderness the sight of a distant road on a clear day may be a significant intrusion into the wilderness qualities of the area, yet to someone else the same spot could be the wildest place they had ever been in. On a misty day, with the distant road obscured, both might feel a strong sense of wilderness. It would be convenient to avoid defining wilderness altogether, and leave it to the personal decision of each individual but, if wilderness preservation is to be recognised as a legitimate

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aspect of land management then some consensus on a definition of wilderness is essential.

Several attempts have been made to systematically define the extent of wilderness in Tasmania. An early attempt was by Russell, Matthews and Jones (1979). They defined wilderness as "a large area of land perceived to be natural where genetic diversity and natural cycles remain essentially unaltered". The criteria used for the identification of such areas were:

- (a) a minimum core area of 25 000 ha;
- (b) a core area free of major indentations;
- (c) a core area of at least 10 km in width;
- (d) a management (buffer) zone surrounding the core area, of about 25 000 ha or more.

The inner core wilderness boundary was located about 10 km from disturbances such as transmission lines, roads, impoundments, mining or forestry operations. The buffer zones, in some cases, include small scale disturbances. Walking tracks, with the sole exception of the Overland Track, were not considered to be disturbances. The outcome of this process was the definition on a 1:500 000 scale map of six core wilderness areas, with surrounding buffer zones, in Western Tasmania. The core and buffer zones could be regarded as a two level wilderness classification. The document also contains a suggestion that wilderness be zoned in two categories; areas for recreational use and areas to be accessible only for scientific reference and biological research. These latter would include vulnerable habitats which could be excessively damaged by recreational use.

The other early attempt at classification of wilderness in Tasmania was proposed by Kirkpatrick in 1980. This was based on a strict definition of remoteness (based on travel time) and primitiveness (based on the arc of visibility of disturbance and distance to the disturbance). It quantified wilderness values on an essentially continuous scale. Kirkpatrick used this methodology to evaluate the effects on wilderness of various potential hydro-electric developments (Kirkpatrick, 1979) and forestry operations (Kirkpatrick and Haney, 1980).

The next published attempt to define wilderness in Tasmania was made by Hawes and Heatley in 1985. This differed only in detail from the work of Russell, Matthews and

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Jones. The criteria used to define wilderness was 8 km remoteness from major intrusions. They did not consider any walking tracks to be major intrusions. Wilderness, and surrounding "primitive country", was plotted on 1:200 000 scale maps using several different scenarios of future development.

The most recent approach is that of Lesslie, Mackey and Schulmeister (1988). This utilised a computer-based geographic information system (GIS). This allowed four different indicators of wilderness quality to be combined to give a total wilderness quality index. The four indicators used were:

- (a) remoteness from settlement;
- (b) remoteness from access;
- (c) aesthetic naturalness;
- (d) biophysical naturalness (the degree to which ecosystems approximate their original condition).

Combining these led to an eight level wilderness quality index (ranging from high to low). This computer based approach is obviously far more flexible than those previously described. It is based on four criteria, not just two, and could easily be modified to include extra criteria or give different weightings to the various criteria as required for particular applications. As with Kirkpatrick's system, the multiple levels of the wilderness quality classification have appeal compared to the simpler classifications which put a line on a map and state that land on one side is wilderness while land on the other is not. Boundaries between different classifications are inevitable but the concept of degrees of wilderness quality makes far more intuitive sense than a sharp division into wilderness and non-wilderness.

Under their criteria the "developments associated with the Overland Track somewhat impact on wilderness quality" (Lesslie, Mackey & Schulmeister, 1988, p31).

The major drawback of the Lesslie approach is that the "aesthetic naturalness" criterion only accounts for disturbances in the immediate area. It does not account for very visible disturbances which can dominate a view in the middle or long distance. Since the view is a major factor for determining the wilderness quality of an area, the most logical system of wilderness classification to adopt in rugged terrain such as Western Tasmania is that of Kirkpatrick in which the arc of visibility of disturbance and distance to the disturbance are major inputs. This is the approach that has been adopted by PWH.

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However, it is a very tedious technique to apply manually and would benefit from computerisation.

For the purpose of this thesis the exact definition of wilderness is not of great importance. However, it is assumed that wilderness value can be quantified on some sort of continuous scale and that the maintenance of wilderness values is a legitimate concern of management.

1.5 Background - Management

The Tasmanian Department of Parks and Wildlife and Heritage is responsible for the management of the WHA in conjunction with the Australian National Parks and Wildlife Service (ANPWS).

The main management response to the problems caused by bushwalkers has been to repair the most badly damaged sections of track. Considerable thought has been given to the best techniques of repairing particular types of problem and planning of repair work is undertaken on a track by track level.

Considerable effort has gone into the Minimal Impact Bushwalking campaign (MIB). This is an educational campaign aimed at getting individual walkers to reduce their personal environmental impact. Its main emphasis has been on the use of fuel stoves rather than campfires and the hygienic disposal of faecal wastes.

In recent years considerable resources have been devoted to gathering basic statistics and information on visitors. Little information is available on visitor numbers prior to this or on the needs and attitudes of visitors.

The management of undeveloped areas which are used mainly for recreation is a relatively new problem, particularly in Australia. Most of the information on the subject originates in the USA, where many of the problems first became apparent.

The Tasmanian situation, where the main recreational activity is walking in a mountainous, wet, temperate region, relates more closely to experiences in New

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Zealand or North America than elsewhere in Australia. The problem can be divided into two related issues:

- 1) physical problems (the obvious deterioration of tracks and campsites);
- 2) social issues (there is concern that users' expectations are not being met due to a lack of information on their numbers, activities, perceptions and needs; in particular, there is concern that overcrowding may detract from visitors' experiences).

No proven broad-level planning strategy to deal with these problems exists but there is now a recognition that some form of management of wilderness recreation is necessary.

1.6 Introduction - Summing Up

When bushwalker numbers were low they caused few obvious problems and there was no concern about the management of the areas they used. The current level of participation in bushwalking causes problems which cannot be ignored, the most obvious being the deteriorating state of many of the walking tracks. Combined with an increasing level of concern for the preservation of wild areas this has led to greatly increased interest in all aspects of wilderness recreation management. The problems are sufficiently recent that no well proven planning strategies exist to cope with them. Those that are available originated in the USA and their relevance to local conditions has yet to be proven.

This thesis examines the practical problems specific to the management of wilderness bushwalking in the context of the management goals for the WHA. It examines some of the management strategies available including the Limits of Acceptable Change System for Wilderness Planning (LAC) which is used in the subsequent discussion of possible options. However, the emphasis is on the discussion of the practical options and it is not intended to be a complete LAC planning exercise or a detailed examination of the LAC. It discusses a range of practical solutions including techniques for monitoring environmental damage and determining maintenance priorities and concludes with recommendations on the balance of options most likely to meet the management goals in the long term.

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Chapter 2 - The Problems

2.1 Track Problems

Origin of Tracks

The great majority of the now popular walking tracks in the WHA were never planned or constructed; they just evolved as generations of walkers followed the same or similar routes. The most notable exception to this is the Port Davey Track which was constructed in 1914 and is still mostly in good condition.

Stages of Track Evolution

From personal observation and discussions it would seem that the major stages in the evolution of a typical walking track in Western Tasmania are as follows.

1) The most obvious route between A and B is followed by the great majority of walkers going from A to B. This is usually the line of least resistance; for example, areas of dense vegetation are avoided and obvious features such as ridgetops are followed. This rarely corresponds to the route that would be selected by a planner who set out to design a track which would be capable of carrying large numbers of walkers over a long period with minimal environmental impact (see table below).

Table 2.1 Idealised Comparison Between Planned/Unplanned Walking Tracks

Well Planned Track	Unplanned Track
* Zig-zags up steep slopes	* Straight up steep slopes
* Well drained	* Erodes rapidly
* Passes through forest	* Passes through buttongrass
plains	
* On mineral soils	* On peat soils
* Withstands trampling	* Muddy and eroded
* Minimal visual impact	* Visual impact may be
	considerable

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2) As time goes by a pad is created where the living vegetation is damaged and the soil compacted. In open country such a pad will usually first become apparent where the topography forces all walkers onto exactly the same route. Once the pad is formed, compaction of the soil may result in a period of stability, although this depends on the soil type and number of users (Calais, 1981). Subsequently, rapid deterioration is likely because the pad's existence encourages all walkers to stick to exactly the same route. It will also encourage more use of the route because it removes most of the difficulty of navigation (a continuous pad can easily be followed in bad weather or by inexperienced parties but the original route may have required some navigational skill). Alternatively the same effects may result when the route is marked by cairns, stakes or tapes.

3) With further use the vegetation on the track is almost totally destroyed. If the track is on a poorly drained soil such as peat it becomes muddy and churned up to a considerable depth in some places.

4) If the track is on a slope then water flowing downhill erodes the disturbed soil and can turn the track into a narrow slot.

5) Most walkers try to minimise their own discomfort:

a) They do not like walking in the narrow eroded slot so they either walk on the edges of it, making it wider, or create a new track parallel to it;

b) They do not like wading through deep mud (or anything that looks as if it might be deep) so they make sidetracks around mudholes or they skirt around the edges of the them thereby increasing their size;

c) They do not like walking on the uneven surfaces often exposed by erosion so they create a new track alongside.

6) The result of these processes is that either the original track gets wider and wider or the sidetracks themselves develop problems and the whole area becomes a complex of braided muddy tracks and mudholes.

7) A possible further stage occurs when a track is "fixed" by the authority responsible for it. This usually involves the large scale use of artificial surfaces and, if not well planned, may destroy the character of the track and the area through which it passes.

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Chapter 2 - The Problems

For the purpose of discussion in this thesis two distinct problems are identified:

- 1) The development of new tracks in previously trackless areas (this has implications for the wilderness quality of the area);
- 2) The deterioration of existing tracks, as described above.

Recreational Succession

The evolutionary stages of a track's development described above correspond, to some extent, to changes in the type of walker who uses the track. In the beginning, when the track is just an ill-defined route, the users will be predominantly the experienced and fit enthusiasts who enjoy exploring "the unknown". As the route becomes better defined and better known (particularly when it is described in a published guide book) it will receive more visits from those who take their bushwalking less seriously and it is likely to be regarded as no longer worth a visit by enthusiasts who pioneered the route in the first place. If the track deteriorates too far it may get such a bad reputation that scarcely anyone visits it. If the track is substantially upgraded then it may become easy enough to appeal to another category of users (for example, family groups), while losing many of the previous users who no longer regard it as a "serious bushwalk". Once upgraded to a relatively high standard a track may be used by experienced walkers as a convenient access route to enable them to explore the surrounding untracked regions which were previously less accessible. This inevitably leads to the creation of rough tracks where there previously were none and the wilderness quality of the whole area suffers. The Overland Track is an example of this. Many experienced local walkers find little challenge in simply walking the track but frequently use sections of it to gain access to explore the surrounding mountains.

These changes can also be interpreted as a creep in the ROS (Recreation Opportunity Spectrum) classification (please refer to chapter 4) of the track from the "rough/difficult" end of the spectrum towards the "easy" end.

2.2 Campsite Problems

Problems with campsites themselves fall into two distinct categories; trampling and proliferation. Fire and pollution problems are mainly associated with campsites and so are discussed under this heading.

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Chapter 2 - The Problems

A) Campsite Trampling

The trampling problems of campsites are mostly very similar to those of walking tracks and do not need much further elaboration. The worst problems are usually not the tent site areas themselves but the areas immediately outside tent entrances and the tracks between the tent sites and the fireplaces, water supply and toilet. It is self-evident that tracks in and around campsites receive substantially more use than the track leading to the campsite as a result of campers performing their domestic chores. These problems are essentially walking track problems and the same management options and solutions apply. The one different problem which has not received much attention is the techniques appropriate for "hardening" tent sites themselves, when required. These differ from walking tracks because of the need to provide a smooth surface suitable for sleeping on and the necessity of withstanding repeated placing of tent pegs.

B) Campsite Proliferation

The basic requirements for a campsite are a water supply and reasonably well-drained, flat, clear ground. These limit the opportunities for camping to a relatively small number of locations on any particular walk. For example, on the Mount Anne Circuit practically all parties would stop at Shelf Camp and one of the Lonely Tarns campsites because of lack of alternatives (Appendix 1, page 6). This leads to the problem of additional sites being created in the limited areas which are suitable for camping. This may be because all the existing sites are in use when a latecomer arrives. Alternatively the extra sites may be created because the camper does not like the look of the existing site (for example, too muddy) or because the camper wants maximum privacy and consequently wants to get as far away from the in-use sites as possible. Whatever the cause, the end result is a proliferation of campsites which does nothing for the aesthetics or nature conservation values of the area. A partial solution to this problem is to educate users not to create additional campsites except when it is unavoidable, but it is hard to see how any strategy which does not restrict the number of users can be effective in the long term. The problem is largely one of excessive numbers of users at some particular times (typically fine summer long weekends), not an excessive total number of users.

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Chapter 2 - The Problems

C) Fire

Bushwalkers have been responsible for several major bushfires in western Tasmania in recent decades (personal communication, various PWH staff). The causes have generally been escapes from campfires.

Bushwalkers campfires also cause other problems. Fireplaces are a semi-permanent reminder of human usage and often contain partly burned garbage. Campfires used to be regarded as acceptable so long as only dead wood was burned but increasing walker numbers now mean that there is a noticeable absence of dead wood around many popular campsites. This is a particular problem in alpine areas where vegetation is sparse. The effects of this removal of dead wood on the local ecology have not been studied in detail in Tasmania but some impact is inevitable (personal communication, Prof.J.Kirkpatrick). A major consequence of the absence of dead wood is the incentive it provides to cut live trees for firewood. PWH has banned campfires on several major walking tracks and has installed coal stoves in huts on the Overland Track (coal is flown in by helicopter).

D) Litter

Litter is a significant problem on some of the more popular tracks. Despite an educational program ("if you can carry it in, you can carry it out") litter is left in the parks, especially at any location which resembles a rubbish receptacle (such as containers for ash from stoves in huts). Attempts to burn non-inflammable garbage (eg aluminium foil) are common and the consequences of this are evident in fireplaces. A significant part of the duties of PWH staff on the major walking tracks in summer is the collection of garbage (personal communication, Cathie Plowman, PWH).

E) Water Pollution

Streams and lakes are polluted by soap (from washing of people and cooking utensils), food scraps and faecal material (see below). This has consequences for both the ecology of the water body and human health where the water is used for drinking.

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Chapter 2 - The Problems

F) Faecal Wastes

The disposal of faecal material has obvious implications for human health and probable implications for the local ecology (please refer to "Suggested Research Topics" in Chapter 5). Leaving faeces exposed brings risk from fly-borne disease. Burying faeces in shallow holes is widely recommended. This works well in areas where there is considerable biological activity in the soil and decomposition is rapid but may cause problems in fragile alpine vegetation or in very wet peat soils. PWH has installed pit or composting toilets at popular huts and campsites on major tracks.

2.3 *Phytophthora*

Phytophthora cinnamomi is an introduced phyto-pathogenic fungus known commonly as "cinnamon fungus" or "root-rot fungus". It has been isolated from plants of 65 species which occur in the WHA. Its distribution within the WHA includes regions around the Port Davey and South Coast Tracks as well as the Scotts Peak and Strathgordon Roads. Its distribution is limited by soil temperature; the highest altitude at which it has been found is 800m. As well as natural dispersal the fungus is spread by movement of infested soil; this includes soil on walkers' boots (LPW, 1989).

2.4 Social Problems

Lack of Information on Users

A major problem confronting managers of the WHA is the lack of information available to them on users of the area, particularly participants in wilderness recreation. Even basic statistical information such as the numbers of walkers using particular tracks has been very scarce until recent years and the collection of more detailed sociological information on users is a problem which is only just being addressed.

Managers are concerned that users' expectations are not being met due to a lack of information on their numbers, activities, perceptions and needs. In particular, there is concern that overcrowding, in some circumstances, may detract from users' experiences. Insufficient information is available to prove that this is significantly degrading walkers' experiences but it is likely to become a problem in the future even if it is not already. It

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is unlikely to be widespread but may be significant at certain times and places (for example, popular campsites at peak periods).

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Chapter 3 - Management Goals

As stated at the start of chapter one, the main management problem of the WHA is to reconcile the preservation of wilderness values with recreational use of the area. Two simplistic extremes are possible:

- 1) Prohibit all human activity in an area thereby maximising its wilderness qualities;
- 2) Allow unrestricted recreational activity thereby reducing the wilderness qualities of all popular areas and maintaining high wilderness values only by default, in areas which are, for some reason, unattractive for recreation.

It seems reasonable that a practical management strategy should lie somewhere between these two extremes; the problem is to decide exactly where.

To properly consider the management goals relevant to bushwalking in the WHA it is necessary to examine the implications of the conservation status of the area and the significance of its wilderness qualities.

3.1 Significance of the World Heritage Area

Conservation

The Tasmanian Wilderness World Heritage Area (placed on the World Heritage List in December, 1989) covers about 1.374 million hectares which is approximately 20% of Tasmania (Commonwealth Department of the Arts, Sport, the Environment, Tourism and Territories and Government of Tasmania, 1989). It contains areas with varying conservation status. Most of the area is designated National Park, the major exception being the Central Plateau Conservation Area.

1.435 million hectares of south-west Tasmania (the Southwest Conservation Area) overlaps the WHA and is proclaimed as an IUCN (International Union for the Conservation of Nature and Natural Resources) Conservation Area Category VIII; Multiple Use Management Area. This includes declared State Reserves (National Parks, Nature Reserves and Historic Sites; IUCN Categories II and IV) (Bosworth, 1984).

In addition the Southwest National Park was approved as a Biosphere Reserve under the Man and the Biosphere Program of UNESCO (United Nations Educational Scientific and Cultural Organisation) in October 1977.

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Management Objectives

The management objectives for a National Park include the protection of "natural and scenic areas of national or international significance for scientific, educational and recreational use. The area should ... provide ecological stability and diversity" (IUCN, 1984, 47-53).

An area needs to be of "outstanding universal value" to be declared a World Heritage Site (Natural). The management objectives for such an area include the protection of "the natural features for which the area was considered to be of world heritage quality". They also suggest that "while recreation and on-site interpretation will generally be developed, some sites may be of such significance that public use will either be strictly controlled or prohibited" (IUCN, 1984, 47-53).

The Tasmanian Wilderness World Heritage Area was nominated on the grounds of both Cultural and Natural property (Commonwealth Department of the Arts, Sport, the Environment, Tourism and Territories and Government of Tasmania, 1989). The cultural importance of the region lies in its significant Aboriginal archaeological sites. The importance of the natural features of the region is such that it meets all 4 of the criteria for a World Heritage Site (Natural). These are (briefly):

- 1) it is representative of a major stage of the earth's evolutionary history (evidence of recent glaciation);
- 2) it is an outstanding example of one of the few remaining temperate areas which is of sufficient size for natural processes to continue;
- 3) it contains superb natural features and areas of exceptional natural beauty;
- 4) it contains a diversity of habitats where populations of rare and endangered species of plants and animals survive.

Wilderness is not specifically mentioned as a criterion for a World Heritage Site (Natural) but the nomination notes that it "is this wilderness quality which underpins the success of the area in meeting all four criteria as a natural property and which is the foundation for the maintenance of the integrity of both the natural and cultural values which are displayed" (page 27). It also notes that "virtually all other areas in the

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temperate zone have been so substantially modified by agriculture and industry that their pristine wilderness characteristics have been destroyed" (page 47).

Article 5 of the UNESCO World Heritage Convention, which established the World Heritage List imposes certain conditions on the signatories including the following requirements:

- (a) "to adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community";
- (c) "to work out such operating methods as will make the state capable of counteracting the dangers that threaten its cultural or natural heritage";
- (d) "to take the appropriate ... measures necessary for the identification, protection, conservation, presentation and rehabilitation of this heritage" (quoted in PWH, 1989).

These have been interpreted by PWH as a directive to conserve natural and cultural values and to maintain and where possible enhance the wilderness quality (WHA Planning Team, 1989). PWH recognises that the wilderness quality of the WHA underlies all its other values so that maintenance of wilderness quality is the best overall management policy for conserving the other significant values of the WHA in the long-term. It also recognises the scarcity of wilderness on a world scale and the increasing interest in wilderness recreation.

In the context of bushwalking in the WHA the three points quoted above could be interpreted as requiring that the values of the area be protected and rehabilitated while managing the area to prevent further degradation. The requirements for "presentation" and "function in the life of the community" suggest that restrictions on access should only be considered in especially significant areas where any ecological damage is unacceptable.

In a Biosphere Reserve the management emphasis is on preservation of "the diversity and integrity of biotic communities of plants and animals within natural ecosystems, and to safeguard the genetic diversity of species" (IUCN, 1984).

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3.2 Parks, Wildlife and Heritage, Tasmania:

Management Objectives

Wilderness management in the USA is simplified by the 1964 Wilderness Act which clearly states that designated wilderness areas are to be "administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness" (Hendee, Stankey and Lucas, 1978).

There is neither a Tasmanian nor an Australian (federal) Wilderness Act and the Tasmania National Parks and Wildlife Act 1970 does not specifically mention wilderness or make mention of the relative priorities of preservation and use in natural area management.

Preservation is given priority over use in a discussion paper (Department of Lands, Parks & Wildlife, 1986) containing proposed "principle objectives" for the (then new) Department of Lands, Parks and Wildlife (LPW). This draft document includes the following:

3. To seek the appropriate conservation and enhancement of the State's natural, historic and cultural environment and particularly the preservation and protection of its unique or endangered species of fauna and flora.
4. Consistent with (3) above, to maximise the use and enjoyment by Tasmanians of Crown Land and to enhance the economic and tourism potential of the State through the provision of appropriate access to and development associated with that land. However, these proposed objectives have never been formally adopted (personal communication, A.McCuaig, PWH).

3.3 Conclusions

It is evident from the above that the outstanding attributes of the WHA are its natural environment and wilderness values. All the above arguments suggest that the maintenance of these values should take precedence over demands for recreation use.

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Chapter 3 - Management Goals

The Limits of Acceptable Change planning methodology (discussed at length in 4.4) requires an answer to the question of "How much change is acceptable?". The best guidelines come from the points quoted above from the World Heritage Convention. Given the present state of many of the walking tracks in the WHA, these suggest that too much damage has already occurred, restoration is needed and such damage must be prevented from recurring in future. Since bushwalking tracks are the traditional and, in many cases, the only means of access to the area, track closure is justified only in especially significant areas where any ecological damage is unacceptable. Elsewhere tracks should be repaired and maintained to prevent further environmental damage.

Management needs to clarify the level of physical impact and social conditions considered acceptable in particular circumstances. In practice, the exact level of damage tolerated and the standard of track repair will inevitably depend on a range of factors including zoning (discussed in 4.1), the practicability of repair and the resources available for such work. Some basic criteria such as stability of track width and depth should apply in all circumstances (personal communication, Professor J. Kirkpatrick) while others such as the actual track width and standard of construction will vary according to the zone and track classification. Likewise, the level of crowding considered acceptable will vary according to the circumstances.

Neither the World Heritage Convention nor the National Parks and Wildlife Act give specific direction on exactly how the compromise between preservation and use should be achieved. This inevitably leaves major decisions to the planning authorities and the government of the day. It would assist planners and the long term stability of management if the priority of preservation over use (and some guidelines on how this was to be achieved) was clearly stated in some legal document such as a Tasmanian or Australian Wilderness Act.

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Chapter 4 - Management Strategies

4.1 Wilderness Management

Most of the literature on the planning and management of wilderness areas originates in the USA because it was there that the concept of wilderness was first legalised (the Wilderness Act of 1964) and the need for wilderness management was first recognised. The North American literature is aimed mainly at fulfilling the "preserve and use" requirement of the Wilderness Act in the management of legally designated wilderness areas. As such, it is very relevant to the management of any essentially natural area (regardless of its legal designation) where the management goals are to both preserve and use. For this reason the literature on wilderness management is the appropriate starting point for considering the management of the WHA, despite the lack of any legally designated wilderness in Tasmania.

The concept and definition of wilderness has been discussed at greater length in chapter 1, here the word is used loosely to mean any essentially natural area.

Is Wilderness Management Necessary?

There is a paradox in the idea of managing a wilderness at all since a wilderness is, by definition, an area where the influence of modern man is minimised as far as possible. Many people associate the idea of land management with large scale environmental manipulation and consequently react negatively to any suggestion of wilderness management. Apart from fire and factors beyond the direct control of the wilderness manager, such as air pollution and climate change, the major human impact on wilderness environments is recreational use. Hence management of wilderness is primarily management of recreational use of wilderness. As such, it is primarily the management of wilderness users not the management of the land (Hendee, Stankey and Lucas, 1978).

Origins of Wilderness Recreation Management

Wilderness recreation management started in the 1960s with the realisation that it was in fact necessary to manage wilderness recreation at all (Brown, McCool and Manfredi, 1987). This was prompted by observations of problems such as eroded trails, litter and messy campsites. Early studies concentrated on gathering data on the behaviour and

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attitudes of wilderness users. The concept of a recreational carrying capacity arose and effort was focussed on management to keep use within capacity.

In 1973 Lucas developed a framework for management based on the early research into recreational carrying capacity. His basic management principles were:

- 1) Maintain ecosystem integrity;
- 2) Control visitor impacts;
- 3) Develop the opportunity spectrum;
- 4) Manage the wilderness periphery sensitively;
- 5) Respect visitors freedom;
- 6) Provide opportunities for solitude.

He recognised the difficulty of determining carrying capacity: "No magic number of users constitutes capacity. Instead, numerous effects of use must be kept within the limits of acceptable change" (Lucas, 1973, 150-154).

4.2 Carrying Capacity

Despite the work of Lucas, the "preserve and use" requirement of the Wilderness Act led to concentration on the establishment of a "carrying capacity" for wilderness. Two basic types of carrying capacity were soon identified: ecological and sociological:

- 1) The ecological carrying capacity was determined by the changes in the physical-biological aspects of an area due to both natural and human-impact causes. Research concentrated on the impact of human use on trails and campsites. Since any human use has some environmental impact, the ecological carrying capacity was totally dependent on the level of impact considered acceptable.
- 2) The sociological carrying capacity was determined on the basis of user satisfaction. Further research on social carrying capacity established that different groups of wilderness users had different tolerances of crowding and that the location and type of encounter were also important (Brown, McCool and Manfredo, 1987).

The concept was further developed by Shelby and Heberlein (1986) who identified a physical carrying capacity (space impacts) additional to the two above. In the wilderness bushwalking context an example of physical capacity is the number of tents that will physically fit into a given campsite.

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They also refined sociological carrying capacity by emphasising that the number of contacts with other users is not necessarily directly related to use levels (some factor such as a similar timetable may result in frequent contacts between users even though the total number of users is low).

Shelby and Heberlein also emphasise the need for sophisticated questioning of users if their real opinions are to be determined. For example, they determined that satisfaction was not an appropriate criterion for determining crowding because it was "generally uncorrelated with use or encounter levels". The most objective means of determining crowding is to study users' contact preferences, not users' satisfaction with their actual number of contacts (Shelby and Heberlein, 1986, chapter 3). This emphasises the need for the designer of user surveys to have some knowledge of sociology, and for the survey to be thoroughly tested, before much reliance can be placed on the results of questions on opinions and attitudes as distinct from straightforward questions of fact.

Although use limits have been imposed by management in several places, few attempts to actually calculate carrying capacity have been made (Brown, McCool and Manfredo, 1987). Such calculations are inevitably highly dependent on the exact management objectives and type of recreation experience that management has chosen to provide.

4.3 Recreation Opportunity Spectrum

The more sophisticated considerations of carrying capacity focussed attention on the importance of management objectives. This led to incorporation of the concept of the Recreation Opportunity Spectrum (ROS) into wilderness management. ROS was first clearly defined by Clark and Stankey in 1979. It is based on the recognition that recreation opportunities are the fundamental resource that is provided for recreationists by management (Brown and Manfredo, 1982). Since there is no such person as the "average camper" quality recreation experiences are best assured by providing a diverse set of recreation opportunities (Brown, McCool and Manfredo, 1987, 45-49). This spectrum of opportunities is defined in terms of activity, setting and experience dimensions. A major use of ROS in the context of wilderness management has been to emphasise that a range of recreation opportunities exist within wilderness and that the purest forms of wilderness are not necessary to provide the least confined recreation opportunities.

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The existence of a range of opportunities within the Tasmanian bushwalking context is confirmed by a survey of Tasmanian Wilderness users (Carlington, 1988, page 331): "the range of views ... is indicative of bushwalkers seeking a range of settings within the parks in which to participate. These settings range from the well marked, heavily travelled, primary corridors to the very seldom visited areas where few if any tracks are marked". This provides the basis for a ROS classification ranging from short/easy tracks to long/rough routes within the range of walks being considered in this thesis.

Some anomalies are inevitable in such a broad classification. Walks can be classified according to their difficulty, surface, length, presence of huts, level of marking, zoning of the area etcetera. The position of any given walk along the spectrum depends on the weighting accorded to each of these factors. For example, the Overland Track is well provided with huts and will have a good surface throughout once current work is completed. If tracks are ranked on the level of accommodation provided or the standard of the surface then the Overland Track lies near the "easy" end of the spectrum, yet if classified on distance it is amongst the longer walks in the state.

Hence, the main use of ROS is to focus attention on the concept of providing a range of opportunities. If the opportunities available are to be examined in detail it is necessary to classify each opportunity according to the criterion of interest.

4.4 Limits of Acceptable Change

The most recent and most comprehensive development in wilderness recreation planning is the "Limits of Acceptable Change" (LAC) system first formalised by Stankey, Cole, Lucas, Petersen and Frissell in 1985. The LAC is intended to be a system for wilderness planning in total; not just planning for recreation, although this is its major emphasis, since recreation-related issues are the major management problem in the majority of wilderness areas (Stankey, Cole, Lucas, Petersen and Frissell, 1985).

The nine major steps of the LAC planning process are:

- 1) Identify area concerns and issues;
- 2) Define and describe Recreation Opportunity Classes;
- 3) Select indicators of resource and social conditions;

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- 4) Inventory resource and social conditions;
- 5) Specify standards for resource and social conditions;
- 6) Identify alternative opportunity class allocations;
- 7) Identify management actions for each alternative;
- 8) Evaluate alternatives and select the preferred alternative;
- 9) Implement actions and monitor conditions.

LAC includes and expands on the ROS concept. It arose from a recognition that any human use of an essentially natural environment caused some impact so that a fundamental requirement of any management system is to define what level of impact is acceptable in what circumstances. This concept was inherent in previous schemes for wilderness recreation planning but was often obscured by the emphasis on calculating a numerical carrying capacity (Brown, McCool and Manfreda, 1987).

The significance of LAC is that it changes the fundamental question from "how much use?" to "how much change?". Changes in environmental and social conditions are measured directly in contrast to indirectly via an assumed relationship with use levels. This removes the emphasis on regulation of use and calculation of carrying capacity as the solution to problems of impact and, instead, identifies the desired environmental and social conditions as the key management concern. "The critical issue in park planning and management is not the number of people using an area but the condition of the environmental setting which determines both the conservation value of an area and the quality of the recreation experiences it provides" (Prosser, 1986, 5-10).

The LAC requires a management decision on the level of physical change and social conditions which are deemed acceptable in any particular circumstances. The major test of the practicality of the LAC is whether appropriate indicators can be found to directly monitor changes in environmental and social conditions. This is discussed, in the context of bushwalking in the WHA, in chapter 6.

The LAC is certainly the most comprehensive methodology for wilderness planning to have been published and is a suitable basis for planning the management of the WHA. To a substantial extent it reflects what already occurs; management plans are prepared based on an identification of the area concerns and issues and an evaluation of the perceived alternative actions. The ROS is considered in this process and the resulting

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plans are reviewed at regular intervals. The LAC formalises this process and draws attention to the need to set standards and monitor environmental and social conditions directly. This is certainly a worthwhile aim, even if it is not totally achievable in practice, as discussed in Chapter 6.

The LAC methodology emphasises the need to decide what levels of physical impact and social conditions are acceptable and to monitor key indicators to ensure that these levels are not exceeded. In this thesis, Chapter 3 addresses the question of acceptable levels of impact while monitoring techniques are discussed in Chapter 6. The thesis does not attempt to undertake either a detailed examination of the LAC or a complete LAC planning exercise for bushwalking in the WHA, but all the stages of the LAC are discussed at some point.

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Chapter 5 - Management Actions

Many different actions are possible to control the problems caused by bushwalking in the WHA. This chapter discusses the available management options and their implications.

The following 4 categories are used as a framework for the discussion:

- 1) control distribution of use;
- 2) regulation of use;
- 3) education of users;
- 4) physical works.

There is inevitably a degree of overlap as some actions do not fit neatly into any one category. For example, use limitation may be by compulsory permit (regulation) or it may be achieved by encouraging users to visit other areas instead (education to redistribute use).

5.1 Control Distribution of Use

Controlling the distribution of use in either time or space gives management the ability to shift use away from areas suffering ecological damage or overcrowding. Some considerations relating to this are discussed below.

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Zoning

Zoning is a management tool widely adopted as a method of controlling use. Zones serve as a basis for setting conditions to control use; a major use of zoning is the separation of incompatible activities. Zoning is an effective way of integrating planning concepts, such as ensuring that the overall objectives of a park will be met (Baird, 1986). Zoning is the most widely accepted method to keep people out of the most sensitive or valuable or recuperating areas, and to limit the impact of visitors (Salm and Clark, 1984).

The Draft Management Strategy for the WHA (PWH, December 1989) suggests five management zones:

- (a) Visitor Services Zone,
- (b) Mechanised Access Zone,
- (c) Recreation Zone,
- (d) Self-reliant Recreation Zone,
- (e) Wilderness Zone.

The last three of these are of interest from the bushwalking management perspective.

The bulk of bushwalking activity takes place within the Recreation and Self-Reliant Recreation Zones. Several different classifications of walking tracks lie within these zones. This allows for a fine graduation of standards within zones.

The main application of zoning lies in the different levels of acceptable change, track construction standards and social conditions which are applicable in different zones. In the recreation zone, it is acceptable that walker numbers are relatively high and some artificial track surfaces are unavoidable; in the wilderness zone there should, ideally, be no contact with other parties or evidence of other humans ever having been there. These standards need to be defined by management as discussed in chapter 3.3.

The Wilderness Zone is one where "the prime objective is the protection of natural and cultural values". Walkers may enter the area but no facilities will be provided. Access may be controlled or restricted to retain environmental quality and preserve the sense of isolation that is sought by most visitors.

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In this context it is of interest to note that the policy of the Federation of Tasmanian Bushwalking Clubs since the early 1980s has been to not do anything to publicise or promote routes in trackless areas (source: personal involvement of the author).

This "passive" approach of not restricting access to the most remote areas, but not doing anything to promote their use either, has worked well for some years. However, given the rapidity with which tracks develop as soon as much walking activity occurs, it seems inevitable that, in the future, restrictions on access will become necessary if any substantial areas are to remain in truly pristine condition.

This is the justification for the "Scientific Reference or Benchmark Areas/Sites of Scientific Significance" which are proposed in the Draft Management Strategy. These may be subject to controls on access or information about their location. This is the zone which corresponds most closely to the "areas to be accessible only for scientific reference and biological research" suggested by A.Moscal in 1978 (Russell, Matthews and Jones, 1979). It is also the closest (in management objectives) to an IUCN Conservation Area Category 1 (Scientific Reserve/Strict Nature Reserve) although it is a zone within a National Park (IUCN Category II) and does not necessarily proscribe human access.

The area with the best chance of remaining in pristine condition without formal restrictions on access would seem to be one which is difficult of access and lacks "natural destinations" (such as spectacular peaks or gorges) which attract visitors.

Attract Most Walkers to "Hardened" Tracks

A major challenge in the management of bushwalking in the WHA is to prevent unplanned recreational succession in walking tracks, that is a shift towards the easier ROS categories. To do this it will be necessary to keep the number of walkers in truly remote areas to a minimum. A substantial proportion of walkers will be attracted to the few well hardened tracks (for example, Overland, Frenchmans Cap and South Coast tracks) if they are appropriately publicised. This may serve to reduce the pressure on higher quality wilderness areas.

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It is also important to note that not all commercial "adventure holidays" require access to high grade wilderness. Some, which have a major emphasis on experiencing the wilderness do, but in many the emphasis is on thrills and adventure and these can be adequately provided in regions of lower wilderness quality.

Increase Supply

Another method of taking the pressure off existing popular areas or of providing opportunities which are presently in short supply is the development of new walking areas. If any such new areas are to be developed it is desirable that they should well be planned from inception. This would avoid most of the problems which occur when tracks just evolve, as has happened too often in the past.

This is one option that has not yet been considered seriously in Tasmania. While it is certainly not desirable to reduce the quality of some of the highest-value wilderness remaining by developing new tracks in the more remote parts of the WHA, there is considerable scope for such developments near its perimeter in areas which are not particularly remote but which receive very little use at present (either in the recreation zone or in an area which would become recreation zone). This is in accord with the general management principle of minimising visitor impact on wilderness by keeping most visitors on its periphery. It must be acknowledged that most of these areas are not as spectacular as, say, the Eastern or Western Arthur Ranges, but there is little doubt that many bushwalkers, who just want to get some idea of wilderness, would be as well satisfied with this experience as with a visit to the heart of the wilderness.

A high priority in planning any such new walking areas should be to ensure that there is minimal degradation of wilderness values by any new tracks. This should not be too difficult to achieve since there are several areas on the fringes of the WHA which presently receive little visitation due to the lack of tracks or lack of publicity; for example, the Picton and Snowy Ranges, Mount Weld, King William Range, West Coast Range and parts of the Central Plateau. The Central Plateau has particular potential as a wilderness area for those seeking solitude since the vegetation and topography offer potential for walkers to spread out, in contrast to most other regions where walkers are channelled onto a few obvious routes or tracks, with obvious consequences for the number of interactions with other groups.

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Another possibility is the development of a Trans-Tasmania Walkway as detailed in the Tasmanian Walkways Feasibility Study (Tasmanian Conservation Trust, 1986). The establishment of such a long distance walkway would have obvious publicity value for the promotion of walking in Tasmania both interstate and overseas. It would lie within the WHA for most of its length. It need not be very costly to complete since, for most of its length, it would use existing tracks. Most of the sections which do not already exist would not be very spectacular walking in themselves (for one section of approximately 15 km there is little alternative but for the track to closely parallel the Scotts Peak Road) but would allow the North to South walk to be completed with minimal contact with roads and civilisation. If such a walkway was developed the reduction in wilderness values caused by upgrading and promoting the existing rough route between Lake King William and the Vale of Rasselas would be of some concern.

The same proposal also discusses the possibility of walkways along the East Coast and the northern part of the West Coast. These, especially the East Coast proposal, would have considerable potential appeal since the long distance walking opportunities in these areas are very limited at present. Although not part of the WHA such walks could be relevant to its management if they took pressure off overused areas. In particular, a long East Coast walk might attract away from the WHA some walkers who want a long walk but are attracted by the better weather and easier walking conditions of the east. It would also offer an all-year-round walking opportunity, in contrast to most of the major walks in the WHA which, in winter, are only suitable for the very experienced and well equipped.

Information Sources

If PWH can exercise some influence over the information available to potential walkers then it can influence their choice of destination and the timing of their trip as well as their behaviour in the bush. It can encourage walkers to the areas best able to withstand their impact.

Guidebooks are the most important single information source for most walkers. 52% of those surveyed in the 1986/87 Wilderness Walker Survey listed them as an information source, more than used any other single source other than "friends". Yet privately

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published guidebooks are largely beyond the control of PWH! The attitude of guidebook authors towards PWH varies from very co-operative to minimal co-operation (personal communication, various PWH staff). Problems caused by privately published guidebooks can include the following:

- 1) They may direct walkers into the most environmentally sensitive areas when the needs of most walkers could be met in less sensitive regions. (If most published route information was directly controlled by PWH it would be possible to divert walkers away from especially sensitive or overused areas by promoting other, less sensitive, areas).
- 2) Once a route is described in a published guide book it is almost guaranteed to evolve into a well defined track in a few years. One example is the route through the "Never Never" from the Central Plateau to the Overland Track. This used to be a rarely used, unmarked route. Since it was described in a popular guide book it has developed into a well defined track for most of its length and it is likely that PWH will be obliged to perform maintenance work on it to prevent further deterioration (personal communication, Cathie Plowman, PWH).
- 3) Guidebooks need to be kept up to date for maximum usefulness. A lot of walkers operating from an out of date guidebook can make it hard for management authorities to implement changes. Guidebooks may not reflect recent changes that have occurred in the track; for example, the most popular guidebook to south-west Tasmania describes the routefinding necessary between the Lonely Tarns and Lake Judd on the Mount Anne Circuit. This route has been so heavily used in recent years that a well defined track now exists; few navigational skills are needed.
- 4) Advice in them may contradict PWH's MIB recommendations; for example, in regard to campfires.

If PWH wants to gain more control over information available to walkers and, hence, walker behaviour it should give serious consideration to publishing its own track guides. These would need to be well presented to compete with the commercial product and should be printed in a form which would allow them to be updated from year to year with minimal expense. They could be in the form of small guides to individual tracks rather than a book of guides to all the major tracks. So long as the standard was at least as good as the commercial product it is likely that they would secure most of the market because the National Park management authority would be seen by most buyers as a more authoritative source of information than any individual author.

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PWH should also make better use of the information sources which it already controls. These are officially published maps and information in Park Visitor Centres and walker registration booths. In particular, better and more up to date information for walkers should be provided in the walker registration booths. These booths can also be used to explain particular local problems to users and ask for their co-operation. They can be used to provide totally up to date information about changes to the track. For example, many walkers setting out on the Mount Anne Circuit would be relying on the outdated guidebook information which suggests that routefinding is necessary on part of the route. If it was explained that a well defined track now exists for almost the entire route walkers would be more inclined to look for it and use it, thereby minimising environmental damage.

5.2 Regulation of Use

Hendee, Stankey and Lucas (1978) emphasise that managers should not mould nature to suit people but should manage human use so that natural processes are not altered. "Managers should do only what is necessary to meet wilderness objectives, and use only the minimum tools, force and regulation required to achieve those objectives". Management should intrude as little as possible on visitors while they are in the wilderness. When regulation of visitors is unavoidable it should, as far as possible, take place before or at the start of their visit.

An important aspect of any attempt to regulate walker behaviour is that strict policing will be impossible because of the remoteness of the area. Hence it will be essential to gain walkers co-operation by educating them about why the regulation is necessary.

Phytophthora

The recommended strategy for preventing the spread of *Phytophthora* is to prevent the movement of soil from infected to uninfected but potentially vulnerable regions. Where walkers are moving between such regions they should be encouraged to clean all soil off their boots (PWH, 1989). The obvious way of implementing this strategy is to require walkers to wash their boots at the appropriate places. Most walkers have never

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heard of *Phytophthora*, let alone know which are infected regions, so it will be essential to gain co-operation by educating walkers on the need for this behaviour.

Fire

Campfires are a hazard both as a potential source of bushfires and for the ecological impact of firewood collection at popular campsites. PWH has declared most of the major walking tracks in the WHA as "Fuel Stove Only Areas" (that is, campfires are banned). Although this is an example of regulation, it was preceded by several years of encouragement of the use of fuel stoves. This public education campaign produced a substantial shift in walker behaviour without compulsion. The formal introduction of "Fuel Stove Only Areas" served to force compliance by the small proportion of walkers who refused to comply voluntarily. This approach would seem to be the most effective way of introducing any new regulation.

Limit Use

1) Restrict Walker Numbers to Protect the Environment.

As identified in Chapter 2 there are two fundamental problems relating to tracks; the evolution of tracks in previously pristine areas and the degradation of existing tracks.

The restriction of walker numbers to a sustainable level is unlikely to be a viable option for preventing the degradation of existing tracks because the most sensitive environments are so easily damaged by walkers that to protect them by restricting visitor numbers without "hardened" tracks would probably require a virtual ban on visitors. In addition, many tracks are already so badly damaged (eg substantial erosion has already occurred) that natural recovery would be extremely slow, even if the track was closed, so some form of repair or restoration is essential. The effectiveness of restricting visitor numbers once track damage has occurred deserves further research as discussed in chapter 5.4.

Calais and Kirkpatrick (1986) suggest that the threshold for unacceptable trampling damage is less than 500 people per annum for some alpine vegetation types and less than 3000 people per annum for many of the soil/vegetation/slope/altitude combinations

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in the Cradle Mountain-Lake St.Clair National Park. The limitation of Calais' work is that it was based on an single survey of track conditions. Calais correlated the observed track conditions with the best estimate of the current usage of those tracks. This approach is unable to distinguish between tracks which had stabilised under their current usage levels and tracks which were still deteriorating.

The author's personal observation (confirmed in discussion with various PWH staff) is that the thresholds for permanent stability are probably far lower than those suggested above.

This leaves the control of the evolution of tracks in currently pristine areas as the only situation where the limitation of numbers is clearly a viable option. As discussed in 5.1, numbers limitation is better achieved by "passive" measures such as attracting walkers to other areas and discouraging the publication of route guides to trackless areas than by "active" measures such as formal restrictions on access.

2) Limit use to Prevent Overcrowding.

This has yet to be tried in Tasmania, but there is little doubt that restrictions on numbers will become necessary if the popularity of bushwalking continues to increase. "Hardening" a track does not imply that it can accommodate an unlimited number of walkers; it just means that some other factor, such as overcrowding of huts or campsites, determines the limit. The onus is on management to determine this limit and ensure that it is not exceeded. There are precedents elsewhere for restrictions on access, well known examples being the Milford Track in New Zealand and Wilsons Promontory in Victoria. Bureaucratic restrictions on where and when people can walk will inevitably meet some resistance because a major attraction of bushwalking is the escape from the rules and regulations of city life. However, it may be possible to limit use by means other than formal rationing. These two options for limiting use are discussed below.

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Use Limitation By Regulation

Brown, McCool and Manfredo (1987) suggest that use limitation should be approached with great caution since such a management strategy can easily create more problems than it solves. Use limitation is essentially a policy of last resort (Grandage and Rodd, 1981). Implementation can lead to excessive management workloads and problems with public acceptance. Brown, McCool and Manfredo (1987) reached several conclusions about use limit policies and their implementation.

a) Visitors accept a use limit policy if there is agreement that such a policy is necessary to protect wilderness conditions. There is less public agreement on appropriate mechanisms for limiting use.

b) Several surveys have suggested that wilderness visitors generally prefer reservation and queueing systems while river rafters prefer lotteries. Pricing or rationing by merit were not acceptable to any group. This is supported by the findings of the Mount Anne Area User Survey in which 42% of respondents supported free permits but only 13% supported payment for permits and 16% a fee for use (Sawyer, 1988).

c) Implementation of use limit policies requires clearly stated objectives on how use is to be allocated. Decisions are needed, for example, on the balance between private and commercial parties in the allocation of permits.

In the Tasmanian context hut bookings (and, possibly, fees) might prove an acceptable means of regulating use in situations such as the Overland Track. Hut bookings will probably meet less resistance than other mechanisms for controlling use since users are accustomed to booking and paying for accommodation in other circumstances. To be effective they would need to be accompanied by restrictions on camping near the track or they would simply displace many users from huts to tents with possibly greater environmental impact. Since the most obvious overuse problem is overcrowding of the huts on the Overland Track this mechanism would address the problem directly.

Bookings (and, especially, fees) for campsites might prove less acceptable since there would probably be greater resistance to the idea of booking (or paying for) the use of a wilderness campsite. Another problem is that the capacity of many campsites is variable

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depending on how close together tents are pitched. On routes such as the Mount Anne Circuit where the capacity of one particular campsite (Shelf Camp) is an obvious bottleneck, the solution might be a booking system for this one site.

In high use areas such as the Overland Track strict policing of use limits would probably be feasible. However, in many lesser used regions strict enforcement is just not practicable. For example, the only ranger presence in the Mount Anne area in recent summers has been a daily road patrol and the occasional track ranger. Substantially increased staffing is most unlikely in the foreseeable future. Effective policing of a use limit policy would probably require the permanent presence of at least one ranger in the area throughout the summer. Hence a use limit policy in such a region would have to be based on co-operation not enforcement and would, therefore, run the risk of penalising the conscientious walker while achieving little.

Use Limitation Without Formal Rationing

Krumpe and Brown (1982) suggest that many wilderness visitors follow familiar routes because of lack of knowledge of alternatives. They describe two attempts to redistribute use by means of brochures/maps which highlighted the most crowded areas. These appeared to have very limited success although neither attempted to measure the actual amount of redistribution. Krumpe and Brown trialled a "backcountry trail selector" which gave users information about lightly used routes. The information described the type of route (along rivers and streams, to mountain peaks etcetera); it did not give any information about crowding. They found a significant shift in use towards the lightly used trails listed in the selector. Not surprisingly, they found that this type of information is more effective if users receive it before they reach the trailhead. The selector had more influence on less experienced users; in fact it served as a substitute for experience. This led to concern that the wilderness experience of those who had independently sought out the lesser used trails might be ruined.

This trail selector was effective because of a lack of awareness of lesser used trails. It is doubtful if this situation applies in Tasmania where there are few little used areas suitable for additional use unless a decision is made to create additional tracks as discussed in section 1 of this chapter.

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It is likely that few visiting bushwalkers recognise the marked seasonality of walking in Tasmania. Information on the level of use of particular tracks at particular times might be effective in redistributing use away from peak periods, so long as the information was available to users when they were planning their trips.

5.3 Education

Walkers can reduce their impact by modifying their behaviour. This can be done voluntarily, by education or compulsorily, by regulation. Bushwalkers are substantially better educated than the population as a whole; 59% of respondents to the 1986/87 Wilderness Walker Survey had completed tertiary education (Department of Lands, Parks & Wildlife, 1987). This should make them a relatively easy group to influence by education.

Education is mainly applicable to problems of fire, litter, pollution and the spreading of *Phytophthora*. In recent years most walkers setting off on the major tracks in summer have been exposed to the PWH's MIB campaign. This is an educational campaign involving an audio-visual display, brochures, and additional rangers on major tracks at peak seasons. It covers a range of topics such as removal of rubbish and disposal of faeces to avoid contamination of streams and lakes, and encourages walkers to use fuel stoves in preference to campfires. Most aspects of the campaign have produced a positive response (Department of Lands, Parks & Wildlife, 1987) but it has been found necessary to declare several areas "Fuel Stove Only Areas" (that is ban campfires) since the number of walkers lighting fires was still too high despite the success of the campaign in improving campfire habits.

The Minimal Impact Bushwalking educational campaign is also applicable to track and campsite problems. Considerable success has been achieved in reducing walkers' impacts on tracks and campsites by educating them, for example, to walk through boggy sections of track not around the edges (thereby widening the bog) and not to unnecessarily create new campsites. The results that education campaigns can achieve with physical impact problems such as these are obviously limited and they need to be combined with physical "hardening" programs.

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On a much broader scale than these education programs aimed at specific problems is the teaching to the wider community of a "wilderness ethic". When visitors to the WHA appreciate the need for appropriate behaviour to preserve wilderness values, then the task of managing the WHA will be greatly simplified.

5.4 Physical Works

Tracks

As identified in Chapter 2 there are two fundamental problems relating to tracks; the evolution of tracks in previously pristine areas and the degradation of existing tracks. Physical works are not an appropriate solution to the first problem if the wilderness values of the area are not to suffer. There are, in principle, several possible physical options to deal with the second problem of degraded tracks including the following:

1) "Harden" tracks.

This is the main solution to the problem of track degradation that has been adopted by PWH. It involves constructing (or re-constructing) tracks so that they can withstand considerably greater use without degradation. The exact technique depends on the terrain but "hardening" typically involves laying rocks and the construction of drains and boardwalks (raised wooden decking) or corduroy (split logs laid on the ground). The engineering aspects of track restoration have been well documented in the "Walking Track Maintenance Manual" (Blamey, 1987).

The standard of track "hardening" can vary according to the type of track. On a lesser used track in a limited recreation zone track upgrading should be restricted to the minimum necessary to protect the environment with particular attention to aesthetics, whereas on a well used track in a self-reliant recreation zone, upgrading may be undertaken to provide reasonable user comfort as well as environmental protection.

A problem with this approach is that it may substantially degrade the "wilderness experience" when walkers spend much of their time on artificial surfaces. In addition, such tracks can intrude visually on a landscape to the point of dominating it. The sun-

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bleached timber of raised boardwalk can be visible for long distances. Corduroy is less conspicuous because it is not raised off the ground.

It is necessary to "harden" tracks to a standard at which it becomes more comfortable to walk on the track than off. Much unnecessary damage is caused by walkers who find the original muddy or eroded track unpleasant to walk on and so create a second track alongside. The new track rapidly becomes as degraded as the first and another track follows. The end result is either an ever-widening track or a network of degraded tracks.

2) Create Multiple Tracks.

It may be feasible to create multiple tracks and rotate use between them so that each track can be closed for regeneration as conditions start to deteriorate. Studies are needed to determine in which, if any, Tasmanian plant communities regeneration is fast enough for this to be a viable option. It is more likely to be a viable option in relatively fast growing low altitude communities than the alpine areas where there are the greatest problems.

3) Replace Damaged Tracks.

If damaged tracks are to be replaced with better sited tracks which will withstand higher levels of use it is necessary to be sure that the new track will be substantially more robust and that the old one can be rehabilitated. This technique has been used on short sections of existing tracks (for example, the Pine Forest Moor section of the Overland Track). Its wider application is doubtful because so many of the soils of the WHA are unstable under trampling pressure. The author's personal observation is that few locations for rerouting exist unless major changes to the character of a route are contemplated (eg shifting a track from a ridgetop to the valley below).

Suggested Research Topics

The following topics all need investigation because of their relevance to the problem of management of walking track degradation. These are additional to the research into rates of deterioration recommended in Chapter 6.

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1) Investigation of the effect on track deterioration of different types of footwear, in particular the difference between traditional stiff walking boots with squared off heels and modern lightweight boots or running shoes with rounded heels. This may be a significant factor particularly in the erosion of steep slopes since walkers descending such slopes usually obtain grip by digging the heel of their boot into the slope (personal observation by the author). The shearing forces in the soil which this generates are substantial and may be a major cause of the destruction of soil structure which is the first stage of erosion. The author's personal experience (which tends to confirm this theory) is that boots with rounded heels offer substantially less grip than boots with square heels in such circumstances.

2) It is generally assumed that a number of walkers travelling cross-country are not causing significant environmental damage until the first traces of a pad appear. Botanical research is needed to confirm this. It may be that in especially sensitive areas such as alpine vegetation the damage to the vegetation or soil structure is significant before it becomes obvious. If this was the case it might be necessary to limit visitor numbers or construct a track to localise damage.

3) In some parts of the WHA walking tracks which pass through forest have eroded to the point where numerous tree roots are exposed and this appears to have stabilised the track surface over quite long periods. For how long can the roots survive exposure and trampling without sustaining damage which will affect the trees?

4) The long-term effect of the disposal of human waste on the local ecology is also a potential problem (personal communication, Prof.J.Kirkpatrick). Educational programs encouraging walkers to bury faecal matter have been aimed at the immediate threat to human health of poor hygiene. Several problems are worth investigation:

a) Most Tasmanian high-altitude soils are nutrient poor. Human urine is rich in nutrients and may be deposited in significant quantities in high use areas such as around huts and popular campsites. This could ultimately lead to a change in the species composition in such areas.

b) Walkers in areas where there are no toilets are encouraged to bury faecal material for reasons of hygiene. This works well in areas where there is considerable biological activity in the soil and decomposition is rapid but may cause problems in fragile alpine vegetation or very wet peat soils. The damage to root systems caused by digging the

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hole can be considerable and decomposition very slow. There are examples where the scars left by toilet holes are still visible after several years and in some frequently visited rocky alpine areas it can be hard to find soil suitable for hole digging which does not already show signs of having been used for that purpose.

c) Ongoing monitoring of faecal levels in water bodies is desirable to see if significant contamination is occurring (personal communication, Tim O'Loughlin, PWH). The implications of faecal contamination for human health are obvious but the implications for the local ecology should also be investigated. PWH guidelines are to bury faeces at least 100m away from running water or lakes but this distance was arbitrarily chosen to imply a "substantial distance" and was not based on any scientific justification (personal communication, Tim O'Loughlin, PWH). Monitoring would establish if this guideline is reasonable, and might confirm the effectiveness (or otherwise) of some PWH toilets, which are well within 100m of water.

5) Do huts or campsites cause the least environmental impact? It is sometimes suggested that huts cause less impact than campsites because use is concentrated into a smaller area. It is now realised that the construction of additional huts is not a simple solution to the problems of campsite degradation because the construction of a new hut on a previously hut free track will result in a substantial shift in the ROS classification of the track and probably attract additional users who would not otherwise have visited the area. For this reason hut construction may increase environmental damage rather than the reverse.

This question probably needs to be resolved on a case by case basis but it needs to be considered whenever a new hut is proposed.

6) Once significant track damage has occurred, can restricting walker numbers prevent subsequent damage? This question has considerable relevance to the validity of use limitation to control environmental damage as discussed in 5.2. The answer is not straightforward and is probably highly dependent on individual circumstances. For example:

a) once walkers have destroyed the vegetation and soil structure, water may be the main agent of erosion;

b) once walkers have destroyed the vegetation and created a track which is unpleasant to walk on (such as mud or uneven bedrock) it is likely that any subsequent walkers will trample the highly unstable edges of the track causing further widening.

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Toilets

The main solution to the problem of disposal of faecal wastes has been the construction of toilets at popular campsites. This has largely solved the hygiene and pollution problems at such campsites although, as discussed above, research is needed into possible pollution from pit toilets. PWH need to better plan the construction of toilets (and other structures) in remote areas; the toilet at the Mount Anne Hut is visually more prominent than the hut itself and rubbish remaining from the demolition of the previous toilet was left there for several years (Sawyer, 1988). Further research into the most appropriate type of toilet and toilet structure for remote areas is appropriate.

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6.1 Need for Monitoring

While it is useful to have as much information as possible on walker numbers and routes it is important not to give too much emphasis to the collection of these data while losing sight of the original objective which is the management of the area to maintain conservation and recreational values (personal communication, Dr G.Stankey, ROS Workshop, Sydney, October, 1988). It is not necessarily important to know exactly how many walkers used which track in what period in order to manage the area effectively. This is the concept underlying the LAC system for wilderness planning discussed in chapter 4. The LAC emphasises the need for management to decide what levels of impact and social conditions are acceptable in particular circumstances and to monitor key indicators to ensure that action can be taken if these acceptable levels are being approached. While this is a sound theory the major problem in applying the LAC is to determine what are appropriate indicators, particularly for social conditions.

The rest of this chapter considers monitoring techniques and indicators appropriate to the management of wilderness bushwalking.

6.2 What is the Limiting Factor?

As discussed above, a management decision is required to define what are acceptable levels of physical impact and social conditions in particular circumstances. This section discusses what are, in practice, the limiting factors determining the amount of use that a wilderness walking track can sustain before these limits are approached.

The limiting factors may be either ecological capacity (environmental damage to tracks or campsites), physical capacity (shortage of campsites) or social capacity (overcrowding of huts/campsites or the track) (Shelby and Heberlein, 1986).

Overcrowding on the track is an unlikely limiting factor because walkers are likely to be more tolerant of the transient interaction with passing walkers than the prolonged interaction at a shared campsite (Hendee, Stankey and Lucas, 1978, page 177). Shelby and Heberlein (1986, page 83) also note this phenomenon with respect to wilderness river rafters who are more tolerant of limited contacts on the river than of encounters at campsites. The Mount Anne Area User Survey also confirms this; 9% of respondents

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expressed some concern about the number of encounters on the track but 15% expressed some concern at overcrowding of the hut or campsites (Sawyer, 1988). This possible limitation will not be considered further (although it could conceivably be a problem in some daywalk areas).

Physical capacity (shortage of space) is an unlikely limiting factor but it can occur. It is the main limiting factor in the numbers who can use the Mount Anne Circuit walk (Sawyer, 1988) since the capacity of Shelf Camp (used by most circuit walkers) is extremely limited, there are no nearby alternatives and no possibility of expansion (except to extremely poor sites). The social capacity of Shelf Camp may be even lower since some of the campsites are very close together; this may lead to perceived crowding when members of separate groups are obliged to use them.

The remaining factors (environmental damage to tracks or campsites or overcrowding of huts/campsites) are those most likely to be the limiting factor on major bushwalking tracks.

The limiting factor can vary according to the nature of the track:

- 1) For a rarely used route in a pristine area the limiting factor will be the walker numbers which cause a visible track to evolve,
- 2) For a "hardened" track with huts (for example, the Overland Track) the limiting factor is likely to be overcrowding of the huts at peak periods,
- 3) For a "hardened" track without huts (for example, the South Coast Track) the limiting factor will be either overcrowding of the campsites at peak periods or the environmental degradation of campsites,
- 4) For a "non-hardened" track the limiting factor may be either overcrowding or environmental degradation of campsites as above, or it may be environmental degradation of the track itself.

It is likely (as discussed in 5.2) that limiting numbers will not be a practical means of containing environmental damage on existing tracks, so it is probable that the only solution to environmental damage problems on popular tracks will be hardening of tracks or campsites. Once this is done the limit will become overcrowding which will probably have to be controlled by regulating numbers at peak periods if it does become a problem.

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6.3 Monitoring of Physical Conditions

The reality is that:

- a) Most of the major walking tracks in the WHA are degraded beyond the point of "acceptable change" by any reasonable definition of "acceptable" and;
- b) The resources needed to reconstruct all major tracks to a reasonable standard are certainly not available in the short-term.

Hence, the real need is for a simple means of determining maintenance priorities, not just a simple means of determining how degraded the tracks are. It is possible that LAC indicators can be used for this but considerable research is needed to identify them and verify their effectiveness. This is further discussed below.

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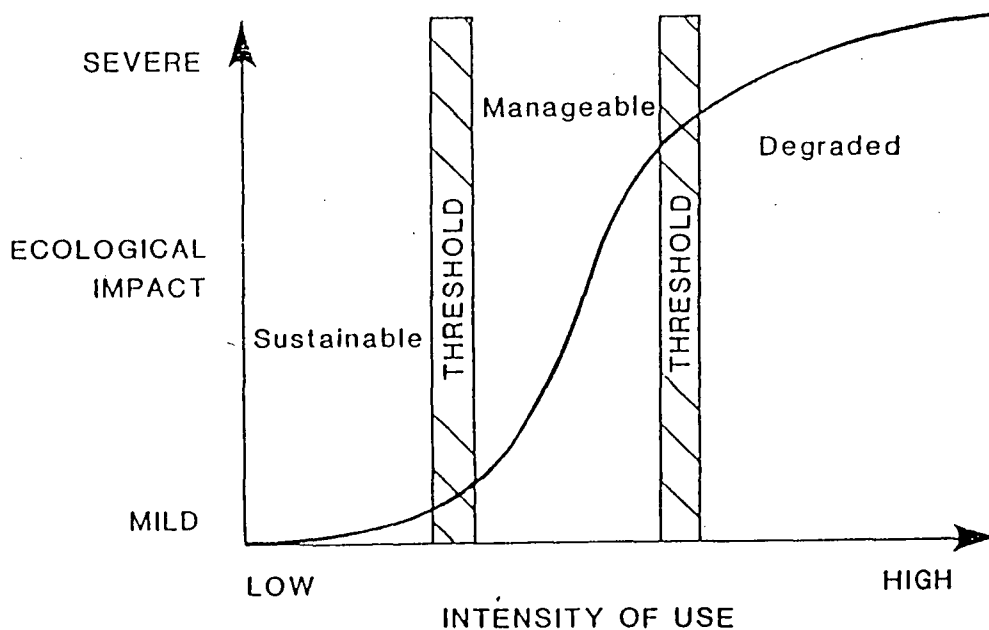
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Hypothetical Relationship Between Intensity of Use and Ecological Impact

Figure 6.1

From: Gillieson, Davies & Hardey, 1986.

In the context of damage to walking tracks, threshold 1 could be the destruction of soil structure and threshold 2 the development of erosion or multiple tracks.



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Maintenance Priorities

It is apparent from observation and the literature (for example, Gilleson, Davies and Hardey, 1986) that the mechanism of track deterioration is not a simple linear progression in which the track slowly and steadily gets worse but incorporates some "thresholds" at which rapid changes occur (see figure 6.1). For example, once vegetation cover is reduced to a particular level erosion can suddenly become very rapid. Hence, the highest maintenance priority should go to a section of track which is rapidly approaching one of these thresholds. For example, maintenance work which could pre-empt major erosion problems should be given high priority. The other obvious candidate for high maintenance priority is a track which passes through plant communities which are particularly sensitive to trampling damage, or are of particularly high nature conservation value.

PWH has given considerable thought to the techniques for repair of degraded walking tracks (see "Walking Track Management Manual", Blamey, 1987) but the assigning of priorities for such work has received far less attention. Initially the problem was tackled in a piecemeal way with the major decisions on track work being taken by field staff on pragmatic grounds with little consideration given to the systematic assessment of priorities for work or the implications of carrying out such work. Currently Track Management Plans are being produced for all major tracks but these only assess priorities within the area under consideration; they provide no opportunity for allocation of priorities between tracks or consideration of broader planning issues (personal communication, various PWH staff).

Some attempts are being made to rectify this situation; the WHA Draft Management Plan (Land Management Division, LPW, May 1987) classifies the major tracks according to Current Classification Level, Planned Classification Level, Upgrading Priority, Current Maintenance Priority and Zone Setting, but the allocation of classifications and priorities is still largely arbitrary. A track's classification level in the management plan needs to consider the implications of track upgrading for future usage patterns as well as the sort of use intended for the track.

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To determine work priorities there is a need for a systematic technique for track assessment which takes into account factors such as the following:

- a) the present condition of the track;
- b) the future condition of the track if no work is done; for example, very high priority should be given to work which will pre-empt serious erosion problems;
- c) the potential for natural restoration if trampling ceases (often related to the degree of erosion);
- d) the conservation significance of the area;
- e) the sensitivity of particular plant communities to trampling damage;
- f) the classification of the walk/track/route; on high standard tracks work may be undertaken purely to improve user comfort but on lower grade routes it should be undertaken only for conservation purposes. A remote "route" does not necessarily equate to low maintenance priority, probably quite the opposite;
- f) the implications for future usage patterns.

If the maximum reduction in environmental damage is to be achieved for minimum cost then PWH must allocate priorities on the basis of a technique such as this. The present system of upgrading one major track (or section of track) at a time no doubt results in some economies in the transportation of workers and materials but can result in some high priority work being postponed for years, by which time considerable additional damage may have occurred.

Indicators

One obvious candidate for use as an indicator for systematically assessing the current state of the track is the "track damage index" described by Calais and Kirkpatrick (1986). This allows a numerical value to be put on the state of a section of track by means of a formula which takes into account the level of damage to vegetation and the width of the track. It is useful as a means of comparing the present state of tracks which pass through broadly similar terrain but has no predictive capability (simple extrapolation over time is unlikely to be useful because of the threshold nature of the problem). It is discussed at greater length in the author's report on track conditions in the Mount Anne area (Sawyer, 1988). Even if "track damage index" measurements were repeated regularly they would offer little useful information about the rate and

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mechanism of deterioration because the index is a combination of several different measurements.

Rate of Deterioration

If damage "thresholds" are to be anticipated some sound means of calculating the rate of deterioration are essential. There does not seem to be any alternative to the time consuming exercise of accurately measuring track cross section profiles on a regular basis as was done by the author in his work at Mount Anne (Sawyer,1988). It only needs to be done on representative sites on each track (the author's work at Mount Anne obtained broadly similar results from multiple measuring points located within the same altitude/soil/vegetation/slope combination). The careful selection of locations for the measuring points would be critical to the success of the monitoring program. The classification described by Kirkpatrick (1990) of mapping synusia requiring different management regimes is probably the appropriate starting point.

It is useful to take reproducible photos of specific sections of track as part of routine track monitoring since they provide a very comprehensible and comprehensive guide to changing conditions. They can confirm details which were never specifically noted and help standardise surveys undertaken by different workers. It is often difficult to exactly replicate an existing photograph. When the photograph is being taken specifically for track monitoring purposes the task must be approached systematically; in particular the camera location should be permanently marked or very carefully noted.

For the information on rates of deterioration to be of maximum usefulness in predicting future damage it needs to be combined with information on walker numbers using the track. Even if absolute numbers are not available, trends in usage patterns of particular tracks would be useful. The most appropriate methods of collecting this information are discussed later in this chapter.

Developing Indicators

A monitoring program as described above on most of the major walking tracks would produce extensive data on the nature, extent and rate of walking track damage on

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various altitude/soil/vegetation/slope combinations. It is evident that different soils react differently to trampling pressure. For example, in the Mount Anne area:

- A) peat over gravel - the peat is eroded off but the substrate is stable unless it is particularly sandy;
- B) peat over gradational dolerite soils - the peat is eroded off but the substrate is usually stable unless on a steep slope where severe erosion can occur;
- C) peat over clayey or sandy soils developed from sedimentary rock - the peat and substrate are prone to erosion especially on steep slopes (personal communication, M.Pemberton, geologist, PWH).

Hopefully, enough data could be gathered to allow accurate prediction of track behaviour and ultimately reduce the need for regular monitoring. As part of this project it would be useful to directly establish the relationship between damage and use levels for the major altitude/soil/vegetation/slope combinations. This would extend the work of Calais and Kirkpatrick (1986). It would involve the establishment of short sections of track which would be trampled in a controlled manner over a period of at least one season. The nature and extent of the deterioration would be closely monitored in order to better understand the actual mechanism of track deterioration.

It is unlikely that the information gained by this means could be used directly to calculate an absolute "carrying capacity" for a specific track because the impact of an individual walker can vary substantially in different circumstances; for example, the walker is moving uphill/downhill; the track is wet/dry; the walker is wearing stiff boots/soft shoes; the walker is carrying a heavy pack/no pack etcetera. Some of these factors, such as the proportion of walkers carrying a heavy pack, are likely to remain constant, but others, such as footwear type may change in time. Particularly important is the effect of the amount of water on the track. The author climbed and descended the steep track up Mount Eliza several times while conducting his fieldwork for this project. His observation was that a walker descending the track in very wet conditions caused a significant downhill movement of soil under his boots with each step. By comparison, the amount of material moved in dry conditions was extremely small. This suggests that any calculated "carrying capacity" needs to be qualified by so many details of the conditions in which it is applicable as to render it of little practical use except, perhaps as an indication of the relative capacities of particular altitude/soil/vegetation/slope

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combinations. It is most unlikely to serve as a reliable predictor of the exact numbers that can be allowed on a particular track.

It is likely that the major use of a better understanding of the mechanism of track deterioration, in conjunction with monitoring of trends in usage patterns, will be to enable better prediction of where problems are likely to develop.

Even if it is useful and possible to calculate a "carrying capacity" (as described above) the important lesson from the LAC is that it should never be relied upon to the extent of ignoring the direct monitoring of environmental conditions upon which it was based.

The ultimate aim of such a monitoring program should be to allow the identification of indicators that will predict when one of the "thresholds" of track deterioration is being approached. Such indicators are likely to be specific to a particular altitude/soil/vegetation/slope combination. For example, the author's work on monitoring track conditions at a steeply sloping location on the lower slopes of Mount Anne suggests that an early stage of track deterioration is the downhill slumping of peat which occurs well before much erosion is apparent. For this particular altitude/soil/vegetation/slope combination a simple check for slumping is likely to be a useful indicator.

Past Deterioration

The above techniques are all methods for monitoring the rate of track deterioration in the future and results will not be available for several years. The following techniques allow some estimates to be made of rates of deterioration and use existing data.

1) Personal Experience

Discussions with individuals who have walked in the area regularly over the years and the author's personal experience both confirm that track and campsite conditions in much of the WHA are deteriorating.

For example, on the author's first visit to the Lonely Tarns in 1983 much of the route between the Anne River Ford and the Tarns was hard to follow and evidence of the

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route was non-existent in some places. Now there is a well defined track for almost the entire distance. In 1983 the campsite at Judds Charm comprised two or three well defined tent-sites, now there are at least five and the large open grassy area of the campsite is suffering considerable trampling damage and could soon be an expanse of mud.

2) Aerial Photography

As part of the author's work in the Mount Anne area aerial photographs up to 15 years old were obtained (Sawyer, 1988). The detail was not sufficient to quantify the general rate of track deterioration and the tracks which were most prominent in aerial photos were not necessarily the worst damaged. What could be usefully identified was the formation of multiple tracks. The most interesting example was one section where four parallel routes had developed; the author had walked this section of track several times during his study of the Mount Anne area without ever being aware of anything other than the two most major tracks.

3) Terrestrial Photography

The most graphic examples of how the tracks have deteriorated over the years come from comparing old and new photos of the same section of track. During the course of his work in the Mount Anne area the author took several photographs which replicated, as closely as possible, ones taken during his first visit to the area in 1977. These showed very clearly the deterioration in track conditions over this period. For a detailed study of past rates of deterioration it would be worth making an appeal for old photos, which include sections of track, to groups such as the Walking Clubs.

Campsites - Damage Assessment

Campsite degradation is just as much of a problem as track degradation but has received less attention in the past. Campsite problems include concentrated trampling damage in a very limited area, fireplaces, removal of wood for fuel, disposal of food and faecal wastes and the problem of expansion.

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As with tracks, the real need is for a technique to determine priority for restoration work. To enable environmental problems to be predicted, a better understanding of the problems is needed. This can best be obtained from a program of monitoring campsite conditions. Ideally monitoring should consist of mapping and describing the condition of each tent-site, fireplace and track within the campsite but the volume of work required makes this impractical in most instances. Such a survey can take up to 3 hours per site (personal communication, Tim O'Loughlin, PWH). Frissell (1978) suggests a scale of simple indicators to allow campsite conditions such as ground cover to be classified on a scale from 1 to 5. As with the "track damage index" this has some usefulness as a means of standardising and simplifying recording of present campsite conditions.

The author's experience (Sawyer, 1988) is that there is really no substitute for detailed mapping and photography if subtle changes in campsite conditions are to be detected relatively quickly. The rough sketch maps drawn by the author in his 1988 work were quite time-consuming to produce but proved to be too crude to be much use. It should not be necessary to go to the time and expense of a precise survey; a simple sketch map showing the location of tent-sites and fireplaces plus a systematic measurement of tent-site dimensions should suffice. A suggested technique is to measure the longest dimension of each tent-site, note its bearing and and note the maximum dimension perpendicular to this (personal communication, J.Kirkpatrick). Since a major problem with campsites is the development of new tent-sites it is essential that the survey attempts to map the location and condition of any area which shows any sign of having been camped on.

Photographs are also very useful for checking changes in conditions but for maximum usefulness they do need to reproduce previous photographs as closely as possible. This can best be achieved by marking permanent locations for the camera. The use of video should be investigated since it has the potential to show interconnections between sites and other aspects of a site such as panoramas which are hard to document with still photography.

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Summary - Monitoring of Physical Conditions

For both tracks and campsites the real need is for a systematic and simple means of determining maintenance priorities. This should be based on a range of criteria including, particularly, the need to pre-empt major environmental problems. To enable such environmental problems to be predicted, a better understanding of the mechanism and rate of deterioration is needed. This can best be obtained from a program of monitoring the deterioration of existing tracks and campsites. This may allow the identification of indicators which will simplify the prediction of major environmental problems in the future. Even if the calculation of a "carrying capacity" is possible in some circumstances it should not be relied upon to the extent of ignoring the monitoring of environmental conditions upon which it was based.

6.4 Monitoring of Social Conditions

A major aspect of the LAC is that it shifts the management emphasis from monitoring use to monitoring change. However, the reality is that, for political and administrative reasons, most land managers need to know, as accurately as possible, the number of users of the area for which they are responsible. Departmental budgets and staffing are influenced by the number of users. Some information on user numbers is also necessary for the implementation of the indicators for the prediction of major environmental problems discussed above.

Walker Statistics - Long Term Trends

As mentioned in Chapter 1, relatively little data are available on the numbers participating in modern-style recreational bushwalking from its origins at the turn of the century until recent times. Kirkpatrick (1979, page 21) examined such logbook data as was available from 1960 to 1979 and concluded on the basis of this very limited evidence that the overall trend was one of "close to linear increases" for Frenchmans Cap, Federation Peak and the Overland Track with an apparent "explosion of wilderness use" on the South Coast Track in the late sixties. Records of walkers using the Overland Track show a peak in 1980/81 and a slight decline thereafter (National Parks & Wildlife Service, 1985). The consensus of opinion at PWH, based on available data and the observations of field staff, is that a steady increase in total annual walker numbers up to

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the early 1980s has now almost levelled off. However, the overall trend is masked by considerable annual fluctuations in use of particular areas; an article in a popular outdoor recreation magazine may attract crowds to one destination one year or a reputation for particularly bad track conditions or overcrowding may deter use of another.

Another indicator of the long-term growth in popularity of wilderness recreation is the increased number and size of outdoor equipment shops.

Walker Statistics - Logbooks

The main source of information on usage of most walking tracks comes from the voluntary registration logbooks usually located at the start of the track. Many well used tracks do not even have a logbook, or did not until recently. Even when logbook data are available they suffer from the major deficiency that logbooks are completed by an unknown proportion of users (certainly substantially less than 100%). At Freycinet National Park, where the logbook is prominently located near the start of the track, cross checking with the pedestrian counter suggests 80% registration (personal communication, Tim O'Loughlin, PWH).

It would be very useful to correlate logbook entries with accurate data on walker numbers (from pedestrian counters or direct counting) to obtain a "calibration factor" for the logbook but a number of issues complicate this:

- 1) It is almost certain that the proportion of walkers registering in the logbook varies widely from track to track according to how conveniently located, or otherwise, the logbook is relative to the start of the track (personal communication, Phil Wyatt, Ranger, PWH). Hence a "calibration factor" would need to be determined for every logbook.
- 2) The author's work in the Mount Anne area (Sawyer, 1988) indicated that 74% of walkers registered in the main logbook (Condominium Creek) but suggested that some types of walker are more likely to register than others. This would result in significant inaccuracies if a simple extrapolation of logbook registrations is assumed to give detailed information on the breakdown of walker types.

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- a) The proportion of overnight walkers who registered was higher than the proportion of daywalkers who did. In particular, daywalkers going on very short walks were much less likely to register.
- b) Interstate and, especially, overseas visitors were more likely to register than Tasmanians.
- c) The proportion of walkers registering in the logbook was probably higher in the non-summer months because the casual daywalkers who probably formed a high proportion of the non-registrants were unlikely to be visitors outside the summer.

Another problem is that most logbook data are entered at the start of a trip; the information relates to what walkers intended to do, not what they actually did. The author's personal experience suggests that the two are often substantially different since many walkers start off with over-ambitious plans or are delayed by bad weather. This consideration is less relevant to logbooks at locations along a walk, such as huts or summits.

Walker Statistics - Pedestrian Counters

Pedestrian counters are, in principle, a simple method of obtaining information on the numbers of walkers using particular tracks. They have a major advantage over logbook entries as an information source; they relate to what all walkers actually did, not what an unknown proportion intended to do.

Two types of counter are available. One uses a pressure mat on the ground as the sensor, the other relies on walkers breaking a light beam.

The counters used by PWH until very recently have been notoriously unreliable. In particular, the light beam type counters need regular maintenance. This unreliability has been blamed mainly on the reluctance of the electronics to function for long periods in damp conditions. The results from such counters can only be trusted when they have been read at frequent intervals and shown no sign of erratic behaviour.

A major limitation of the pressure mat counter is the restrictions on possible sitings of the counters. They need a flat (or nearly flat) location for the mat and, preferably, an artificial surface such as boardwalk or corduroy. Alternatively they can be buried in the

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ground on a narrow section of track. It is also essential that the site is not frequented by wombats or wallabies because these are sufficiently close to the weight of a human that they will register on the counter. A minor problem is that if the mat is large enough not to be stepped over it is likely to undercount people walking close together.

Some of these drawbacks can be overcome by using counters which operate by breaking a light beam rather than using pressure mats. The unit is small and inconspicuous and can easily be concealed in trees. The pressure mat counters would still have their use however. In open ground with only low vegetation the posts needed for a light beam counter would be most conspicuous and sure to attract unwanted attention so a pressure mat counter would be more appropriate.

Some considerations apply to any type of pedestrian counter. The counter must be located on a well defined section of track where it is unlikely to be bypassed. If possible, the counters need to be installed reasonably close to the start of the track to permit easy access for installation, reading and maintenance (battery replacement), but not so close as to record casual visitors who just stroll along the track for a few minutes. They need to be in places where walkers are unlikely to stop or walk on them twice. They must be inconspicuous so as not to attract attention which is likely to lead to multiple counting (either accidentally, while investigating the mysterious object or deliberately, after it is recognised for what it is).

They must count only walkers, not birds or animals.

If obtaining information on walker numbers and behaviour was sufficiently high priority then consideration could be given to a more "high-tech" approach. By using a computer datalogger instead of a simple counter it would be feasible to record the direction in which the walker was travelling (by the use of two adjacent sensors) and it would be straightforward to record the date and time of each count. This data would be very useful because it could be analysed to give information on group size and usage patterns. It would also give far more confidence in the data obtained:

Example 1: Correlation with logbook entries would be straightforward (exact times and party size would be available).

Example 2: If an unusual count occurred with a simple counter there is inevitably doubt as to whether this is genuine. If the time of each count was recorded it would probably be obvious whether the unusual count was due to a large number of small groups, one

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very large group or an error (for example, if most of the counts occurred overnight then animals are probably responsible).

The data would be stored in the datalogger's memory until downloaded into a portable computer carried to it (or the datalogger removed and taken to a computer). Such technology is expensive but is widely used in industry and is available "off the shelf" in housings designed for outdoor use.

The major limitation inherent in pedestrian counters of any type is that they offer no information about the intended route of the walker. Few tracks lead to only one destination and many walkers do not return to their starting point so accurate information about numbers using particular routes in remote areas can only be obtained by installing the counter there; an expensive exercise. For example, both ends of the Mount Anne Circuit walk are heavily used by walkers doing shorter trips so the only way to reliably count numbers doing the full circuit is to locate a counter in the most remote part of the circuit where it will only be encountered by those doing the full circuit. If counters are to be used in this manner they need to be totally reliable and have a long battery life.

Pedestrian counters are not, alone, the ultimate method of gathering information on walkers. However, they do provide some information which complements that available from logbooks. The two together have the potential to provide as much information as is likely to be needed for management, so long as the limitations of both are considered.

Walker Statistics - Surveys

If management is to obtain more information on wilderness users than can be derived from logbooks and counters, particularly information on their attitudes and opinions, then there is little alternative but to run some sort of questionnaire or survey.

Ideally these should be carefully designed according to the well known guidelines for conducting surveys (Smith, 1981). A census (a survey contacting 100% of walkers) is not normally practicable so a statistically rigorous survey would stratify the walker population by selecting certain periods of the year (bearing in mind the known distribution of walkers and factors such as public holidays) and during these make contact, preferably by interview, with a predetermined proportion of walkers selected at

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random. This would result in contact with a "typical" cross-section of walkers and the results obtained could be extrapolated to the entire walker population with a known degree of certainty (dependent on sample size).

Unfortunately such statistically rigorous sampling techniques would be very expensive to implement since they would require the interviewer(s) or questionnaire distributor(s) to spend a long time in the field, very little of which would be spent actually contacting walkers. A far cheaper survey to conduct is one which relies on either a less statistically rigorous distribution system (for example, Track Rangers handing out Wilderness Walker Survey questionnaires to all walkers at particular campsites on particular days) or on voluntary collection of questionnaires by walkers. Either approach inevitably introduces some bias into the results. Local experience suggests that walkers are, in most respects, a reasonably homogeneous population so that the errors introduced by relying on voluntary collection are not sufficient to justify the expense of more rigorous surveying techniques (personal communication, Tim O'Loughlin, PWH).

A straightforward questionnaire or survey appears to produce satisfactory results to questions on behaviour. However, a more sophisticated approach is probably necessary if reliable information is to be obtained on users' attitudes and opinions. As discussed in Chapter 4, a simple question on "satisfaction with number of contacts with other users" does not necessarily produce reliable information on perceived crowding. Better results were obtained by studying users' contact preferences (Shelby and Heberlein, 1986). Since a major concern of management is to reliably determine the nature and extent of the crowding problem there is obviously a need for a study to determine the most reliable way of asking the question(s) which gather this information. The same considerations apply to any other questions on opinions or attitudes as distinct from straightforward questions of fact. For example, questions related to users' perceptions of the natural environment will need to be very carefully designed if meaningful responses are to be obtained on such important issues as the effect of unnatural disturbances (such as track work, forestry operations and aircraft) on their experiences.

It is possible that such a study will identify appropriate factors to serve as LAC indicators of social conditions but it is likely that these are more appropriate to monitoring environmental conditions and that the monitoring of social conditions will continue to rely on logbook registrations, pedestrian counters and periodic surveys.

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The high nature conservation value and wilderness qualities of the WHA are evident from its World Heritage listing and other conservation designations. It is clear that the degradation caused by recreational use must not be allowed to compromise these qualities. However, there is an absence of clear direction on where the balance between preservation and use should be struck (ie how much change is acceptable). The strongest guidelines for management come from the World Heritage Convention itself. These can be interpreted as requiring tracks to be repaired and maintained to prevent further environmental damage. Track closure is justified only in especially significant areas where any ecological damage is unacceptable. This reconciliation of the preservation of natural and wilderness values with the number of bushwalkers who wish to experience these qualities is the main management problem relating to bushwalking in the WHA. It would assist planners and the long-term stability of management if the priority of preservation over use (and some guidelines on how this was to be achieved) was clearly stated in a Tasmanian or Australian (Federal) Wilderness Act.

The most obvious physical problem is the deteriorating state of many of the walking tracks but there are many others including the loss of wilderness quality of remote areas as tracks evolve in previously untracked regions, campsite deterioration, campsite proliferation, fire, litter, disposal of faecal waste, pollution and the spread of *Phytophthora*. Social concerns include possible overcrowding and the impact of unnatural disturbances such as track work, views of distant roads or forestry operations and low-flying aircraft. All may result in a loss of "wilderness experience" to users of the WHA.

The LAC planning methodology provides a useful basis for planning for the WHA. The ongoing cycle of planning and review reflects the existing procedures. The LAC emphasises the need to decide what levels of physical impact and social conditions are acceptable and monitor key indicators to ensure that these levels are not exceeded. The problem with the LAC is to determine appropriate indicators. Most of the major walking tracks in the WHA are already substantially degraded and the resources to repair all of them to a high standard are not available at present, so the real need is to identify indicators which will predict environmental problems and allow remedial action before environmental problems become too serious. Further work is needed to identify such indicators, which are likely to be specific to particular soil/vegetation/slope/altitude classes, but one such potential indicator has emerged from

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the author's work in the Mount Anne area; this is the slumping of peat on steep slopes. If PWH is to minimise environmental damage for minimum cost it must allocate its maintenance priorities on a basis such as this rather than on the present basis where one major track (or section of track) is worked on at a time. To assist this work some fundamental research on the mechanisms of track deterioration is needed; this would include closely monitored trampling under controlled conditions and the analysis of existing information on the rate and nature of track deterioration over the years. This might allow the calculation of relative carrying capacities for different soil/vegetation/slope/altitude classes but it is unlikely that a prediction of the exact "carrying capacity" of a particular track will be possible. The important lesson of the LAC is that even if it is useful and possible (in some circumstances) to calculate a "carrying capacity", it should never be relied upon to the extent of ignoring the direct monitoring of the environmental conditions on which it was based.

A wide range of practical management options are available. No one option provides the solution to all problems in all circumstances but a combination of options can provide a reasonable solution most of the time.

The main response of PWH to date has been to increase durability by "hardening" tracks and there is little doubt that this is unavoidable in many situations. Limiting walker numbers is not an option for containing damage to existing tracks because, to be effective, this would amount to a virtual ban on use, and even this would not solve the problems of pre-existing damage. On a lesser used track in a self-reliant recreation zone track upgrading should be restricted to the minimum necessary to protect the environment with particular attention to aesthetics, whereas on a well used track in a recreation zone, upgrading may be undertaken to provide reasonable user comfort. PWH needs to give more attention to the aesthetics of any structure (eg toilet) or track work constructed in wilderness areas in order to minimise the reduction in wilderness values.

The zoning of the WHA should serve as the basis for controlling the distribution of use. In particular, access to the wilderness zone should not be encouraged. Increasing the supply of walking opportunities by the creation and promotion of new tracks is an option which has not yet been tried in Tasmania but which might be of use in relieving the pressure on presently popular areas. The ROS is potentially useful in identifying the

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sort of opportunities for which there is a demand. The development of any new tracks would require careful planning to ensure minimal degradation of wilderness values and to ensure that the new tracks did not themselves become "management problems" requiring substantial expenditure after a few years use. It is envisaged that these tracks would be located primarily within the area zoned for recreation.

There is scope for improvement in the control of information sources such as maps, guidebooks and information displays. This has major implications for directing use to the areas best able to cope with it and the presentation of MIB information.

PWH has put substantial effort into the MIB campaign. This has been very successful in educating users to reduce their personal environmental impact. The program needs to be continued to cope with the influx of new walkers each year and to explain the rationale for any new measures which need to be introduced in the future such as numbers limitation or controls to prevent the spread of *Phytophthora*. The difficulty of enforcing regulations in remote areas means that any regulation of walker behaviour needs substantial public acceptance to be effective.

Use limitation is likely to be necessary in two different circumstances. One is the control of overcrowding on popular tracks at popular times of the year such as the Overland Track during January. Visitors accept use limitation if there is a public perception that it is necessary but there is less agreement over the best way of implementing use limitation. The other circumstance where use limitation will be required is to restrict access to remote and pristine areas which are presently trackless. Significant levels of access to such areas inevitably result in the evolution of tracks and consequent loss of wilderness values. It is hard to see how any substantial areas can be preserved in pristine condition indefinitely without severely restricting access. It is hoped that this can be achieved by "passive" means (eg an absence of publicity, especially route guides, for such areas) rather than the "active" approach of banning access, which may be impossible to enforce strictly.

There is a shortage of information on bushwalkers in the World Heritage Area. This includes basic statistical information as well as information on their activities, perceptions and needs.

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The LAC suggests that, ideally, social conditions should be monitored by selecting appropriate indicators and monitoring these. In practice this is obscured by the political and administrative need to gather statistics on user numbers and activities. To achieve this, PWH needs to make use of more sophisticated and reliable pedestrian counters in conjunction with logbooks which more easily allow the extraction of statistical data.

If potential social problems such as overcrowding are to be addressed then a sophisticated sociological study is needed to determine the nature and extent of the problem (simple, straightforward questions produce satisfactory information on questions of fact but more subtle questioning is needed to obtain meaningful data on users opinions and attitudes). Such a sociological study may identify suitable indicators which will allow the LAC concept of monitoring social conditions by the use of indicators to be implemented.

However, the desirability of gathering information on users behaviour should not be allowed to obscure the objective of managing the area to maintain conservation and recreational values.

There is no one solution to the problem of preserving the nature conservation and wilderness qualities of the Tasmanian Wilderness World Heritage Area while allowing visitation to it. However, since all the problems under consideration are ultimately caused by bushwalkers, a major part of any solution must be the management and education of bushwalkers, not management of the land. The most useful single factor would be widespread community acceptance of a "wilderness ethic".

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Appendix 1 - Mount Anne: Physical Conditions

This appendix reproduces a report to the Department of Lands, Parks and Wildlife on a study conducted by the author in the Mount Anne area in the summer of 1987/88.

The original report was titled "Walking Track and Campsite Conditions in the Mount Anne Area". It is reproduced in full with the exception of an appendix of 60 slides which were included only with the copy supplied to the Department.

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Summary

The aim of this project was to gather information about track and campsite conditions in the Mount Anne area.

Several methods of assessing the condition and rate of deterioration of tracks and campsites were evaluated and suggestions were made on the appropriate type of restoration work.

The major conclusions included the following:

1) Some tracks, especially the heavily used one from Condominium Creek to the hut have already suffered severe and essentially irreversible damage (erosion). Action is urgently needed to contain damage to present levels.

2) Track cross-sections were marked at sites on the Condominium Creek to hut track and on the Eliza Plateau. These were accurately measured in July 1988 and May 1989.

* These measurements have proven that the tracks are deteriorating rapidly (the worst case being the loss of 4cm depth of soil over a width of 1m on the Eliza Plateau).

* Ongoing measurements at these sites are desirable to establish accurately the rate of deterioration and its relationship to user numbers.

* The measurements have shown that the initial stages of track deterioration are not necessarily obvious without careful measurement (slumping of peat on slopes and soil compression even though the surface vegetation is apparently undamaged).

* The measurements confirm the "threshold" nature of trampling damage. Damage is minor until the "threshold" of destruction of the soil structure is reached (in peat soils this usually coincides with destruction of the surface vegetation); subsequent erosion then occurs rapidly. This emphasises the need for track repair work to occur before serious problems are evident.

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3) The state of some of the campsites is cause for concern. In particular the Judds Charm campsite is both expanding and deteriorating rapidly.

4) The new (constructed summer 1988/89) toilet at the hut is more prominent visually than the hut itself. Better planning procedures are needed to ensure that aesthetic disasters such as this are not repeated.

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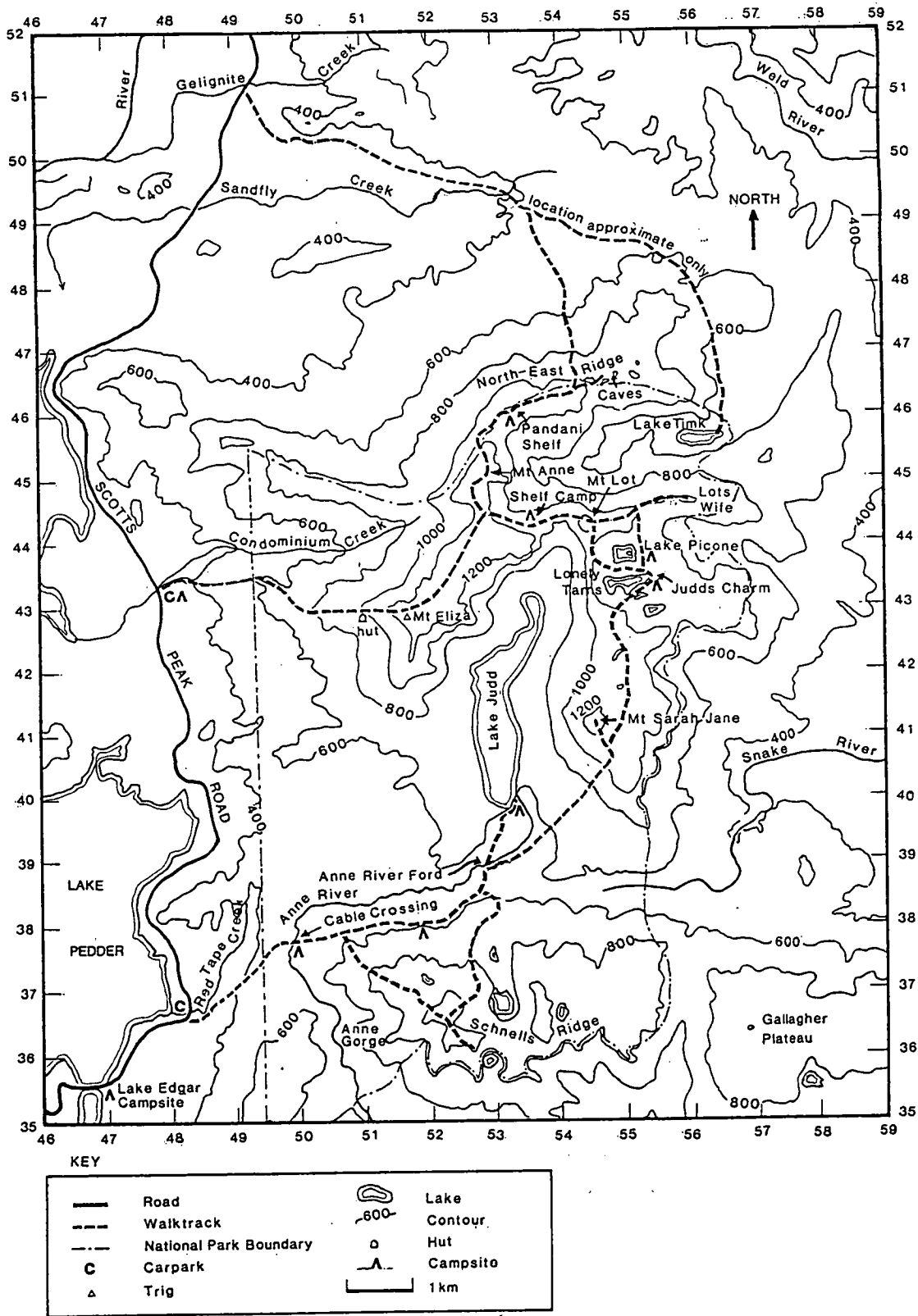
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Mount Anne Area



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1 Track Conditions

The following notes on the condition of each of the tracks are based on notes made in the field, where a checklist of important points was completed for each track.

1.1 Condominium Creek to High Camp Memorial Hut

The first 400m of this track crosses the flats between Scotts Peak Road and the base of the ridge leading to Mount Eliza. It is entirely artificially surfaced and in generally good condition. The remaining 3.5km of the track climbs up the ridgetop towards Mount Eliza. Apart from the last 50m to the hut this ridge is comprised of shallow peat soil on quartzite. The vegetation is low scrub, no more than knee high.

A substantial amount of trackwork (steps, drains and the blocking off of sidetracks) has been done on the first 200m of the climb. There is a 50m section of corduroy in the gully where the lower ridge joins the main one at 495434. There is also a section of steps and boardwalk where the track emerges onto the top of the main ridge at 500430. It is not known when this work was done but the blocked off sidetracks still show little sign of natural revegetation. A lack of maintenance on the track is evident with many drains being totally blocked and ineffective. In some places a single drain serves too great a length of track resulting in erosion problems below the exit of the drain.

The major problems on most of this track are erosion and the development of multiple tracks. Almost the whole of the track is of sufficient gradient that water running down the track will rapidly cause erosion. However, since it lies almost entirely along the ridgetop the potential is there to drain water off the track very easily. Much of the lower half of the track is already eroded to bedrock but on the upper half some peat remains in most places. Once substantial erosion occurs most walkers evidently find the resulting surface unpleasant to walk on and start to create a new track. In a few places the exposed bedrock forms a reasonable surface for walking and, as such, is likely to remain stable in the long term.

The only solution to the massive and continuing erosion problem would appear to be to reconstruct the entire track with frequent steps and drains (attention to drainage being the most critical). The most heavily eroded section of the entire track is at the junction

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of the lower and main ridges (498432) where the track climbs straight up the side of the main ridge. The peat is far deeper here than elsewhere and the potential for good drainage rather less so it would probably be worth rerouting the track to the south-west of its present location to keep it on the easily drainable ridgetop as far as possible. A short section of boardwalk would probably be needed where the rerouted track crossed the wet area between the two ridges. The badly eroded section of the existing track could probably be rehabilitated by building a series of fences across it to prevent further erosion and encourage the build up of soil.

Apart from this no obvious improvement on the routing of the track is possible. It is unlikely that any total relocation of the track would be worthwhile, especially as the existing track would remain as a highly visible scar.

1.2 High Camp Memorial Hut to Mount Eliza Trig

This short section of track climbs steeply uphill. Once it leaves the low forest around the hut it is mainly an easy scramble over slightly exposed dolerite boulders. Two large mudholes exist on the lower half of the track but apart from these there is little environmental damage associated with the track. For much of the route over the boulders a parallel track (apparently established only recently) exists ten or twenty metres to the north. This avoids most of the boulders and lies mostly on soil and vegetation among dolerite outcrops. This route would probably be preferred by most walkers and its increased use is unlikely to result in significant environmental problems. If this was to become the main route it would require slightly improved marking and possibly some minor relocation. It is recommended that the cairns marking one or other of these routes be removed.

1.3 Mount Eliza Trig to Mount Anne Summit

For most of its 3km this section of track crosses the undulating Eliza Plateau. It lies entirely on dolerite apart from short section of quartzite (520430 to 521433). Most of the last half of this track lies on dolerite boulder fields where the track is marked only by cairns. Where the track does not lie on rock it passes through true alpine vegetation which is rare in Tasmania and, hence, of considerable conservation significance (personal communication, Prof J Kirkpatrick). For the most part the vegetation is

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standing up well to trampling although there are some places where the soil has been churned to mud. In part this is because the open nature of the vegetation does not force all walkers to keep to exactly the same route (many of the worst trampled areas are where walkers are all forced onto exactly the same route). At 525440 (just before the track reaches the western end of Lightning Ridge) it passes through a string bog ecosystem where some trampling damage to the pools is very evident. This could be totally eliminated by rerouting the track ten or twenty metres to the west, nearer the edge of the plateau.

Apart from this, and a few other locations suffering considerable trampling, there is no damage which, at present, requires repair. This situation could easily change in the near future if present usage patterns continue. There are two reasons:

- * In the past the absence of an obvious pad or natural obstacles has caused walkers to spread out and spread the trampling damage. A visible pad now exists for much of the vegetated part of the plateau. This could serve to attract more walkers to use it and hence concentrate and accelerate trampling damage.
- * The "threshold" nature of trampling damage. Once surface vegetation is totally destroyed by trampling, the succeeding stages of churning of soil to mud and then erosion (essentially irreversible) can occur very rapidly. It would appear that much of the track on the vegetated part of the plateau is now close to this threshold with the surface vegetation severely damaged.

Due to these possibilities and the high conservation significance of the area it is recommended that pre-emptive management action should be considered before the deterioration of the track becomes so substantial that the only option is to reconstruct it with a largely artificial surface. This management action could take the form of reducing usage of the track by removal of the hut.

At the very least the track should be monitored carefully so that further signs of overuse can be detected before damage becomes too extensive (NB Three of the permanent monitoring stations established as part of this project are located on the vegetated dolerite part of the plateau 200 to 300m north-east of the Eliza Trig). The need for monitoring applies particularly to the quartzite section of the plateau. This is of especially high conservation significance since it is the highest and most exposed area

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of quartzite in the Southwest (personal communication, John Davies, botanist, Lands, Parks and Wildlife). It is covered by sparse feldmark vegetation and some erosion is occurring naturally. There does not appear to be any walker-caused erosion because it is a particularly open section and walker impact is spread over a wide area.

There is a short section of duplicated track near where the track down to Shelf Camp leaves the plateau. It probably originated as a short cut to Mount Anne summit. It is recommended that this be closed (just a matter of removing several cairns).

1.4 Gelignite Creek to Lake Timk and North-East Ridge

This track follows the old "Bombardier" Track across predominantly button grass plains for about 6km before entering rainforest. The "Bombardier" Track section is well defined and easy to follow. It is muddy in places but does not receive enough use to become really badly churned up. I have not walked the final section of track to Lake Timk but I have been told that it is so little used as to be almost impossible to follow. Most of the marking tapes have fallen off trees and there is little or no recognisable pad on the ground. The starting point of the track is not well defined and some walkers leave the Scotts Peak Road up to 1km south of Gelignite Creek and join the track near the eastern end of the first open buttongrass section.

The main use of this track is for access to the North-East Ridge for walkers and cavers. The track to the North-East Ridge leaves the "Bombardier" Track about 5km from Scotts Peak Road and climbs steeply through rainforest to the ridgetop. A well defined pad has not yet developed and the route would be very hard to follow if the marking tapes on the trees were removed. The track was evidently cleared and marked by cavers without any reference to Lands, Parks and Wildlife.

Once on top of the North-East Ridge one track leads east to the caves while the other goes west to the Pandani Shelf. These tracks pass through low scrub and have been churned into mud in many places although there are not yet any bad bogholes or track duplication.

The Pandani Shelf comprises two approximately level shelves on the south-eastern side of the North-East Ridge. They are formed of sedimentary rock and comprise low

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vegetation dominated by pineapple grass dotted with pandanis and small stands of low rainforest trees. They are extremely waterlogged most of the time and would appear to be exceptionally vulnerable to trampling damage. A track exists along the full length of the upper shelf leading to the rock slabs at the Mount Anne end which were used as a campsite by cavers in January 1987. The track has been churned into mud in many places although there are not yet any bad bogholes or track duplication. A few isolated traces of tracks are just visible on the lower shelf.

The route from the Pandani Shelf to Mount Anne summit involves gaining the ridgetop above the shelf. There does not appear to be any one popularly used route to here since an ill-defined pad exists only along the southern half of this ridgetop. A cairned route links this pad to the north-east corner of the summit pyramid of Mount Anne. There is at least one large gap in the cairns so the route would be very hard to follow in poor visibility. It lies over dolerite boulders and sparse alpine vegetation. Apparently it is possible to climb to the summit of Mount Anne from this approach but I was unable to locate the route. If this approach was ever to be used by any number of walkers it would be desirable to establish a track along the whole of the rocky ridgetop above the Pandani Shelf to keep traffic along the shelf itself to a minimum.

The North-East Ridge is not a well used walking route mainly because it does not appear in any published walking guide (only a cavers' guide book). The Mount Anne Traverse (ie ascend the North-East Ridge and go over the summit to descend to Condominium Creek or the Mount Anne Circuit) appears to be becoming increasingly popular and is likely to become more so when it is more widely realised that the summit itself can easily be bypassed to the west thereby avoiding the need to carry full rucksacks on the tricky scramble over the top. At present this route would be very hard to follow in poor visibility but only a few more cairns would be needed to make it straightforward to follow in almost any conditions.

If the "Mount Anne Traverse" route became well established and well known two problems are likely; it will probably result in a small increase in the number of walkers on other parts of the massif who are attracted by the "new" route and it will massively increase usage of the Pandani Shelf, which is likely to be disastrous for such a fragile area.

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It is, therefore, recommended that visitation to the Pandani Shelf be discouraged as far as possible. The cairns could easily be demolished between the shelf and the summit and if the marking tapes were removed from the track up to the North-East Ridge it would be extremely hard to follow. Any inclusion of the North-East Ridge track in a published guide book or map should be discouraged as far as possible.

1.5 Red Tape Creek to Lake Judd

This track climbs gently from the Scotts Peak Road to a saddle in a low range of hills before descending a few metres into the Anne River Valley. Once across the Anne River valley the track skirts the base of Schnells Ridge for 2km before recrossing the Anne River. The final kilometre of the track climbs onto the top of the moraine which dams the southern end of Lake Judd. At the point where the track first reaches the top of the moraine a well defined pad leads straight down to the water's edge. This offers a far better view up the lake than from the campsite. The vegetation is low scrub, predominantly buttongrass, with some low trees, apart from the last section where the track passes through rainforest on the moraine at the end of Lake Judd.

Corduroy has been laid on the first section of track where it leaves the road and steps have been constructed on a short steep section as it climbs towards the Anne River valley. The first crossing of the Anne River valley is entirely artificially surfaced with boardwalk and corduroy on both sides of the river, but no trackwork has been done beyond this. Maintenance has been neglected on this trackwork. Many of the steps have been partially washed downhill and several of the older sections of boardwalk are partially collapsed. The worst boghole on the entire track occupies a two metre gap in the boardwalk at the eastern side of the Anne Valley flats. The cable crossing of the Anne River is in poor condition. The access steps on both side have disappeared and the top cable was so slack as to make the crossing very hard to use until I improvised a means of tightening it.

Most of the track is not particularly pleasant to walk on but nowhere does it have the major environmental damage of the Condominium Creek track. There are a few locations where the track should be repaired to prevent further environmental damage. There are several localised areas where erosion is significant. These are mostly towards the western end of the section of track along the base of Schnells Ridge. The track also

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contains several bad bogholes which should be repaired to prevent further development of sidetracks around them. This applies particularly to the track on the buttongrass flats just south of the Anne River ford where some major sidetracks have already developed.

If this track was to be upgraded to a standard higher than simply fixing the major problems as outlined above then consideration would have to be given to the likely effect on usage. Compared to many other walks in south-west Tasmania it is short and easy; Lake Judd is only 7km from the road and only 300m of climbing is involved. It also provides a far greater sense of "wilderness" than most walks of similar distance since one is out of sight and earshot of the road as soon as the Anne River Valley is reached. Only the rough nature of the track deters greater usage at present. If a high quality track was provided all the way to Lake Judd it would almost certainly receive far more use than at present. This would put considerably greater pressure on the campsite. The implications of this are discussed further in 2.2.7 (Lake Judd Campsite).

1.6 Schnells Ridge

This route does not appear to get much use (only 7 out of 231 respondents to Mount Anne Area User Survey questionnaire went there) despite being described in Chapman's Guide Book. The route leaves the Lake Judd Track at 506379 and climbs a steep quartzite ridge covered in low scrub. It is similar in geology and altitude to the ridge from Condominium Creek to the hut so presumably would suffer the same fate if subjected to the same amount of use. At present there is a faint but distinct pad up the ridge and a few cairns near the top. Once on the ridgetop the track varies from clearly defined to non-existent and there is little trace of it on the descent past Smiths and Moraine tarns to where it rejoins the Lake Judd Track at 526386.

The absence of a well defined track probably deters many less experienced walkers from attempting it and routefinding would be genuinely difficult in poor visibility.

If it was considered desirable to provide a another long daywalk in the Mount Anne area then the Schnells Ridge Route could be developed and promoted. So long as track work preceded a major increase in user numbers, the problems of the Condominium Creek track could probably be avoided.

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1.7 Mount Anne Circuit (Eliza Plateau to Lake Judd Track)

From where it leaves the Eliza Plateau to the point where it leaves the south ridge of Mount Lot the route lies either on dolerite boulders, bare rock or the sparse vegetation between dolerite outcrops. There is generally not enough soil for erosion to be a problem but damage is resulting from unnecessary multiple routes. Rima Truchanas (Track Ranger Program Review, 1986-1987) noted two descent routes to Shelf Camp and three routes between Shelf Camp and the Slot, although I did not notice quite this much duplication. It is recommended that the most satisfactory route be adequately marked and marking (cairns) on alternative routes be removed.

From the bottom of the south ridge of Mount Lot the route descends through dense rainforest approximately 400m to open ground at the west end of the moraine between Lake Picone and Judds Charm. A well defined pad exists at the northern end of this section but it becomes progressively less apparent further south. A maze of partly formed pads indicates that most parties end up making their own route through this section. It is recommended that a route be marked right through this section to minimise this environmental damage.

The pad along the top of the moraine between Lake Picone and Judds Charm is clearly defined but no erosion is evident. The well established track linking Lake Picone and Judds Charm is likewise not a problem but Chapman's guide book recommends a route from Lake Picone straight up to the top of the moraine. This must receive very little, if any, use because it involves crossing the Lake Picone outlet creek where it is around 40cm deep and the banks are very soft, yet no trampling damage is evident. It is recommended that Chapman be asked to correct this in future editions of his guidebook.

The route from Lake Picone towards Lots Wife is very evident where it crosses the swampy flats around Lake Picone. No major problems are yet evident but it is likely that they soon will be. For aesthetic reasons boardwalk should be avoided in an area such as this if at all possible so it is recommended that an alternative route be established on harder ground. The route is hard to follow where it climbs through rainforest under the eastern end of Mount Lot. It is recommended that this be marked to localise environmental damage. The route along the ridgetop to Lots Wife and the route

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across the top of Mount Lot both lie predominantly on bare rock and no environmental problems are likely.

The climb from Judds Charm up to the ridgetop at 547428 lies on an open hillside on which shallow soil is covered by low scrub. The track is muddy for most of its length with some erosion becoming evident on steeper sections. It is recommended that this section be repaired with steps and drains before erosion becomes severe. Some relocation may be appropriate.

The route now follows the sparsely vegetated ridgetop for around 300 m. In poor visibility it would be possible to lose the route here so it is recommended that a few more cairns be constructed, again to localise environmental damage.

The track now descends to the last two tarns (549423 and 549417). The track is muddy for most of its length with some erosion becoming evident on steeper sections. It also passes through some extremely wet areas. It is recommended that the steep sections be repaired with steps and drains and the track rerouted around the wettest areas if possible.

From tarn 549417 the route climbs onto the top of the moraine to the east. No well defined pad exists until the top of the moraine is reached so, again, it is recommended that this be marked to localise environmental damage. A well defined pad exists from here to the edge of the plateau. It is muddy in some places but no major environmental damage is likely in the near future.

The sidetrack to the summit of Mount Sarah Jane is adequately marked and needs no attention.

From the edge of the plateau the track descends steeply to join the Lake Judd track in the Anne River valley. The uppermost 100m of the track are not very clearly marked, again, improved marking is recommended. There are several bad bogholes and sidetracks on this section, mostly in the buttongrass of the Anne valley. Some attention to the worst of these is probably worthwhile to minimise track duplication, but the erosion problem is not severe and it is inappropriate on a walk of the nature of the Mount Anne Circuit to upgrade it purely for reasons of user comfort.

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The above recommendations may seem to be suggesting a standard of track marking higher than is appropriate for a route such as the Mount Anne Circuit but the reality is that a well defined pad now exists over almost the whole route. Once usage reaches this level it is considered that damage will be minimised by keeping all walkers on the one route. While the existence of a defined track for the entire circuit must reduce its challenge, the major factor "protecting" the circuit from heavier use remains the difficulty of the section over Mount Lot and no modifications are proposed here.

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2 Campsite Conditions

2.1 Methodology

The following section discusses the condition of each of the regularly used campsites. The discussion is based on notes made in the field, where a checklist of important points was completed for each campsite. A sketch map of each campsite was drawn to permit the identification of each individual site in the report and accompanying slides. These maps are not sufficiently accurate to permit detection of minor changes in conditions but should allow monitoring of major changes such as the development of entirely new tent-sites.

The report covers only the remote campsites used by walkers. The campsite behind the carpark at Condominium Creek is not included, neither are the campsites associated with the caves of the North-East Ridge.

2.2 Discussion of Campsite Conditions

2.2.1 High Camp Memorial Hut and Associated Campsites

Please note that the following discussion is based on conditions in the summer of 1987/88. A totally new toilet with composting tank was constructed in the summer of 1988/89. This is referred to as toilet 3. Toilet 2 was in use prior to this. Toilet 1 was replaced sometime prior to the commencement of this study in December 1987.

The High Camp Memorial Hut is the most popularly used location in the entire area for overnight stays. It was constructed by the Hobart Walking Club in the early 1970s. It must be one of the most solidly constructed mountain huts in Tasmania with stone walls and a steeply pitched metal roof. Inside it has a stone floor. A lack of maintenance in recent years is evident. The hut leaks in some conditions, apparently through the walls or around the window, not through the roof. Condensation may be a significant source of moisture. The amount of moisture present is enough for the mattresses in the hut to be mouldy and usually damp. The external cables to hold the roof down have all come adrift but this does not seem to matter. Other than this the structure appears sound. Minor maintenance tasks which need attention include the latch on the door and the

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attachment of the guttering to the roof. Storage of building materials takes up some of the limited space in the hut. It is recommended that these be removed along with the untidy pile of rubbish (believed to be the dismantled remains of toilet 1) now located about 140m downhill, near the first quartzite outcrop.

The water supply is from a tank behind the hut fed by guttering on one side of the roof only. The water is slightly tainted by wood smoke and during the dry summer of 1987-88 the tank was very nearly empty on several occasions, although I never heard of it running out completely. It would be easy to fit guttering to the other side of the roof as well to double the catchment area. The original water supply was from a series of soakage pits in the ground but since the hut was built directly uphill from these they are probably badly contaminated now.

There is an open fireplace within the hut and the "hut code" sign on the back of the door encourages users to leave a supply of firewood for the next visitors. In conjunction with the tools supplied in the hut this seems to contradict the "No Campfires in Alpine Areas" sign and Minimal Impact Bushwalking information displayed at the start of the track. The hut is located among eucalypts about three metres high which have grown since the area was last burned. Amongst them are numerous dead trees about five metres high killed in the fire. The dead trees are completely absent within easy reach of the hut, having been cut down for firewood. Only the stumps remain. There is some evidence of live timber having been cut for firewood near the hut. It is recommended that the fireplace be removed. A sign could explain why fires are inappropriate in such an area or a stove could be installed with coal provided as occurs at the Overland Track huts. This would also heat and dry out the hut far more effectively than the present fireplace but would create the same ash and rubbish disposal problem as has been encountered on the Overland Track.

A pit toilet (toilet 2) is located a few metres behind the hut. Its location is not clearly indicated and a few hut users are unaware of its existence. The pit was apparently created by blasting in solid rock (personal communication, Gary Witzerman, Ranger). Not surprisingly, it does not function very well. For the whole of the summer of 1987-88 it was in disgusting condition with the contents of the pit overflowing downhill, especially during and after rain. I would guess that most users of the hut performed their toilet functions somewhere other than in the toilet. Toilet paper was observed in the

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vicinity of the hut on several occasions. There does not appear to be anywhere around the hut with sufficient depth of soil to support a functioning pit toilet. If this is the case there would seem to be no option but to install some more sophisticated type of toilet.

Removal of the hut should be considered if a satisfactory solution to the toilet problem cannot be found. One can only speculate on how many users would camp at this location if the hut was removed. I would guess that many would no longer attempt an overnight trip at all, but that the hut site would be a popular campsite, so long as it still had a potable water supply (since the present water supply is the tank fed from the hut roof some other water supply would have to be provided). If the hut were to be removed several planned campsites should be created in the area by Lands, Parks and Wildlife staff. Removal of the hut might probably reduce total visitation to the area but it might increase environmental damage to the Eliza Plateau if it encouraged more visitors to camp there (at present the numbers who camp on the plateau is negligible despite some good, if exposed, sites).

The hut is already too small for the numbers using it in peak periods and this problem is likely to get worse in the future. Several campsites exist around the hut. They receive little use compared to the hut. This suggests that most people prefer to stay in the hut and that the main use of the campsites is as overflow accommodation when the hut is crowded.

A significant environmental problem in the vicinity of the hut is an extensive network of poorly defined tracks. These tracks are so numerous that it is possible to stray off the main track in the vicinity of the hut despite three small signposts. Some of these tracks lead to campsites. Presumably the rest were created by people searching for firewood or place to go to the toilet. If the main route was clearly marked, the fireplace blocked off and a decent toilet provided these tracks would probably become overgrown in a few years.

There are several possible campsites around the hut including the open ground immediately in front of the hut, but most of these are so poor that it is unlikely that they receive much use. The two which probably do receive regular use are described in 2.1.

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The following problems remain however as at 26/05/89:

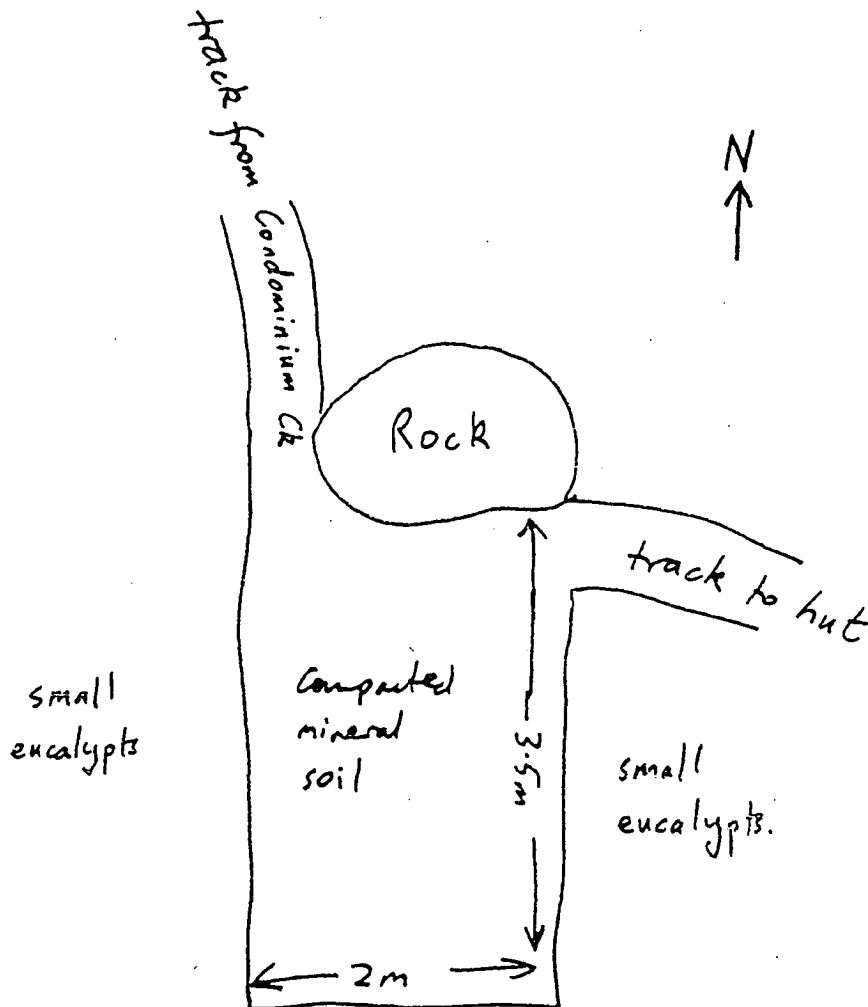
- * The aesthetics of the new toilet (toilet 3) leave a lot to be desired. To walkers approaching from below it is more prominent than the hut itself. The height of the structure is caused by the nature of the design, in which the toilet is located on top of the tank which itself is at least 1.5m high and mostly above ground level (it is dug into the slope at the uphill end and above ground level at the other).
- * There are still some construction materials lying on the ground around the toilet.
- * The previous toilet (2) has not been dismantled and no attempt has been made to clean it up. Exposed faecal material was still clearly visible with a trickle of water overflowing from the pit. Note that the pit from toilet 1 has been covered with several large rock slabs and the structure removed.
- * The pile of rubbish approximately 140m below the hut (believed to be the remains of toilet 1) was still there and had been increased by rubbish created by the construction of toilet 3.

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Campsite Sketchmap 1

Campsite Below Hut

(3/7/88)



The other reasonable campsite near the hut comprises a 2.5m diameter circular area approximately 100m below the hut, 1m off main track. Basalt rock & soil.

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2.2.2 Shelf Camp

According to the Mount Anne Area User Survey Shelf Camp received more use than any other campsite in the area (not including the hut). It is basically a poor campsite, its popularity derives from a lack of alternatives. It is in a spectacular location, it is reasonably sheltered from the west and south, it offers easy access to Mount Anne summit and it is a convenient stopping point for walkers doing the Mount Anne Circuit. Many spend more than one night here while waiting for suitable weather to attempt the difficult section across Mount Lot. There is no alternative site in the immediate vicinity, and not even the possibility of expansion of the existing site since it is surrounded by steeply sloping ground. The closest alternative camping would be on the Eliza Plateau and it is certainly not desirable to divert use to there.

Three of the four possible sites are on rock slabs, or rock and bare earth. Some trampling damage is evident between the rock slabs. Only the fourth site, on largely undamaged pineapple grass, is likely to deteriorate with further use. The water supply comes from a few small pools around the site. Water only flows through these in wet conditions so the supply is potentially vulnerable to pollution.

Four lengths of steel reinforcing rod are left at the campsite for use as tent poles. These days hardly anybody does not carry poles so their removal is recommended.

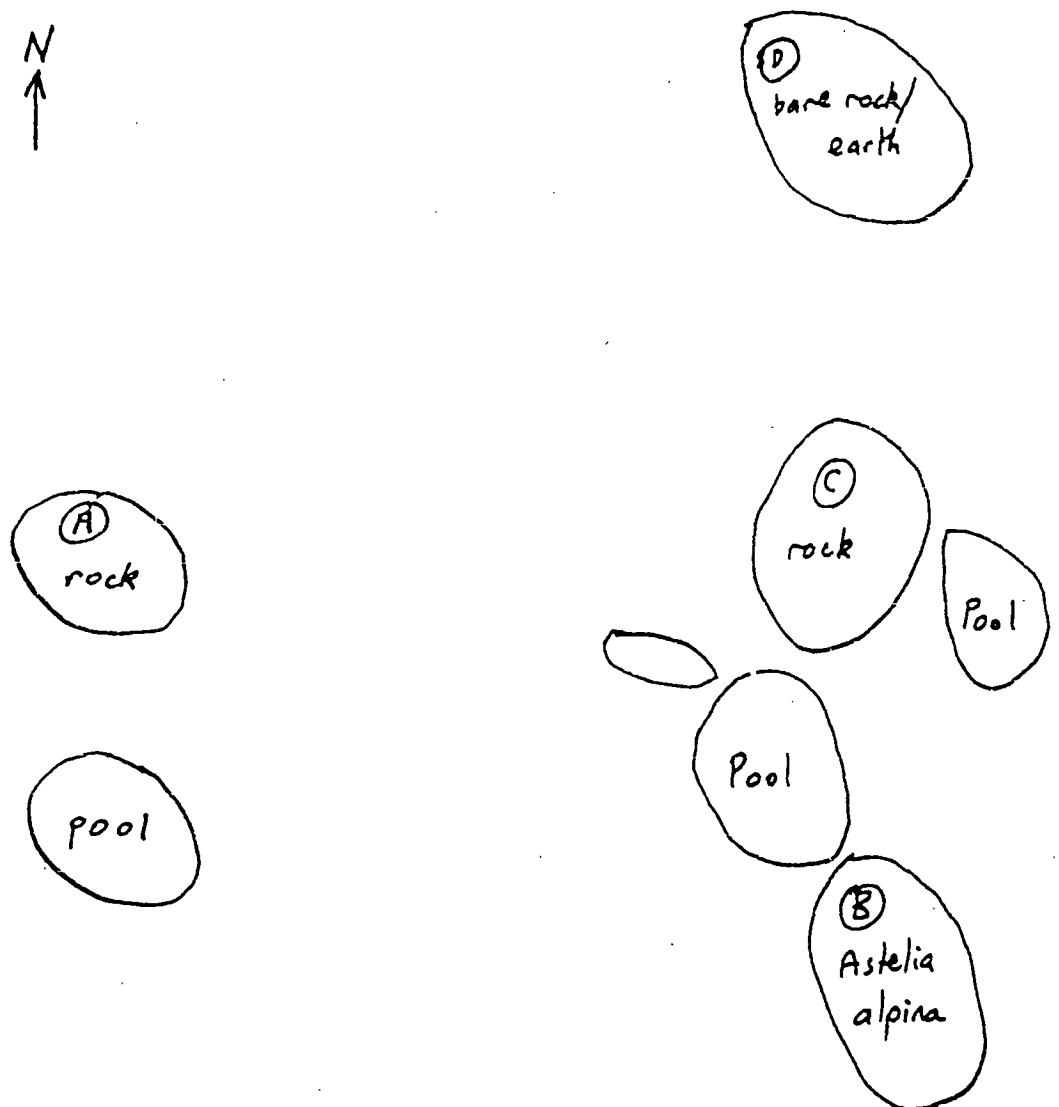
Chapman's Guide Book does not point out that it is impossible to use tent pegs on most of the sites. The major environmental problem is trampling damage of site B and on paths between the rock slabs. Given the lack of suitable alternative sites it is hard to see how the damage can be significantly reduced except, perhaps, by signs to draw users' attention to the problem.

In the long term it will probably be necessary to regulate visitor numbers in peak periods to avoid forcing people to camp in inappropriate places which are both lousy campsites and unnecessarily environmentally damaging.

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Campsite Sketchmap 2

Shelf Camp
(2/4/88)



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2.2.3 Sandfly Creek

At the point where the track to the North-East Ridge crosses Sandfly Creek (only about a one hour walk from the Scotts Peak Road) there is a campsite on each side of the creek. Each site consists of a cleared patch of bare soil about 2m in diameter. Neither showed any sign of recent use so no further recording of their condition was done.

2.2.4 Pandani Shelf

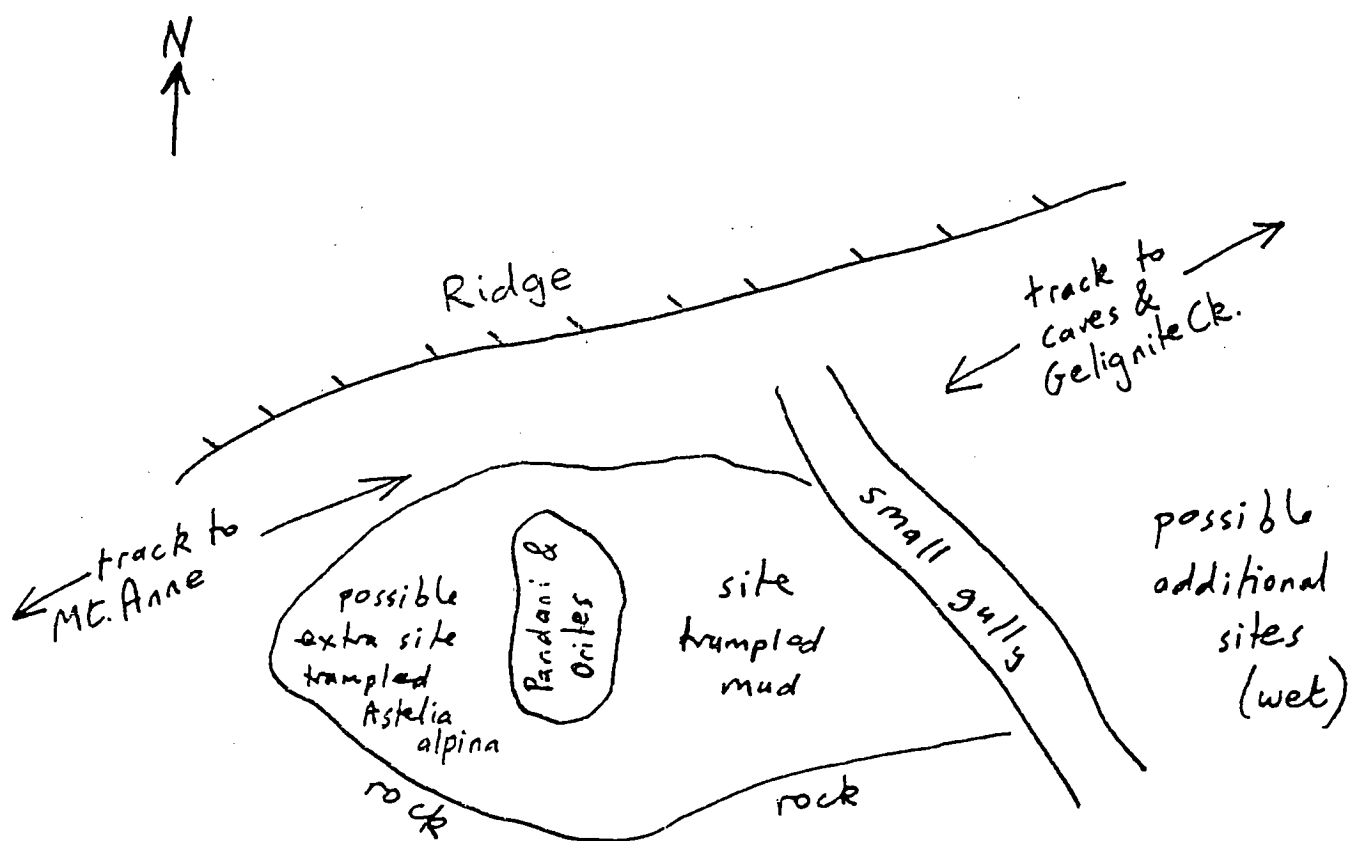
There are three distinct campsites on the Pandani Shelf. Site "A" probably receives much of its use because it is the first site encountered when the Shelf is approached by the usual route from Gelignite Creek. It is suffering considerable trampling damage and its use should be discouraged. A sign directing users to either of the other campsites on the shelf is suggested. Site "B" is the best site on the Shelf; it is pleasant to camp on and it should stand up well to use since the soil is well drained and compacted. The only environmental problem likely to arise from additional use is the development of a track to the campsite. Site "C" comprises a number of possible sites all on rock slabs. The major problem here is the poor state of the track leading to them (presumed to have been caused by heavy use by cavers in Jan 1987).

The major problem on the Pandani Shelf is not the campsites themselves but the vulnerability of any well used track to trampling damage.

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Campsite Sketchmap 3

Pandani Shelf Site "A" (535460)
(14/4/88)

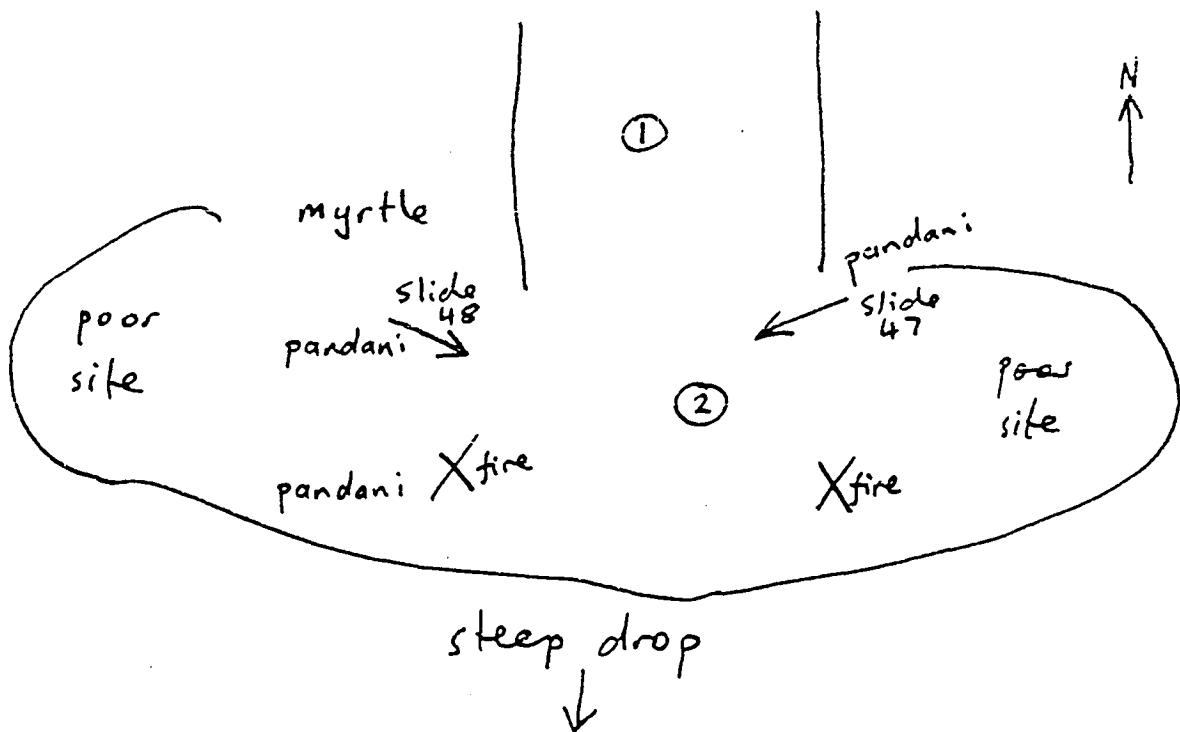


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Campsite Sketchmap 4

Pandani Shelf Site "B" (534459)
(14/4/88)

Located on outer edge of lower "shelf"



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2.2.5 Lake Picone

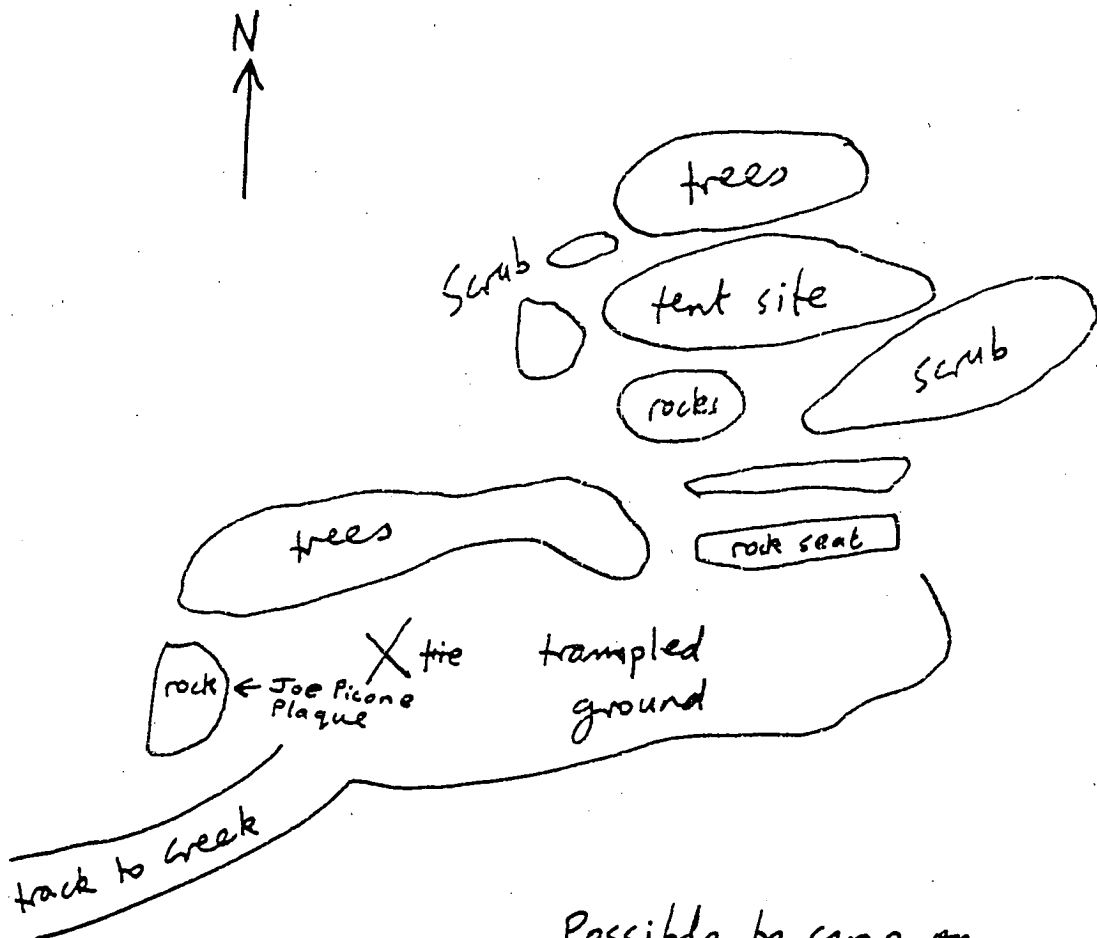
This comprises one reasonable tent site plus a fireplace and a rock which makes an excellent seat. Some trampling damage is evident on the tent site and around the fireplace. These clear areas are prominent from Mount Lot and also the top of the moraine between Judds Charm and Lake Picone. Camping is also possible on the extensive flat area surrounding the campsite but this is very wet most of the time.

It would be desirable to eliminate camping at Lake Picone to allow restoration of the site. Alternative camping is available at Judds Charm (only about 7 or 8 minutes walk away). Judds Charm has overuse problems of its own but probably the best compromise is to discourage camping at Lake Picone (it would help if it were not listed as a campsite in guide books) and concentrate all campers in the area into Judds Charm campsite which could be upgraded as discussed in 2.2.6. The area around Lake Picone is one of the most fragile of the whole Mount Anne Circuit so it should be carefully monitored for deterioration in the future.

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Campsite Sketchmap 5

Lake Picone (553438)
(17/3/88)



Possible to camp on
much of surrounding area

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2.2.6 Judds Charm

This is the more widely used of the Lonely Tarns campsites (37 person-nights compared to 22 for Lake Picone in the Mount Anne Area User Survey). Since it has three good sites and several more reasonable ones it is likely that it actually receives a higher proportion of use than the figures indicate. Many walkers doing the Mount Anne Circuit would spend more than one night here and have a rest day, knowing that they have only the easy walk out to Red Tape Creek ahead of them. The number of spots that have been used as tent sites at some time suggest that it has occasionally had a very large number of users simultaneously. It is a more sheltered campsite than Lake Picone and much less visible from any of the surrounding high ground.

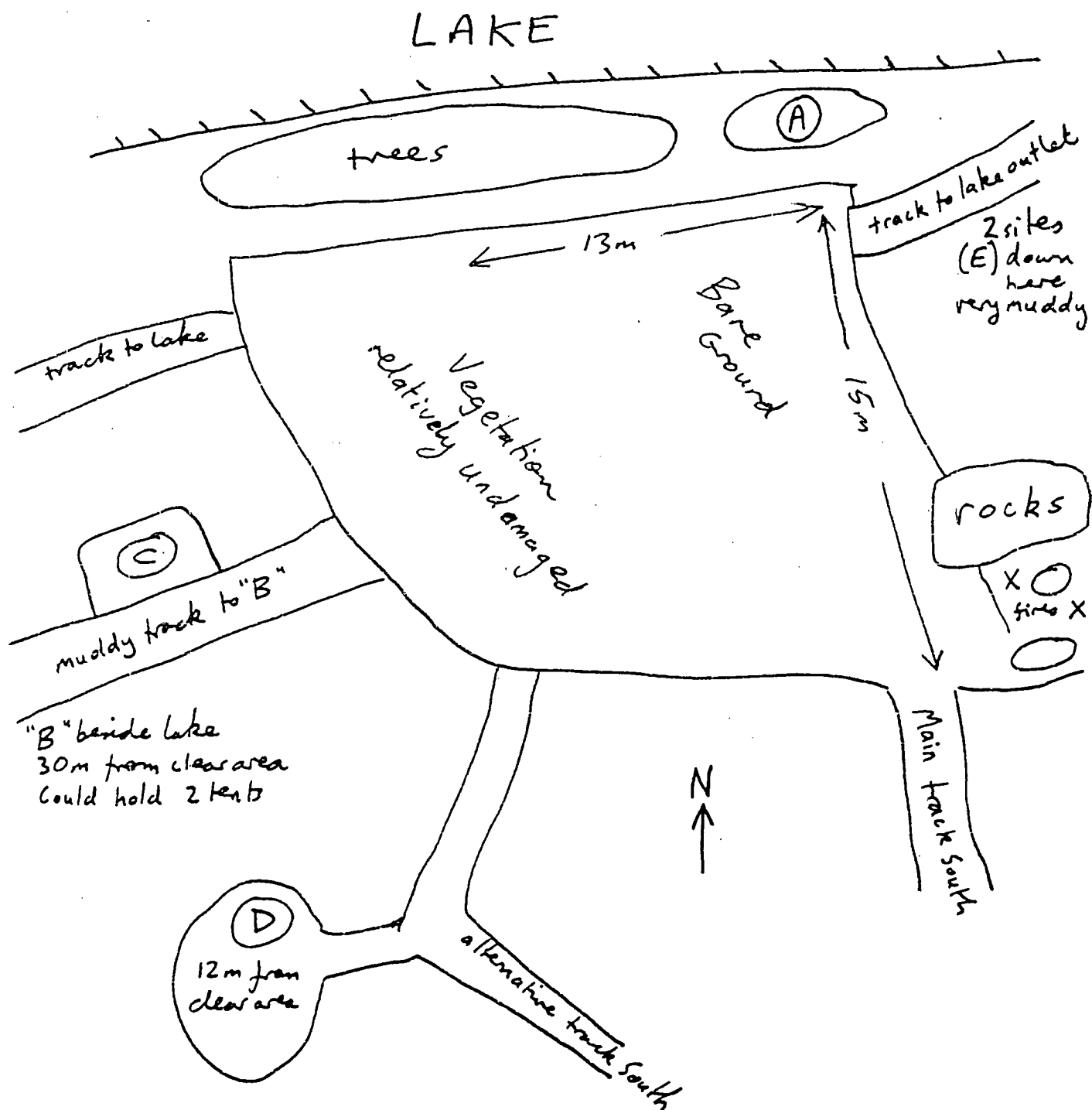
The major environmental problem is trampling damage to the central area of open ground and the proliferation of tracks and campsites. Apart from people walking across the central area for access to campsites it is probably used as a campsite itself when the better sites are all occupied. The surrounding area probably has the potential for a few new campsites. If additional sites are to be created they should be selected and cleared by Lands, Parks and Wildlife staff. Some trackwork within the campsite area itself might be appropriate to minimise future trampling damage. If such expansion was undertaken it would be desirable to provide a toilet too. Just to the east of the campsite would probably be a suitable location; there is probably deep enough soil for a pit toilet and it would be well screened by surrounding vegetation.

In the long term it will probably be necessary to regulate visitor numbers in peak periods to avoid unacceptable degradation of the campsite.

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Campsite Sketchmap 6

Judds Charm (553434)
(17/3/88)



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2.2.7 Lake Judd

The Lake Judd campsite consists of a relatively large cleared area under 10 to 20m tall trees with several individual campsites adjoining. The large area was probably created by the understory vegetation which had previously separated discrete tent sites being slowly destroyed. The surface is generally pleasant to camp on and it should stand up well to use since the soil is well drained and compacted. The major environmental problem is the apparent rate at which the campsite is expanding. This is presumably caused by overcrowding on occasions such as summer long weekends when latecomers find that they have to create a new site if they want anywhere to camp.

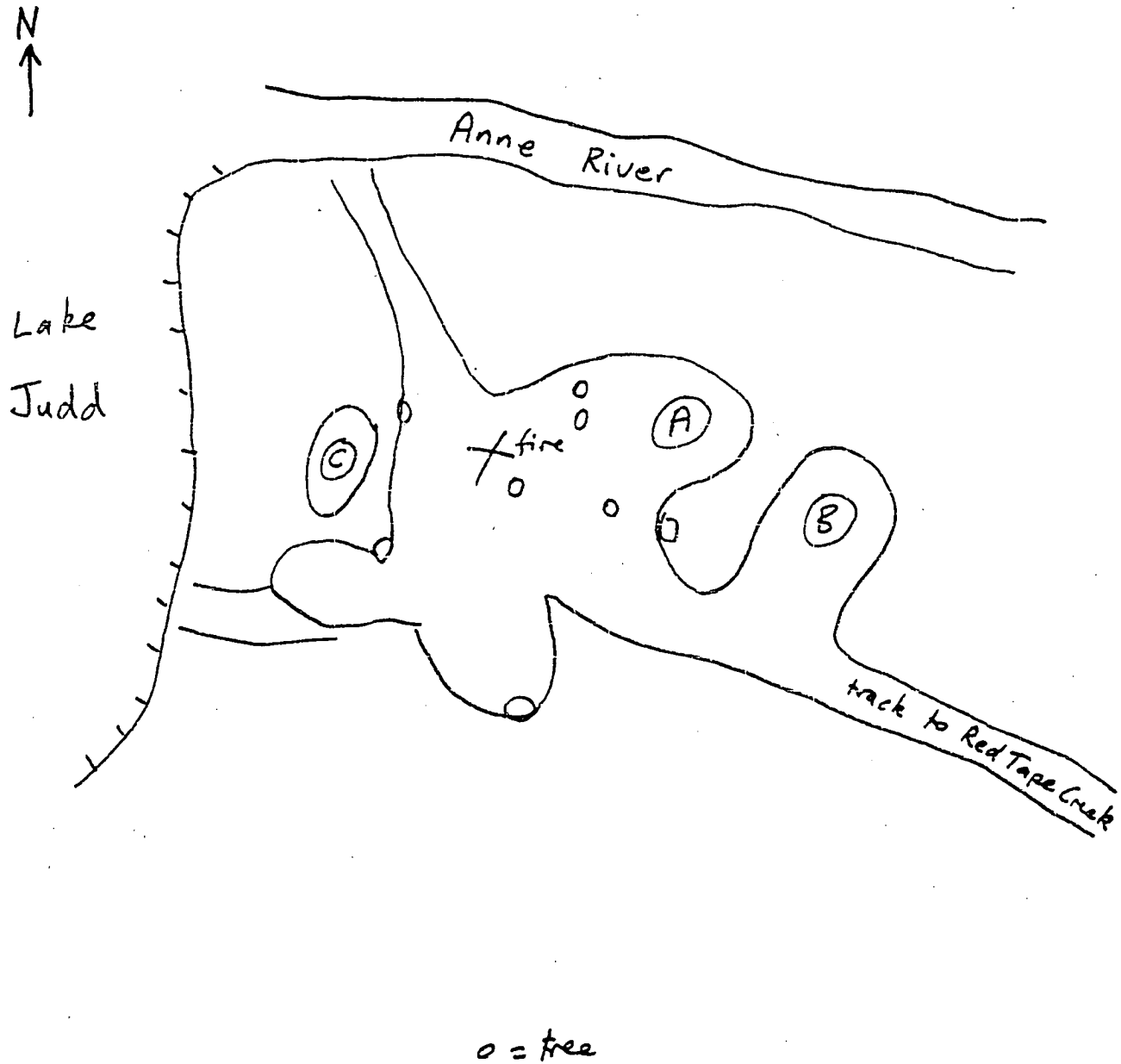
If it was considered desirable to encourage use of this area by upgrading the track from Red Tape Creek then it would be necessary to expand the campsite to cope with the increased usage. There is some scope for additional campsites up the slope to the south-west from the existing sites. If additional sites are to be created they should be selected and cleared by Lands, Parks and Wildlife staff so that they remain discrete sites and do not just increase the size of the central area, as seems to have happened when walkers try to squeeze in an additional tent. If such expansion was undertaken it would be desirable to provide a toilet too. The camp lies on an old moraine so a pit toilet would probably be adequate. The camp lies on mineral soil and there is plenty of dead wood for firewood (at present) so the only restriction on campfire use would be bushfire danger.

In the long term it will probably be necessary to restrict visitor numbers in peak periods to avoid unacceptable degradation of the campsite.

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Campsite Sketchmap 7

Lake Judd (533400)
(5/3/88)



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2.2.8 Anne River Ford

Chapman describes this as "not a very good campsite". It is now a 2m diameter patch of mud in amongst buttongrass. Some regeneration of vegetation is apparent so it probably has not been used for some while. No further recording of its condition was done.

2.2.9 Schnells Ridge

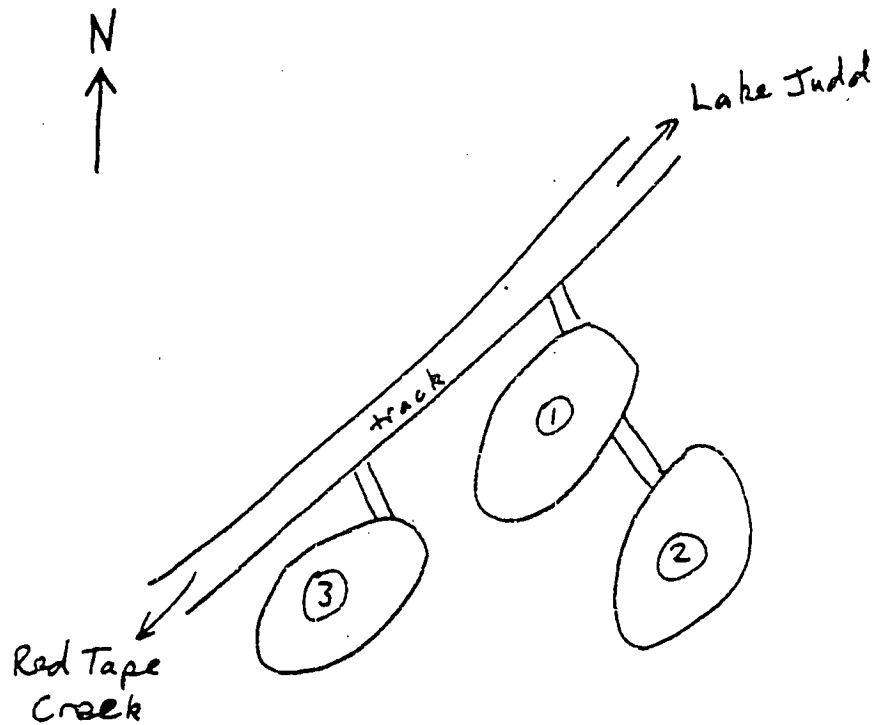
This campsite (519380) is located beside the Lake Judd Track about midway along the base of Schnells Ridge. It has expanded from one small site to three since 1979 (personal recollection). Apart from the actual clearing of the sites, environmental damage is minimal. The sites do not appear to get much use. It is not obvious what they are used for because it is not a particularly attractive spot to stop at for its own sake. It may serve as an overflow site when either the Anne River Cable Crossing or Lake Judd sites are crowded, it may be used by parties on the Mount Anne Circuit who do not want to do the whole of the Lonely Tarns to Red Tape Creek section in one day (as is usual) or it may be used as base camp by parties making an extended trip to Schnells Ridge.

At present environmental damage is minimal and is unlikely to get worse so no action is needed.

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Campsite Sketchmap 8

Schnells Ridge (519380)
(7/3/88)



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2.2.10 Anne River Cable Crossing

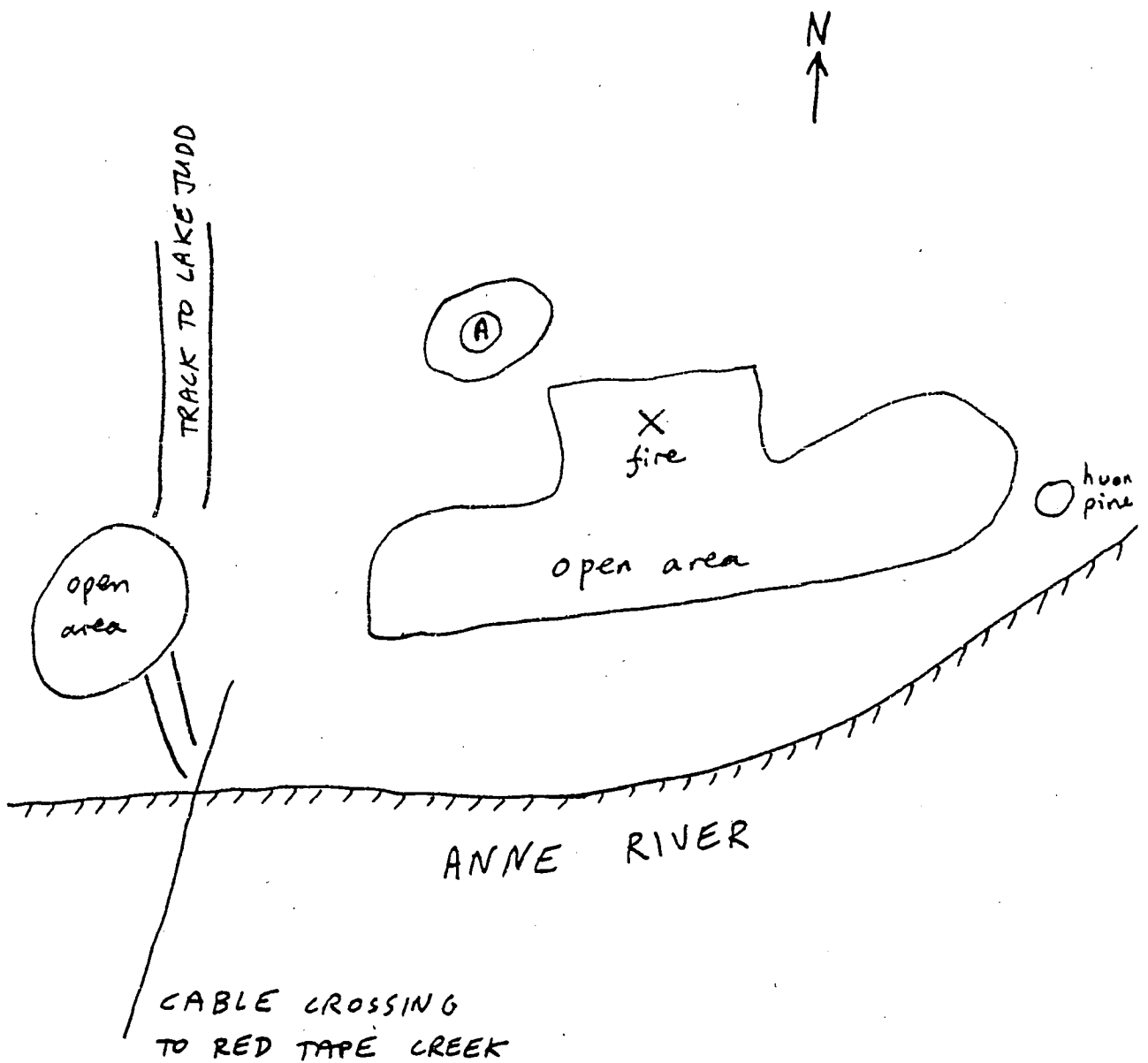
This site is only about 40 minutes walk from the Scotts Peak Road so it probably receives some use from people who want to camp in the "wilderness" without having to exert themselves very much. If the track to Lake Judd is substantially upgraded this type of use may increase. It also probably gets some use from walkers doing the Mount Anne Circuit who want to leave themselves a short easy walk out to catch the bus the next day. The site is vulnerable to flooding by the Anne River in heavy rain.

At present environmental problems are minimal and unlikely to get worse so no action is suggested.

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Campsite Sketchmap 9

Anne River Cable Crossing
(27/4/88)



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3 Damage Assessment

3.1 Track Damage Index

It was decided to use this technique for the following reasons:

- * An integral part of the project was to attempt to quantify the condition of the tracks.
- * The track damage index is a technique which had been developed and used successfully in Tasmania.

The track damage index was originally proposed as a means of quantifying trampling damage on the Overland Track. It involves collecting data every 500m along the track (Calais and Kirkpatrick, 1986). At each site a transect of variable length is placed across the track, divided into ten parts, and for each of the ten parts the dominant condition of the track is noted. The conditions are defined as:

- 1) Native vegetation unmodified by trampling.
- 2) Vegetation broken or flattened by trampling but largely complete live cover.
- 3) Above ground biomass largely destroyed but showing evidence of potential vegetative recovery.
- 4) Above ground biomass completely destroyed with soil exposed and compacted over most of the section.
- 5) Soil partly removed by erosion or converted into mud.

Three such transects are made one metre apart. They run across the track and only include undamaged vegetation if it is surrounded by damaged vegetation. The track is taken to include all of conditions 2 to 5. A rough cross section is drawn and notes made of aspect, elevation, geology, track slope, track depth, topographic slope, dominant plant species and vegetation structure. A single index is calculated by taking the mean of the condition numbers and multiplying this figure by the track width in centimetres. eg a 1m wide track comprising half exposed soil (4) and half mud (5) would score $4.5 \times 100 = 450$.

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It was considered to be both impractical and unnecessary to make the sites exactly 500m apart, but it was important to have a objective means of determining the exact location since a difference of a few metres could produce a huge difference in the value of the index. Hence the distance between the sites was 500 paces, counted with the aid of a hand held counter. The first transect was made exactly at the 500th pace which eliminated any subjective element from the choice of site. A standard form was completed at each site so that no details were inadvertently omitted.

Shortcomings of Track Damage Index

*** Is All the Information Worth Collecting?**

The track damage index as described by Calais and Kirkpatrick consists of two almost independent activities: measurement of the index itself and recording of accompanying information (soils, topography etc). This was a time-consuming activity in the field. It is not worth recording both types of information unless there is a specific need for both. For example, if the track damage index is being measured purely for track assessment purposes it is unlikely to be worth gathering the detailed information on soils, topography etc but this might be more useful than the index itself if the main aim is to predict future problems since geology/soil type has a major influence on the type of track problems that develop (personal communication, M Pemberton, geomorphologist, Lands, Parks and Wildlife).

*** Applicability to Short Sections of Track.**

Calais and Kirkpatrick proposed the 500m interval between sampling sites with the intention of using the technique on the 50km Overland track. When the technique is applied to sections of track only a few kilometres long a very small number of sites are obtained so the applicability of the overall index to the track as a whole is very dubious. This problem could easily be overcome by reducing the distance between sites so that a minimum of, say, 10 sites are measured for any section of track which is to be considered alone.

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*** Mud and Erosion.**

It was felt that the index gave too much weight to relatively minor damage and too little to more severe problems. If the track damage index is to be used in the future I would suggest extending the conditions "point score" to the following:

1 to 4) as previously.

5) shallow mud (say <15cm).

6) deep mud (say >15cm).

7) some erosion (say <15cm).

8) severe erosion (say >15cm).

An alternative approach might be to measure the depth of the track and incorporate this figure into the index calculation.

*** Bifurcation.**

The index does not work well in the situation where two parallel tracks have evolved a significant distance apart with no damage to the soil/vegetation between them (there are several examples of this in the Mount Anne area). eg consider two parallel tracks 25m apart, each 30cm wide bare ground. The track damage index for each individual track would be $30 \times 4 = 120$. If the two are considered as components of the one track then the track damage index is $2500 \times (2 \times 4 + 8 \times 1) / 10 = 4000$. This figure gives a totally misleading impression of the state of the track. Probably the best solution is to note the existence of the parallel tracks and calculate the track damage index of each separately.

*** Rock or Artificial Surfaces.**

Calais and Kirkpatrick did not explain how the index is to be calculated when the site falls on totally unmodified rock (eg the last 3 sites before Mount Anne summit) or on a completely artificial surface (eg boardwalk). Allocating an index of zero to such sites lowers the overall index for that section of track so I felt that the most useful solution was to ignore such sites and accept that the index applied only to those parts of the track which passed through vegetated areas and were not artificially surfaced.

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Usefulness of Track Damage Index

So long as the shortcomings discussed above are appreciated then the track damage index is a useful method of quantifying the broad level of environmental damage to different tracks, which is all that its inventors ever intended it to be.

However, the most pressing need is for a systematic technique for determining the nature and priorities for future track work. The track damage index, taken alone, is not such a technique since it is only a measure of present track conditions and ignores factors such as the future condition of the track if work is not done, the potential for natural restoration and the conservation significance of the communities through which it passes.

However, it may have a use in determining priorities for track work since it can be used to compare the state of two different tracks, so long as they pass through broadly similar terrain and vegetation. It would be reasonable to use the track damage index to compare the state of two different tracks both of which negotiated buttongrass plains, but it would be absurd to use it to compare a track across an alpine plateau and one across a buttongrass plain.

3.1.3 Track Damage Index - Results

The track damage index (TDI) was calculated for all of the most heavily used tracks.

<u>Track</u>	<u>No of Sites</u>	<u>Mean Width</u>	<u>Mean TDI</u>	<u>Standard Deviation</u>
Condominium Creek to Hut	9	2.4m	1010	730
Eliza Trig to Mount Anne	6	1.0m	390	250
Red Tape Creek to Lake Judd	15	1.0m	400	210
Anne River Ford to edge of Sarah Jane Plateau	6	0.9m	320	200

Notes:

- 1) Condominium Creek to Hut; one site on corduroy, 2500 paces from start - ignored.
- 2) Eliza Trig to Mount Anne; first site - no well defined track (counted as zero), last 3 sites all on dolerite boulders - ignored.

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- 3) Red Tape Creek to Lake Judd; the first site beyond the Anne River cable crossing occurred on boardwalk - ignored.
- 4) Anne River Ford to edge of Sarah Jane Plateau; last site predominantly on quartzite boulders - ignored.

Track Damage Index - Discussion of Results

The high standard deviation in the track damage index for all four tracks reflects the high variability in track conditions in all areas.

With the exception of the Red Tape Creek to Lake Judd track the number of sites was insufficient for great reliance to be placed on the figures. The significance of the small number of results for some sections of track was not realised until the fieldwork had been completed and it was impractical to gather more data (see above "Applicability to Short Sections of Track").

The track damage index for the Condominium Creek to the hut track is over double that for the other tracks. This reinforces the first impression that this track is in far worse condition than any of the others. This is despite the fact that a major problem on this track is erosion, which does not score especially high on the track damage index "point score".

The only surprise in the rankings given by the track damage index is the high score for the Eliza Plateau track which I would, subjectively, have expected to have had the lowest score. This is probably a reflection of the rather small number of sample sites, most of which happened to fall on particularly bad sections of track.

3.2 Rate of Deterioration

It is evident that track deterioration is a continuing problem. With the likelihood of a steady increase in visitor numbers in the future the rate of deterioration is likely to increase unless some action is taken. The following are possible methods for assessing the rate of deterioration.

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3.2.1 Personal Experience

Discussions with individuals who have walked in the area regularly over the years and my own personal experience both confirm that track and campsite conditions are slowly but steadily deteriorating.

- 1) The photographs discussed in section 3.2.3 confirm this for the Condominium Creek to Hut track.
- 2) When I first used the campsite at the base of Schnells Ridge (519380) in 1979 there was one cleared site barely large enough for a single small tent. Now there are three cleared sites there, all larger than the original.
- 3) On my first visit to the Lonely Tarns in 1983 much of the route between the Anne River Ford and the Tarns was hard to follow and evidence of the route was non-existent in some places. Now there is a well defined track for almost the entire distance. In 1983 the route from Lake Picone towards Lots Wife was barely apparent, now it too is well defined for almost the entire distance. In 1983 the campsite at Judds Charm comprised two or three well defined campsites, now there are at least five and the large open grassy area is suffering considerable trampling damage and will soon be an expanse of mud.
- 4) The track along the Pandani Shelf on the North-East Ridge has deteriorated markedly since 1985. This is probably due mainly to a large group of cavers who camped there for several weeks in January 1987 and commuted daily between their campsite on the shelf and the caves.

3.2.2 Aerial Photography

Aerial photographs of the Mount Anne area taken in February 1973 (black and white), March 1984 (black and white) and January 1988 (colour) were obtained. The track from Condominium Creek to the hut was examined closely in all three sets of photos. The track as a whole was far more apparent in the later photos than the earlier ones but the detail was not sufficient to quantify the general rate of track deterioration. What could be usefully identified was the formation of side tracks. The bifurcation at 484435

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(altitude 420m; about 50m from the base of the hill at Condominium Creek) was not visible in 1973 but was obvious in the later photos.

The bifurcation at 486435 (altitude 480m; slightly further up the hill) was evident even in 1973. The most interesting example was at 503430 where the track climbs through quartzite outcrops about 650m downhill from the hut (altitude 840m). In 1973 only one track was visible here. In 1984 two could be clearly seen with traces of a third. By January 1988 four could be identified. Aerial photography has a real use in identifying this sort of track damage because the number of side tracks at this point was not obvious from the ground; I walked this section of track several times during the study without ever being aware of anything other than the two most major tracks.

Apart from the Condominium Creek to Hut track only the following were visible in the later aerial photos: Sections of the Red Tape Creek to Lake Judd track, the initial section of the track from the Anne River crossing (529390) towards Mount Sarah Jane, the track along the ridgetop to Lots Wife and the track along the moraine top between Judds Charm and Lake Picone. No useful information could be gleaned on the condition of any of these tracks. It is worth noting that the tracks which are visible in aerial photos are not necessarily the worst damaged; eg much of the Mount Anne Circuit route across the plateau from Judds Charm to Mount Sarah Jane, which is not visible, is in much worse condition than the section between Judds Charm and Lake Picone, which is visible.

3.2.3 Terrestrial Photography

The most graphic examples of how the tracks have deteriorated over the years come from comparing old and new photos of the same section of track. During the course of this study I took several photographs which replicated, as closely as possible, ones taken during my first visit to the area in 1977. These showed very clearly the deterioration in track conditions over this period. If it was considered worthwhile to make a detailed study of track conditions over the years then it would be worth making an appeal for old photos, which include sections of track, to a group such as the Hobart Walking Club.

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It is recommended that reproducible photos of specific sections of track should be taken as part of routine track monitoring in the future since they provide a very comprehensible and comprehensive guide to changing conditions. Note that it is often difficult to exactly replicate an existing photograph. When the photograph is being taken specifically for track monitoring purposes the task must be approached systematically; in particular the camera location should be permanently marked or very carefully noted. A slide of each of the permanent monitoring stations established as part of this project is included with this report.

3.2.4 Permanent Monitoring Locations

Part of the project was to establish permanent monitoring locations which would provide a base for measuring the rate of track deterioration in the future. It is more likely that useful data will be obtained from these in the future if they are not too much trouble to access for future measurements, so monitoring in the more remote areas was not considered. Two locations were selected for permanent monitoring. One location is on one of the worst sections of the Condominium Creek to the hut track, on the lowest part of the main ridge (501430) at an altitude of 800m. Multiple braiding of the track had occurred here so a full cross section included most stages of track development. Two monitoring sites were established, about 30m apart, to provide some insurance against the markers being disturbed.

The other location was on the Eliza Plateau, between 200 and 290m east of the Eliza summit trig. This was chosen because the Eliza Plateau is of considerable conservation significance and it is desirable that signs of overuse should be detected before the damage becomes too extensive. Three monitoring sites were established here, in very similar environments, on sections of track that were virtually undamaged, moderately damaged and trampled to mud.

Ongoing monitoring of these sites is recommended since this will permit quantification of the relationship between use and track deterioration. The permanent installation of a pedestrian counter on the lower part of the Condominium Creek to Hut track in 1988 means that user numbers are known with reasonable accuracy for the first time.

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Methodology

Each of these monitoring sites was marked with wooden pegs which were left in place. The sites were photographed and the track cross section was carefully measured. The initial measurement was made in May or July 1988 and all were remeasured in May 1989. All cross sections were drawn as if the two pegs were on exactly the same level. This is not exactly correct but the errors resulting from this assumption are far smaller than the errors of measurement. The cross-section profiles were measured by clamping a tape tightly between the wooden pegs (see slides) and measuring down from this baseline to the ground at 10cm intervals. A rigid baseline would have improved accuracy but been most inconvenient to carry to the monitoring sites. The stretched tape worked well in windless conditions; the undamaged parts of the cross-sections were generally reproduced to within a few millimetres in the subsequent measurement.

The cross-sections included undamaged vegetation on both sides of the obvious track. The sections marked as "track" on the cross-section profiles are the parts of the cross-section that looked as if they were regularly walked on (at the time of the first measurement).

The photos are included in the slide collection (see appendix) and the cross section profiles and discussion follow.

It was hoped that the measurements would confirm the "threshold" nature of trampling damage. This theory suggests that damage is minor (and reversible) until the "threshold" of destruction of the soil structure (in peat this usually coincides with destruction of surface vegetation) is reached; subsequent (essentially irreversible) erosion then occurs rapidly. This is obviously a broad generalisation which does not apply equally to all combinations of soil type/structure and topography. For example, on a flat site considerable churning of soil may occur without erosion following.

Condominium Creek to Hut Track Sites

All sites on peat (approximately 30cm) overlying thin layer of gravel and mineral soil above quartzite bedrock. Surrounding vegetation was predominantly buttongrass with *Melaleuca* and *Banksia*, all less than 1.5m high.

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Appendix 1 - Mount Anne: Physical Conditions

All photos taken and cross-sections drawn facing uphill.

Two complete cross sections were measured, mainly as an insurance against some of the marker pegs being removed.

The location is on one of the worst sections of the track, on the lowest part of the main ridge (501430) at an altitude of 800m. Multiple braiding of the track had occurred here so a cross section included most stages of track development. Each cross-section was around 10m total width so each was broken into 3 for ease of measurement.

At the point where the track reaches the top of the main ridge there is a short section of boardwalk. The first cross-section is located approximately 10m above the end of this boardwalk and the second a further 30m uphill.

Results

Some erosion is evident on all the tracks; typically this amounts to 1 or 2cm vertically.

Horizontal erosion has also occurred:

- * The two examples of a track eroded to bedrock occur in the top left and lower centre sections. In both cases the width of the bottom of this gully has increased.
- * In the upper right section several cm of peat have been lost from the left side of the track making the eroded section that much wider. Most of the missing material has slumped approximately 50cm downhill; it can be seen in slide 57A.

Filling of the track has occurred in several locations:

- * The main track on the top left section was eroded to bedrock. This has filled slightly with the accumulation of small quartzite fragments.
- * In the top centre section a substantial build up of material has occurred on the left of the track. This appears to be a slumping of peat from further uphill.
- * Slumping is also evident in the right of the lower right section.

Conclusions

- * Continuing erosion of some type is evident on all tracks. The data provides little evidence of the "threshold" nature of trampling damage since all tracks had passed the

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Appendix 1 - Mount Anne: Physical Conditions

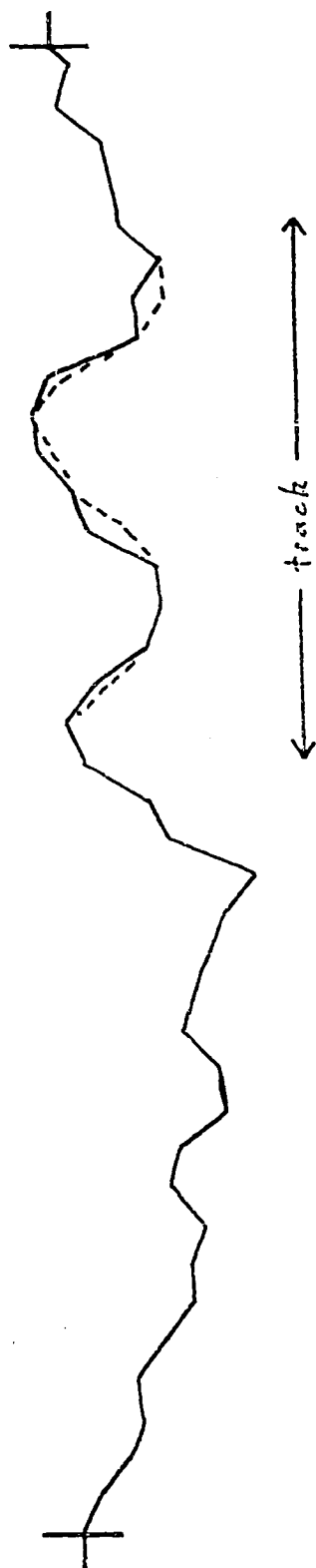
threshold of destruction of surface vegetation before the first measurements were made. Hence the measurements only show the rapid nature of post-threshold erosion.

* Slumping of peat caused by trampling would appear to be a major initial part of the erosion process. Once slumping has occurred the material must be far more vulnerable to subsequent erosion by flowing water. It is not always apparent from inspection that slumping is occurring, especially where relatively undamaged vegetation has slumped along with the peat. The implication is that substantial damage (in the form of slumping which is very vulnerable to subsequent erosion) may have occurred before any damage becomes obvious.

Cross-section profiles follow.

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Appendix 1 - Mount Anne: Physical Conditions

Track Cross-Section 1



Condominium Creek - Hut

Lower Left (Slide 58)

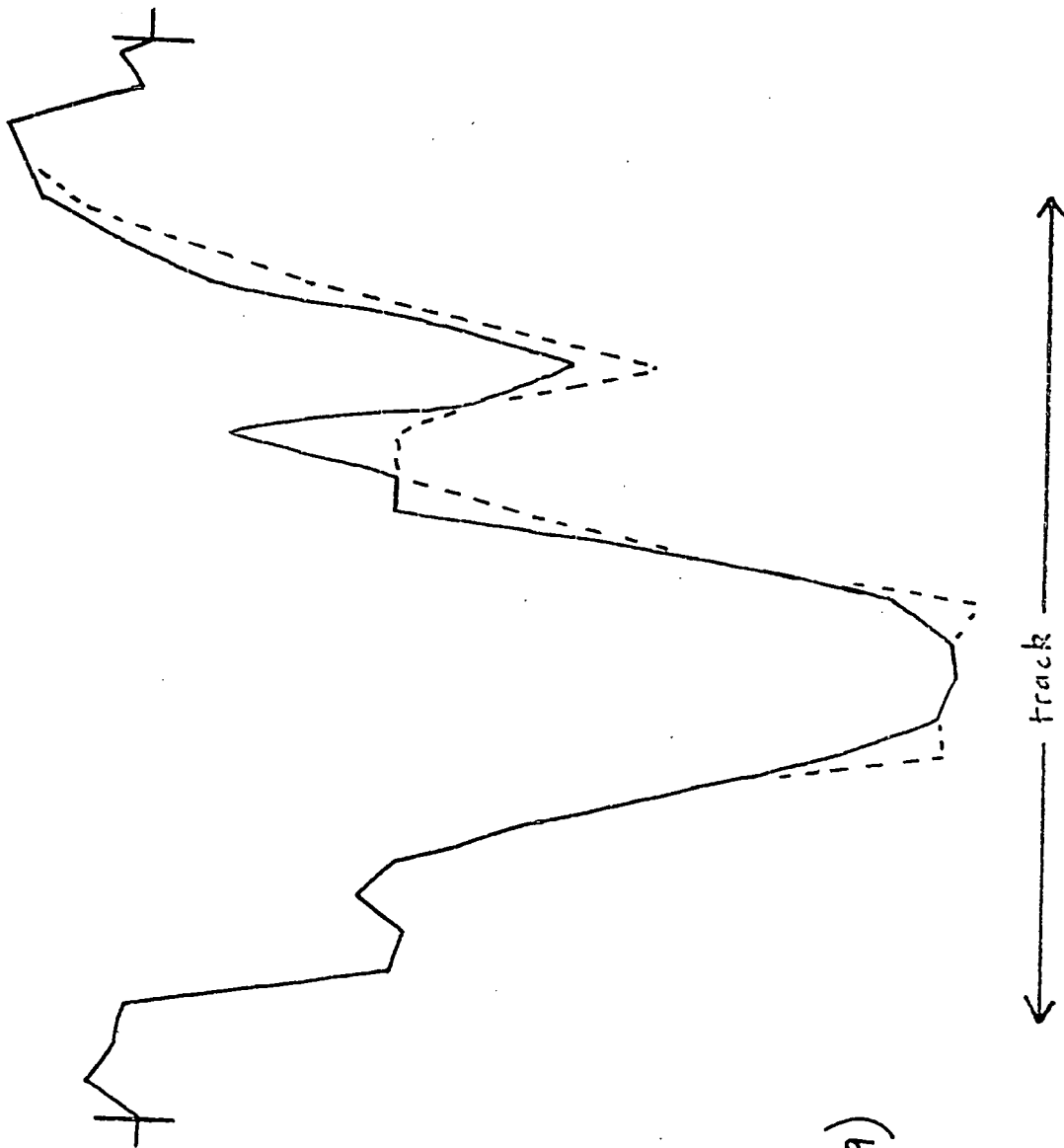
Scale: Horizontal 1:20
Vertical 1:5

— 26/5/88

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Appendix 1 - Mount Anne: Physical Conditions

Track Cross-Section 2



Condominium Creek - Hut
Lower Centre (Slide 59)

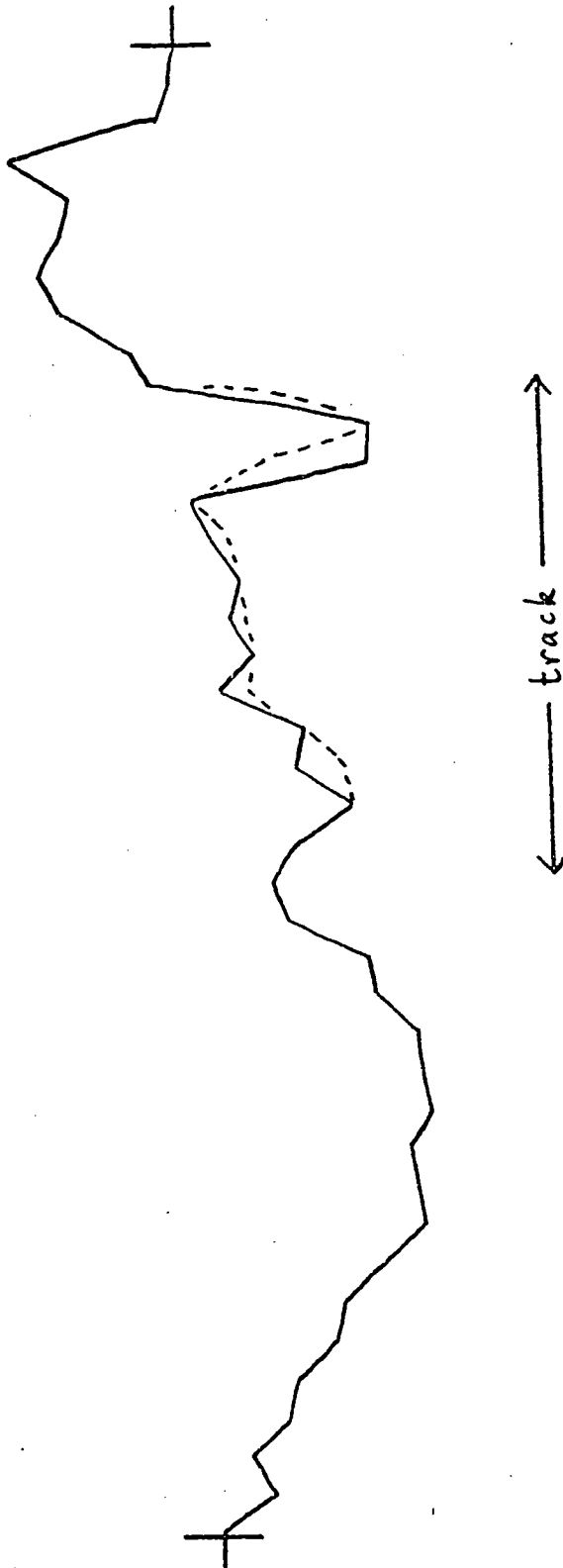
Scale: Horizontal 1:20
Vertical 1:5

— 26/5/88

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Appendix 1 - Mount Anne: Physical Conditions

Track Cross-Section 3

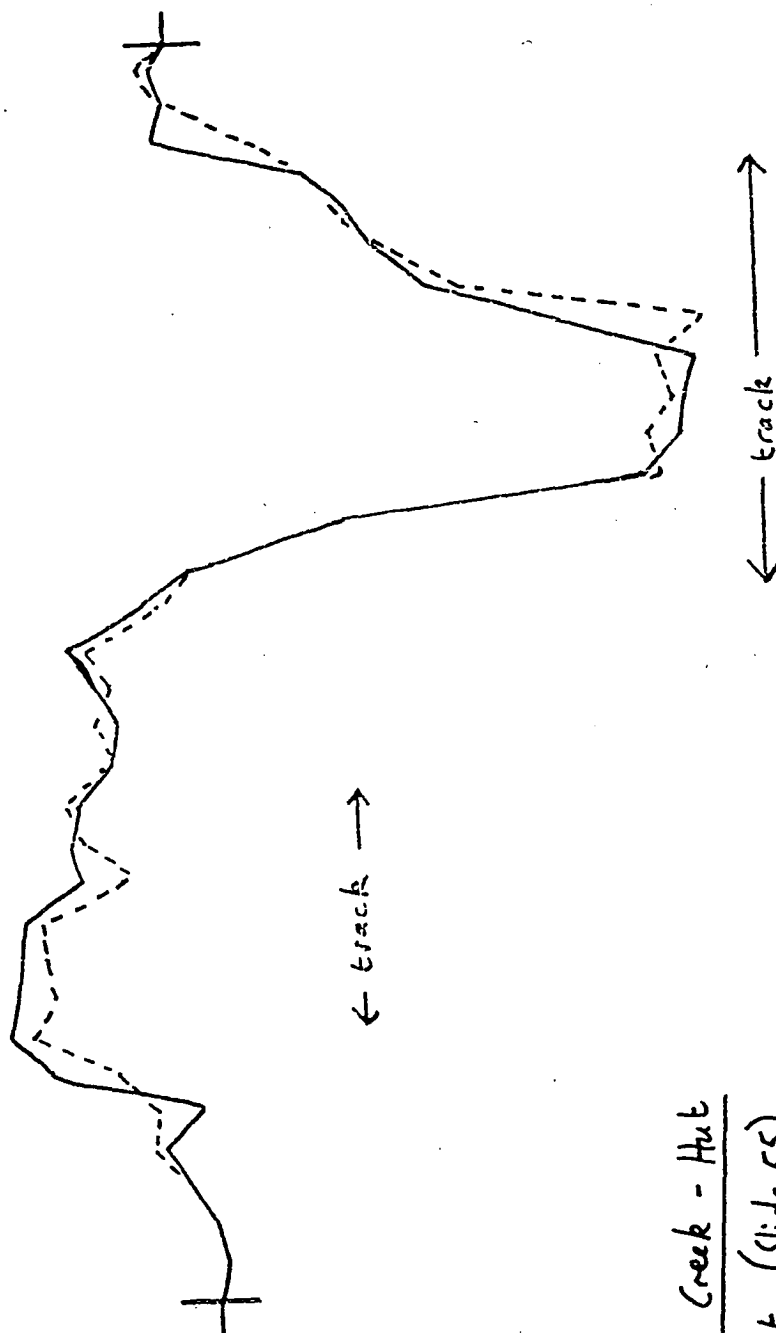


Condominium Creek-Hut
Lower Right (slide 60)
Scale: Horizontal 1:20
Vertical 1:5
— 26/5/88
--- 26/5/89

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Appendix 1 - Mount Anne: Physical Conditions

Track Cross-Section 4



Condominium Creek - Hut
Upper Left (Slide 55)

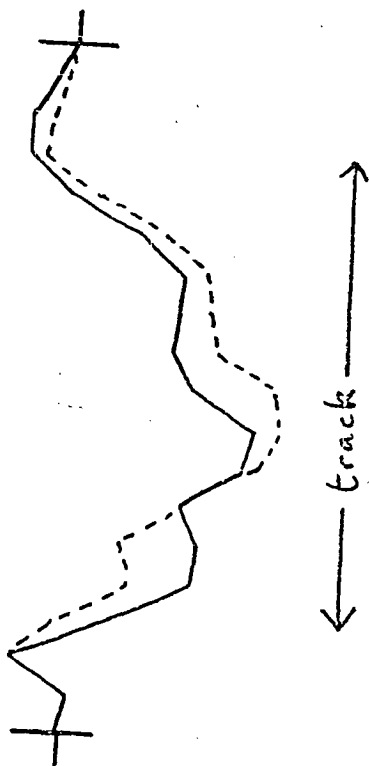
Scale: Horizontal 1:20
Vertical 1:5

— 2/7/88

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Appendix 1 - Mount Anne: Physical Conditions

Track Cross-Section 5



Condominium Creek - Hut
Upper Centre (Slide 56)

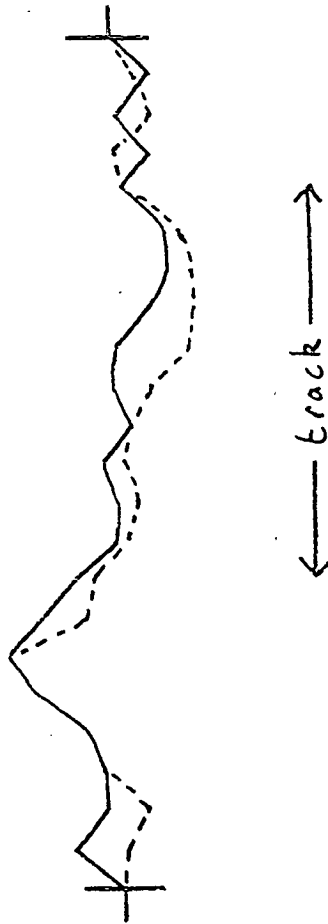
Scale: Horizontal 1:20
Vertical 1:5

— 2/7/88

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Appendix 1 - Mount Anne: Physical Conditions

Track Cross-Section 6



Condominium Creek - Hut
Upper Right (Slide 57)

Scale: Horizontal 1:20
Vertical 1:5

— 2/7/88

--- 26/5/89

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Appendix 1 - Mount Anne: Physical Conditions

Eliza Plateau Sites

All sites are on peat soil (depth 5-10cm) over dolerite bedrock. Measurements were not attempted on the quartzite section of the plateau (of particular interest because of its conservation significance) because the "track" is not well defined anywhere on this section. Vegetation is predominantly cushion plants with some *Astelia alpina* and bushes of *Scoparia* and *Diselma* less than 1m high.

All photos taken and cross-sections drawn facing towards Mount Anne summit.

Site 1: approximately 200m beyond Eliza Trig - track evident (vegetation destroyed) but not obviously eroded.

Site 2: approximately 270m beyond Eliza Trig - track severely trampled to mud.

Site 3: approximately 290m beyond Eliza Trig - track on virtually undamaged cushion plants.

Results

The most dramatic evidence of track deterioration comes from site 2 where an average of 4cm of soil has been lost over a width of approximately 1m. This area was badly churned up mud at the time of both sets of measurements. By comparison, no erosion had occurred at site 3, where the vegetation cover was unbroken, and minimal erosion at site 1, where the vegetation cover had gone from the track but churning of the soil had not occurred. This is evidence of the "threshold" nature of trampling damage; once the critical point of collapse of the soil structure is reached the subsequent stage of erosion occurs relatively rapidly.

None of the three show any evidence of an increase in track width.

The most interesting and unexpected result is the extensive compression of the soil under trampling pressure while the surface vegetation remains apparently undamaged.

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This is most apparent on the right of cross-section 3 but it is also evident on the right of cross-section 2 and the left of cross-section 1 so it is almost certainly a genuine effect and not a reflection of the accuracy of the measurements.

Conclusions

These results confirm the "threshold" nature of trampling damage (damage is minor until the "threshold" of destruction of the soil structure is reached; subsequent erosion then occurs rapidly). This emphasises the need for track repair work to occur before serious problems are evident.

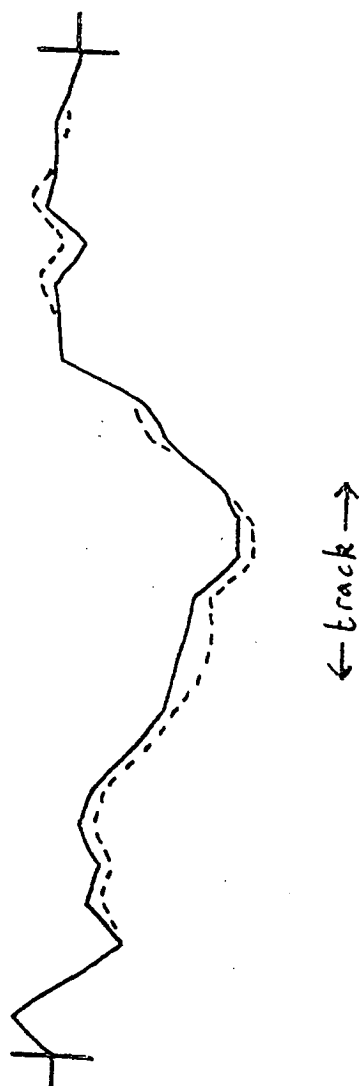
The implications of the soil compression under trampling pressure are considerable since it suggests that substantial changes to the soil structure are occurring well before evidence of trampling damage is apparent. This is likely to have adverse effects on the vegetation and probably means that erosion will be extremely rapid once the surface vegetation is destroyed.

Cross-section profiles follow.

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Track Cross-Section 7



PLATEAU 1 (slide 61)

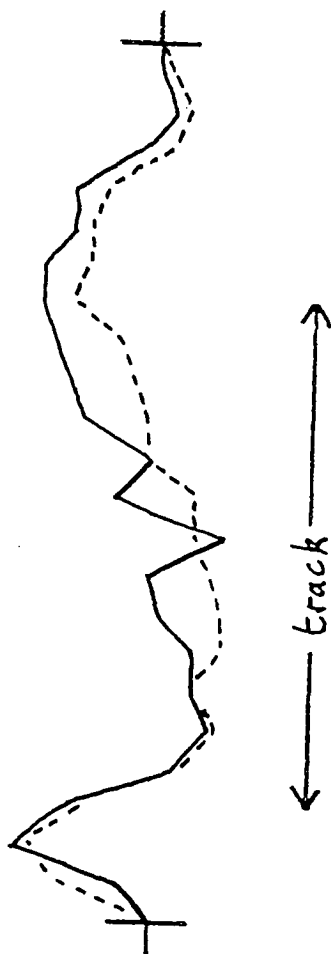
Scale: Horizontal 1:20
Vertical 1:5

— 3/7/88

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Track Cross-Section 8



PLATEAU 2 (Slide 62)

Scale: Horizontal 1:20
Vertical 1:5

— 3/7/88
--- 26/5/89

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Track Cross-Section 9



no track evident

PLATEAU 3 (Slide 63)

Scale: Horizontal 1:20
Vertical 1:5

— 3/7/88

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4 Management Considerations - Mount Anne Area

4.1 Ultimate Development of South-West Tasmania

The World Heritage nomination of September 1989 means that there is no longer any possibility of the natural area of the Anne Range becoming almost an "island" in a "sea" of altered landscapes, with access likely from the east as well as the west, as could have happened if the maximum possible forestry development had occurred under the previous World Heritage Area boundaries.

It remains to be seen whether forestry operations will occur right up to the new boundaries and whether any "wilderness restoration" will take place.

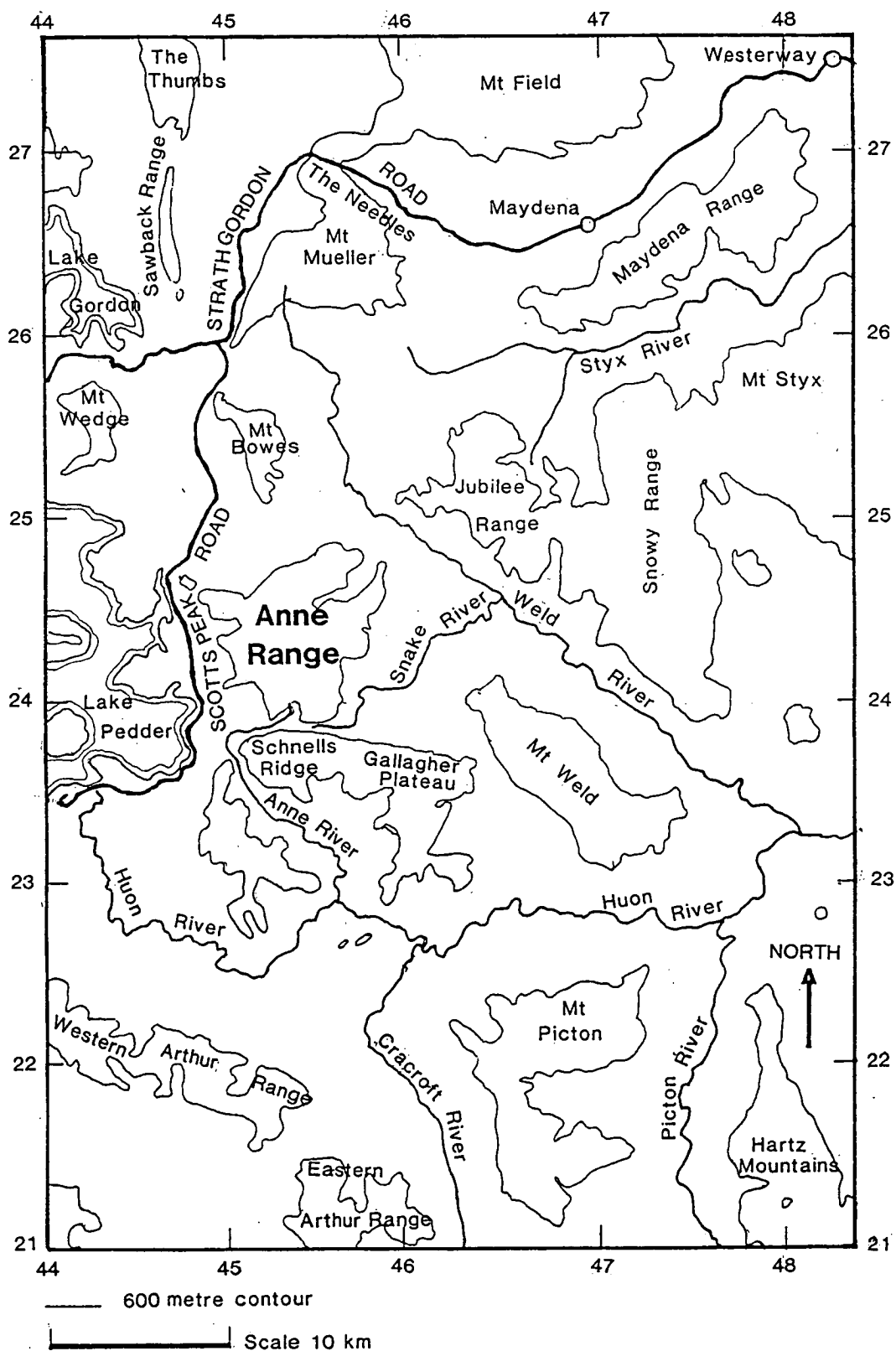
The hypothetical "maximum wilderness" scenario would involve no forestry to the west of Mount Weld and the Snowy Range, the restoration of Lake Pedder and the closure and revegetation of the Scotts Peak Road. This would solve all the Anne Range's overuse problems at once because it would become several days walk from the nearest road.

Forestry operations extending to the new World Heritage Area boundary would substantially affect the apparent naturalness of the views east from the Anne Range (this is discussed in more detail in "viewfields" below) but are unlikely to lead to access from the east since the closest part of the World Heritage Area boundary (in the Weld Valley) is still over 12km from the eastern edge of the Lot-Sarah Jane plateau.

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Appendix 1 - Mount Anne: Physical Conditions

Mount Anne Area - Major Topographic Features



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Appendix 1 - Mount Anne: Physical Conditions

4.2 Viewfields

Please refer to the map showing major topographic features.

The Lake Judd Track is a low level walk so the views are dominated by the surrounding hills. Once the Anne River valley is reached the Scotts Peak Road is out of sight and the track itself is the only intrusion into the naturalness of the area.

The most popular walk in the Mount Anne area is the climb from Condominium Creek to Mount Eliza summit. The view from this track is dominated by Lake Pedder and the prominent scar of the Scotts Peak Road. These are also prominent from Mount Anne summit and the high ground in the south of the area (summit Mount Sarah Jane and Schnells Ridge).

Most of the Eliza-Anne Plateau slopes gently to the east so the views to the west are only rarely seen. From Mount Lot and the Lonely Tarns the view is almost entirely natural since Lake Pedder and the Scotts Peak road to the west are obscured by the Eliza-Anne Plateau. This results in a much greater sense of remoteness than is experienced on other parts of the Range.

The view to the east from anywhere on the Anne Range is dominated by Mount Weld and the Snowy Range on the skyline with the Jubilee Range, the Upper Weld and its tributary the Snake River in the foreground. Any forestry operations to the west of Mount Weld and the Snowy Range will detract greatly from the apparent remoteness of the Mount Lot/Lonely Tarns region.

The only intrusions into the views to the east (as of early 1988) are two clearfelled coupes visible through the gap between the Snowy Range and Mount Weld, about 15km away in the middle Weld Valley and a single coupe visible to the north of the Snowy Range in the Styx Valley (over 20km away). The Weld Valley coupes were clearly visible under most conditions but an unusually clear day was needed to see the Styx Valley disturbance. The only other visible sign of forestry operations was to the north, on the ridge to the east of Mount Mueller. This was most visible from the North-East Ridge (about 16km away) but extremely clear conditions were needed to notice it at all.

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Appendix 1 - Mount Anne: Physical Conditions

4.3 Competing Recreational Opportunities

The recreational opportunities considered are those involving some degree of walking; car based touring has no direct implications for management of the Mount Anne area. Over 50% of respondents to the Mount Anne Area User Survey were Tasmanian residents, and probably the majority of these were from the Hobart region. One could, therefore, consider all wilderness bushwalking venues within three hours drive of Hobart as competing recreational opportunities. This would include the Lake St Clair area and Frenchmans Cap as well as the south eastern parts of the Southwest (eg Hartz Mountains, Adamsons Peak, Mount La Perouse, the eastern end of the South Coast Track, Mount Picton and Mount Bobs). It is more relevant to consider only those venues accessible from the Strathgordon or Scotts Peak Roads. The Mount Anne area contains walks ranging from the very short to three days duration (the normal time taken to complete the Mount Anne Circuit) so walks that are substantially longer than this are not considered in detail.

Popular walks of less than four days duration and accessible from the Strathgordon or Scotts Peak Roads are described below. These walks are summarised in section 4.6 using a classification which is virtually equivalent to Recreation Opportunity Spectrum categories.

* Mount Field National Park - Range of walks from the very short, high standard track to Russell Falls to long rugged daywalks such as the summit of Mount Field West. There is no destination in the park that cannot be visited as a daytrip but it is both practical and enjoyable to combine several destinations into one trip which involves spending one or more nights out. Of particular relevance is the existence of several relatively high standard tracks in alpine areas which are well provided with walkers' huts. (The only other high altitude hut in the Southwest is the High Camp Memorial Hut on Mount Anne). The Mount Field National Park is often forgotten when the range of walking opportunities in the Southwest is being considered but it offers a good range of walks at the easier end of the bushwalking Recreation Opportunity Spectrum and it deserves more promotion as part of south-west Tasmania (eg "The Gateway to the Southwest").

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Appendix 1 - Mount Anne: Physical Conditions

* Destinations accessed via the ANM gate at Maydena - eg Mount Mueller, Wylds Craig and Snowy North. Most of these are infrequently visited one or two day walks. Tracks exist but are generally poorly marked and hard to find. The major longer walks undertaken from here are trips to Lake Rhona, the Denison Range and beyond using the "shortcut" approach of wading across the Gordon River rather than the traditional approach from the Strathgordon Road to the south. The inconvenience of obtaining permission to enter the ANM concession probably deters more use of walks such as these.

* The Needles - This range is a pleasant daywalk from the Humbolt Divide. It is not well known that a track exists. The apparent absence of a track would deter many potential users despite the fact that the ascent of the range is not steep and it offers easy cross-country walking.

* Adamsfield/Gordon Plains/Thumbs - This track serves mainly as access to the Vale of Rasselas, Lake Rhona and the Denison Range. These trips are too long for inclusion here but shorter trips could include Adamsfield or Gordon Bend (on well marked tracks), or the Thumbs, which includes some straightforward off-track walking and would require an overnight stay.

* Mount Wedge - It does not seem to be widely known that there is a well defined track to the summit, which can be reached in little more than one hour from the road. The starting point of the track is not at all obvious.

* Sentinel Range - This top of this range is a strenuous daywalk from the Strathgordon Road. As far as I am aware no track exists.

* Mount Sprent - This summit is a strenuous daywalk from the Serpentine Dam Site. A well defined track exists which is also the starting point for the traverse of the Wilmot and Frankland ranges.

* Hamilton Range - This route, which starts from the Strathgordon Dam Site, gives access to the Denison Gorge and the Truchanas Huon Pine Reserve, which can be reached in a two or three day walk. The initial climb up the Hamilton Range is on a well defined track but the start of it can be hard to locate. Once the open top of the Hamilton

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Appendix 1 - Mount Anne: Physical Conditions

Range is reached there is little trace of a track and the correct ridge to descend to the damsite could be very hard to locate in poor visibility.

* Mount Bowes/Old Port Davey Track - The Old Port Davey Track can be joined at Frodshams Pass. This gives access to Mount Bowes. Keyhole Cavern on the upper Weld can be visited by following Cotcase Creek down to the Weld.

* Scotts Peak - This is primarily the starting point for three of the major walks of the Southwest; The Port Davey Track, the Western Arthurs and the Eastern Arthurs (although these are frequently approached from Farmhouse Creek to the east). The only relatively short walk from here would be to spend one or two nights at the western end of the Western Arthurs before returning to Scotts Peak. This is a well defined route and this trip is popular among local walkers.

4.4 Recreation Opportunity Spectrum

The following discusses the application of the major points of Recreation Opportunity Spectrum to the Mount Anne area.

*** Demand Analysis**

The major input to this planning process which is lacking for the Mount Anne area (or south-west Tasmania in general for that matter) is data on the demand for various recreation opportunities. Existing usage patterns can give some indication but are not the whole answer because a full range of recreation opportunities is not provided at present. The obvious gaps in the Spectrum of Recreation Opportunities are towards the short/easy end as discussed below. If the provision of additional opportunities of this type was being considered it would be advisable to conduct some sort of "market research" survey among existing and potential users of the entire region to ensure that there was a demand for such opportunities.

*** Supply Analysis - Existing Opportunities**

A general observation is that south-west Tasmania is well provided with walking opportunities towards the long/rough/difficult end of the spectrum but very lacking in

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Appendix 1 - Mount Anne: Physical Conditions

walks from the middle of the range to the short/easy/good track end of the spectrum. This is confirmed by the discussion of the existing walking opportunities in 4.3 and classification in 4.6. The track classifications used in 4.6 are virtually equivalent to Recreation Opportunity Spectrum categories.

*** Supply Analysis - Potential Opportunities**

If some demand is assumed for those opportunities which have been shown to be lacking then the following are some options for meeting that demand:

* Creation of a Needles Picnic Area Nature Trail (as proposed in the draft management plan): See 4.5 for a discussion of why it is desirable to provide a short, high-standard walk such as this on the Strathgordon Road.

* High Standard Nature Walk at Red Tape Creek. The start of the Lake Judd Track swings south across the buttongrass before proceeding north-east. There is considerable potential for a loop walk which proceeds from the existing car park through the rainforest, crosses the creek and joins the existing track to return across the buttongrass (this was originally suggested to me by Ranger Gary Witzerman). A nature walk at Condominium Creek would not have the same potential for traversing different vegetation types.

* Upgrading of the Lake Judd Track. This has a high potential for upgrading because it is a relatively short track (only 7km from Scotts Peak Road to Lake Judd) and has no steep climbing. It also has unusually high wilderness qualities since the Scotts Peak Road is out of sight and earshot as soon as the Anne River Valley is reached. If such upgrading was contemplated it would be necessary to anticipate the likely impact on the Lake Judd Campsite, as discussed in 2.2.7.

* Upgrading of the Schnells Ridge Track: Some marking along its full length and a limited amount of track cutting where it rejoins the Lake Judd Track at its eastern end would substantially reduce the difficulty of this track although some steep sections would inevitably remain. It would then offer an alternative long, but not particularly difficult, daywalk. It is unlikely that it would receive a great deal of use since it is close to the Condominium Creek to Eliza Plateau walk which is of similar level of difficulty

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(more climbing but less horizontal distance) and leads to a more obviously spectacular and interesting destination.

* **Creation of an official track up the Needles:** The Needles lie alongside the Strathgordon Road at its highest point. The ascent of the range is neither particularly steep, long nor difficult. The Needles therefore offer considerable potential for the creation of a good standard day or half-day walking track and are readily accessible, lying less than 20km beyond Maydena.

* **Upgrading of the Mount Wedge Track:** Some signing at its start and advertising of its existence would be the main tasks required to promote this as high-standard half-day walk leading to a summit which offers excellent views. The track is nowhere difficult or particularly steep and it starts right alongside the Strathgordon Road.

* **Upgrading of the Old Port Davey Track (section south of Frodshams Pass):** This old track would only require some clearing of overgrowth and, possibly, marking to reopen it. It is doubtful if it would receive much use since it lies parallel to the Scotts Peak Road and no longer leads anywhere. A more realistic proposal would be to reopen either the northern or southern half (whichever was more suitable) as good standard daywalk to Mount Bowes.

* **The Scotts Peak Area:** The half-day walk to Junction Creek and the Arthur Plains is undertaken for access to the major walks which lie beyond; it is a particularly unattractive walk in its own right. There are no obvious walks of one day or less which could be developed from Scotts Peak.

4.5 Recommended Provision of Recreation Opportunities

According to the Tasmanian Visitor Survey 1986 there were 32334 interstate and overseas day-trip visitors to "Strathgordon/Lake Pedder". Personal observation suggests that the majority of these were vehicle-based tourists who drove to the Strathgordon damsite and returned without going down the Scotts Peak Road. For this reason the provision of a short nature walk on the Strathgordon Road should receive higher priority than any similar facility on the Scotts Peak Road which is likely to receive substantially less use. Even if the Scotts Peak Road were sealed, as has been proposed,

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the "natural destination" for casual tourists would remain the Strathgordon damsite. This pattern of visitation could be reversed if any major tourist destination were created at Scotts Peak. This could then justify the provision of additional facilities on the Scotts Peak Road. The same argument applies, to a lesser degree, to the provision of high standard walks of up to 3 or 4 hours duration; see suggestions above for the Needles and Mount Wedge. I would, therefore, recommend the development of a high standard nature walk on the Strathgordon Road and at least one of the high standard half day walks discussed above.

Note that the Recreation Opportunity Spectrum has been interpreted here in terms of the provision of a range of walking opportunities. It is considered that this is the appropriate range to be provided in an area such as this. Recreational opportunities further towards the "developed" end of the spectrum are inappropriate in an area preserved for its natural values.

4.6 Summary of Track Classifications

These six classifications are based on those used in the Western Tasmania World Heritage Area National Parks Draft Management Plan (May 1987). The eleven categories in this document have been reduced to six by combining the finer distinctions eg Walks 1, 2, 3A and 3B have been combined into WLK. The more recent Southwest and Franklin-Lower Gordon Wild Rivers National Parks Draft Management Plan (1988) goes even further with only three categories; walk, track and route.

<u>Mount Anne Area</u>	<u>WLK</u>	<u>TR1</u>	<u>TR2</u>	<u>TR3</u>	<u>RT1</u>	<u>RT2</u>
Condominium Creek to Eliza Trig ..			P		X	
Mount Anne Circuit					X	
Lake Judd Track			P	X		
North-East Ridge					X	
Eliza Trig to Mount Anne					X	
Schnells Ridge			P			X
Red Tape Creek Nature Walk	P					

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<u>Other</u>	<u>WLK</u>	<u>TR1</u>	<u>TR2</u>	<u>TR3</u>	<u>RT1</u>	<u>RT2</u>
Scotts Peak Road						
Rainforest Walk	X					
Needles Picnic Area Nature Trail .	P					
Mount Field National Park	X	X	X			
Via ANM gate at Maydena				X	X	
Needles		P				X
Adamsfield/Gordon Plains/Thumbs ..				X	X	X
Mount Wedge		P	X			
Sentinel Range						X
Mount Sprent					X	
Hamilton Range					X	X
Mount Bowes/Old Port Davey Track .			P	X	X	
Scotts Peak				X	X	

Key: X = existing classification
P = proposed classification

Where tracks are listed in the Western Tasmania World Heritage Area National Parks Draft Management Plan (May 1987) the classification is as used in that document. For other tracks the classification is based on the author's own judgment.

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Appendix 2 - Mount Anne Area User Survey

This appendix reproduces a report to the Department of Lands, Parks and Wildlife on a study of users of the Mount Anne area conducted by the author from 18/12/87 to 25/4/88.

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Appendix 2 - Mount Anne Area User Survey

Summary: Conduct of Survey

The aim of this project was to gather as much information as possible about users of the Mt Anne area in the summer of 1987-88.

The main data gathering exercise was the running of a survey (the Mt Anne Area User Survey) from 18/12/87 to 25/04/88. 231 usefully completed forms were obtained, a response rate of 21%, based on the best estimate of user numbers.

Walker Registration Logbooks were examined and as much information as possible extracted from these.

Three pedestrian counters were installed but these did not contribute much useful information. They were not available until near the end of the project and proved to be most unreliable.

The following total numbers of walkers were estimated (all figures for the year ending 25/04/88):

Walkers from Condominium Creek: 1100

Walkers from Red Tape Creek: 250

Walkers - North-East Ridge: 150

Total walkers in Mt Anne Area: 1500.

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Appendix 2 - Mount Anne Area User Survey

Summary: Results of Survey:

- 1) 74% of respondents were overnight walkers. The mean trip duration was 2.9 days for overnight walkers.
- 2) Almost half the respondents were aged over 30.
- 3) 55% of respondents were Tasmanian residents. This is approximately twice the proportion of Tasmanians found on the Overland Track and reflects the different nature of the walks in the Mount Anne Area.
- 4) Peak user numbers occurred around public holidays.
- 5) Bushwalking in the Mount Anne Area is a strongly seasonal activity: 77% of logbook registrations occurred in the 36% of the year from mid-December to the end of April.
- 6) Average group size was 2.6 persons. The most common group size was 2 persons.
- 7) Routes: the proportion of respondents using the main routes was as follows:
Eliza Plateau: 32%
Mt Anne Summit: 38%
Mt Anne Circuit: 29%
- 8) The most common information sources were guide books (57%) and friends (47%). Maps rated a surprisingly low 28%.
- 9) Most respondents appreciated the naturalness of the area and were well satisfied with their visit.
- 10) More respondents were concerned by degraded track (82%) than track work (36%).
- 11) Track erosion and trampling damage concerned 75% of respondents but only 30% were concerned by firewood gathering.

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Appendix 2 - Mount Anne Area User Survey

12) Crowding is not yet a problem: only 15% of respondents were concerned about crowding at the hut and campsites.

13) Free permits as a means of regulating use were supported by 42% of respondents (with 20% unsure) but there was clear opposition to any method of numbers' regulation requiring payment.

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Appendix 2 - Mount Anne Area User Survey

1 Methodology

Prior to the commencement of this study, the only information available on usage of the Mt Anne area was from the voluntary registration logbooks located at Condominium Creek, High Camp Memorial Hut and Mt Anne summit. These suffer from the usual problem of logbooks in that they are completed by an unknown proportion of users (certainly less than 100%). There is not even a logbook on the well used Lake Judd Track let alone the lesser used route to the North-East Ridge. Hence the only available information was a minimum estimate of user numbers on the main Eliza Plateau Track and some indication of usage patterns.

In order to gather more information on numbers and patterns of usage a survey of users was conducted during the summer of 1987-88. This relied on the voluntary completion of questionnaires. It gave some indication of the numbers using particular areas, details of their trips and their perceptions of the area.

It was hoped that accurate numbers would be obtained from three pedestrian counters which were installed at different locations but various delays and problems meant that little useful data was obtained from them.

As much information as possible was obtained from the logbooks and an attempt made to correlate this with the information from the counters to obtain a "calibration factor" for the logbooks.

It would have been interesting to have gathered some information on long term trends in visitor numbers. The only reliable information for the Mt Anne area is the logbook at Condominium Creek, which dates back to the early 1970s. There is little doubt that bushwalking has been steadily growing in popularity in recent years. The increasing number and size of outdoor equipment shops is an indication of this. It was considered that the investigation of long term trends in visitor numbers was beyond the scope of this project.

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2 Pedestrian Counters

The use of the pedestrian counters was something of a fiasco. Hardly any useful data was obtained from their use.

They were originally ordered from a mainland supplier at the beginning of December 1987 with delivery promised in about two weeks. When they had still not arrived at the end of January 1988 (despite frequent enquiries to the supplier) the original order was cancelled and a local electronics firm commissioned to construct a suitable counter. Their prototype was available late in February and indoor testing suggested that it worked well so two more were ordered and quickly supplied. The counters comprised a proprietary pressure sensitive mat (500mm by 750mm) connected by about 500mm of cable to a box containing batteries (which last for 6 to 8 weeks of normal use) and the electronics of the counter. The pressure mat was placed on the track with a piece of hessian over the top of it and the box concealed nearby. The pressure mats were not designed for this type of use and tended to produce a "messy" electronic signal with contact being made and broken repeatedly as the walker's foot descended onto them. To avoid multiple readings from this cause the electronics incorporated a half second delay (ie once one footfall had been recorded another count could not be made for half a second). The counter would not record for a second time until the first foot had been removed so a walker stopping on the mat would not cause miscounting. The counters were finally available for use in mid-March and one was installed on each of the Condominium Creek and Red Tape Creek tracks on 21st March. The counter on the Condominium Creek track was installed on boardwalk about 200m from the start of the track. The counter on the Red Tape Creek track was installed on corduroy about 200m from the start of the track. The third counter was temporarily installed on the track about 100m above the hut on the top of a 400mm high step in the track.

2.1 Pedestrian Counters - Problems

2.1.1 Lack of Testing

When the counters finally became available in mid-March they were installed in the field as soon as possible in an attempt to get at least some useful data from the 1987-88 summer bushwalking season. Following the successful testing of the prototype counter and with assurances from the manufacturer that the other two had been tested, they were

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installed with minimal further testing (4 steps on each when they were first installed). This was a most unfortunate oversight because the counter at Red Tape Creek was eventually discovered to be overcounting significantly. No meaningful data was collected from this site. It was obvious from the start that this counter was returning surprisingly high readings but initially it was suspected that wombats using the track were responsible. A check on 27th April showed that walking over the mat 11 times produced 14 registrations on the counter. It is vital to check each counter in conjunction with its pressure mat before installation.

2.1.2 Delay Time

The delay time of half a second is excessively long. A brisk walking pace is 2 metres per second (ie in 0.5 second a walker can cover 1 metre). Since the mat is almost 1 metre long this means that two people walking briskly within 2 metres of each other will register as one. This is not a particularly unusual situation and was observed to occur at Condominium Creek when a party of 3 walking close together produced only 2 registrations. The delay time should be reduced to the minimum possible which will avoid multiple counting due to the limitations of the pressure mats.

2.1.3 Limitations of Pressure Mat Type Counters

The major limitation of the pressure mat counter is the restrictions on possible sitings of the counters. They need a flat (or nearly flat) location for the mat and, preferably, an artificial surface such as boardwalk or corduroy. Alternatively they can be buried in the ground on a narrow section of track. If the counter is not in such a location it is far more likely to be walked around and far more likely to attract curiosity which will probably lead to multiple readings. It is also essential that the site is not frequented by wombats or wallabies because these are sufficiently close to the weight of a human that the pressure mat could not be expected to distinguish them.

The Condominium Creek counter was sited on the flat section of boardwalk before the steep climb up the ridge commenced. It would have been better sited a short distance up the ridge had a suitable site been available. This would have avoided the counting of a number of persons who obviously had no intention of walking any distance.

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The counter on the Red Tape Creek track was installed on corduroy about 200m from the start of the track. The number of droppings suggested that the track was frequently used by wombats. This would have been a probable source of overcounting even if the counter had not malfunctioned.

The third counter was placed above the hut in the hope of obtaining some data on the proportion of walkers who actually progressed above the hut but the best site that could be found would certainly have been bypassed by some walkers while others could easily have produced multiple readings as they hauled themselves, or other members of their party, up the steep step on which it was situated.

2.1.4 Reading of Counter

A trivial problem with the counters as used was that the LED readout could not be read in daylight. It was necessary to cover both one's head and the counter with a raincoat or similar in order to read the counter. Since the counter was attached to the pressure mat by a short cable it was necessary to kneel on the ground while doing this. This could have been rather unpleasant in wet conditions.

2.2 Pedestrian Counters - General Considerations

To obtain useful data from a counter it must be located on a well defined section of track where it cannot be bypassed.

If possible, the counters need to be installed reasonably close to the start of the track to permit easy access for reading and maintenance (battery replacement), but not so close as to record casual visitors who just stroll along the track for a few minutes. They need to be in places where walkers are unlikely to stop or walk on them twice. They must be inconspicuous so as not to attract attention which is likely to lead to multiple counting (either accidentally, while investigating the mysterious object on the track or deliberately, after it is recognised for what it is). They must count only walkers, not birds or animals.

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2.2.1 Type of Counter

In view of the problems discussed above, it would seem that consideration should be given to using counters which operate by breaking a light beam rather than pressure mats. Counters of this type have apparently been installed near Lake St Clair on the initiative of the local Rangers (personal communication, Cathie Plowman). With careful development counters of this type could overcome some of the problems associated with the pressure mat type counters. If the light beam was located around 1 to 1.2m above the ground there would be no problem of it counting animals while it would count all but the smallest children. A requirement in the electronics that only signals of greater than a certain duration be counted should eliminate the possibility of birds or insects flying through the beam being counted and attention to the detail design of the units should make them unattractive for birds or insects to remain where they would block the beam. The light source and receptor would be small and inconspicuous and could easily be concealed in trees.

The pressure mat counters would still have their use however. In open ground with only low vegetation the posts needed for a light beam counter would be most conspicuous and sure to attract unwanted attention so a pressure mat counter would be more appropriate. If a serious, long term effort was being made to determine walker numbers it would be well worth constructing short sections of artificial track at appropriate sites to serve as counter locations. (This apparently was done near the start of the track South from Scotts Peak to Junction Creek, although the counter has not been maintained in recent years).

2.2.2 Dataloggers

If obtaining information on walker numbers and behaviour was sufficiently high priority then consideration could be given to a more "high-tech" approach. By using more sophisticated counters it would probably be feasible to record the direction in which the person was travelling (by the use of two adjacent light beams or pressure mats) and it would be straightforward to record date and time of each count. This data would be very useful because it could be analysed to give information on group size and usage patterns. It would also give far more confidence in the data obtained.

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Example 1: Correlation with intentions book entries would be straightforward (group size, time and date are known).

Example 2: If an unusual count occurred with a simple counter there is inevitably doubt as to whether this is genuine. If the time of each count was recorded it would probably be obvious whether the unusual count was due to a large number of small groups, one very large group or an error (eg if most of the counts occurred overnight then animals are probably responsible).

This level of sophistication would involve using a battery powered datalogger attached to the counter. The data would be stored in the datalogger's memory until downloaded into a portable computer carried to it (or the datalogger removed and taken to a computer). Such technology is widely used in industry and is available "off the shelf" in housings designed for outdoor use.

2.3 Pedestrian Counters - Future Use

2.3.1 General

If counting walker numbers is to be given high priority in the future then consideration should be given to using the most appropriate type of counter for the particular conditions (light beam or pressure mat). More sophisticated counters utilising dataloggers would be desirable but the additional expense may not be justified.

Detailed information on numbers using particular routes would still require counters to be located remote from the road where access for reading and maintenance would be very time consuming. Both ends of the Mt Anne Circuit walk are heavily used by walkers doing shorter trips so the only way to reliably count numbers doing the full circuit is to locate a counter in the most remote part of the circuit where it will only be encountered by those doing the full circuit.

So long as accurate counters can be developed and the manpower to read them is available then they offer far more accurate basic information than intentions books or questionnaires because they relate to what 100% of walkers actually did, not what an unknown proportion planned to do (some respondents to the user questionnaire

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certainly filled it out before or during a trip, rather than afterwards as instructed). This is a particularly important consideration in the case of the Mt Anne Circuit walk which probably has an exceptionally high "drop-out" rate.

While it is undoubtedly useful to have as much information as possible on walker numbers and routes it is important not to give too much emphasis to the collection of this sort of data while losing sight of the original objective which is the management of the area to maintain conservation and recreational values. It is not necessarily important to know exactly how many walkers used which track in what period in order to manage the area effectively. This is a basis of the Limits of Acceptable Change planning methodology.

2.3.2 Mt Anne Area

It is recommended that if work is to be done on the Condominium Creek to High Camp Memorial Hut track it should include a permanent counter site in an appropriate location a short distance up the ridge. The Red Tape Creek and North-East Ridge tracks are probably best served by light beam counters on wooded sections of the track. It has to be accepted that some tracks are just not suitable for the use of automatic counters; it would be very useful to know the number of walkers who actually reach the Eliza Plateau and Mt Anne summit but there is no appropriate site for a light beam counter anywhere on the plateau and no artificial track on which to install a pressure mat. For the most part the track is so poorly defined that a pressure mat buried in the ground (if anywhere with deep enough soil could be found) would be walked around by many walkers. Probably, the best that could be achieved would be a light beam counter somewhere between the hut and Eliza summit. The North-East Ridge track presents a different problem. The start of the track is not well defined where it crosses an open buttongrass plain and the first point where all routes converge is approximately 30 mins walk from the road. This is far enough to be a nuisance for reading and maintenance but cannot be avoided.

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2.4 Pedestrian Counters - Results

<u>Date</u>	<u>Condominium Creek</u>	<u>Red Tape Creek</u>	<u>Above Hut</u>
21/3/88	0 (11am)	0 (2pm)	
31/3/88	53 (11:45am)	41 (11am)	0 (3:30pm)
"	61 (5:25pm)		
2/4/88	89 (10am)		35 (1pm)
4/4/88	223 (4:25pm)	72 (3:20pm)	
15/4/88	276 (1:35pm)	163 (1pm)	
24/4/88	340 (12:30pm)	212 (2pm)	
"	365 (7:30pm)	226 (8pm)	
25/4/88		244 (5pm)	
26/4/88	370 (8pm)	244 (9am)	287 (3:30pm)

The counters at Condominium Creek and Red Tape Creek were installed on 21/3/88 and the one above the hut was installed on 31/3/88. All were read for the last time on 26/4/88 when the counter above the hut was removed. The other two were left in place for future use by Lands, Parks and Wildlife.

* Red Tape Creek. The results from the Red Tape Creek counter must be regarded as most unreliable. Treading on the counter 11 times on 27/4/88 produced 14 counts. It also produced 14 counts between 2pm and 8pm on 24/4/88. The author was not actually present at Red Tape Creek for the whole of this period but it is probable that no walkers used the track in this period. This high count was probably caused by animals using the track as well as problems with the counter. Another factor suggesting massive overcounting is the ratio between counts at Condominium Creek and counts at Red Tape Creek. The questionnaire results imply a ratio of approximately 3:1 (assuming Mt Anne Circuit walkers triggered each counter once). The actual ratio of counts is 370:244 (approximately 1.5:1). The conclusion has to be that the Red Tape Creek counter was overcounting to such a degree as to be quite useless.

* Condominium Creek. Several spot checks were made on this counter and, on each occasion, it appeared to be functioning correctly so there is no reason to doubt this

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aspect of its performance. Some overcounting almost certainly occurred at Condominium Creek due to the location of the counter on the flat section of boardwalk at the start of the track. It was reported to me that children had been riding bicycles along this section at Easter and I personally observed one group of car-bourne tourists walk as far as the base of the climb, thereby registering on the counter. Some undercounting was also observed (people walking close together) but overall the results from this counter were assumed to be accurate.

* Counter Above the Hut. This counter was not well sited but was in the best location that could be found without substantial work. The ratio of counts above the hut to counts at Condominium Creek was 287:316 implying that 91% of those triggering the Condominium Creek counter reached above the hut. This seems unlikely. More probable explanations are that either the hut counter was overcounting (its accuracy was never checked and its poor location could have resulted in overcounting from walkers stepping on it more than once) or that many people staying in the hut made more than one trip each to the Eliza Plateau (this is quite probable, based on personal observation).

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3 Conduct of Survey

The major information gathering exercise of the project was a questionnaire which distributed throughout the major part (18 weeks) of the summer of 1987-88 bushwalking season (18/12/87 to 25/4/88). This obtained basic demographic data, details of the activity undertaken, and some information on users' attitudes to, and perceptions of, their environment.

The survey was conducted in conjunction with the Wilderness Walker Survey already being conducted by Lands, Parks and Wildlife. The questionnaire was attached to the Wilderness Walker Survey and printed in the same format (see Section 6 for sample questionnaire).

3.1 Questionnaire Distribution and Collection

A small number of questionnaires were distributed in person, either by the Track Rangers or the author but over 90% of those completed were collected voluntarily from distribution points near the start of each of the three established tracks in the area. Each distribution point was stocked with Minimal Impact Bushwalking pamphlets as well as the questionnaires. All three distribution points were checked regularly by the author throughout the summer to collect completed questionnaires and ensure a continuous supply of new ones. Questionnaires could be returned by depositing them in the box provided at each collection point, the box by the road at the Maydena tollgate or by posting them to Lands, Parks and Wildlife in Hobart.

The main Mt Anne track from Condominium Creek already had a substantial walker registration booth located at its start so the questionnaire distribution and collection boxes were simply mounted within this structure, with a note on the log book holder to draw walkers' attention to the questionnaire.

The Lake Judd track from Red Tape Creek had no pre-existing walker registration facility so a purpose built "box on a stick" distribution/collection box was installed just far enough down the track for it to be out of sight from the road.

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The track from Galignite Creek to the North-East Ridge presented a greater problem. There is a reasonably well defined track which leaves the Scotts Peak Road near Galignite Creek, and a "box on a stick" distribution/collection box was initially installed beside this track, again just far enough down the track for it to be out of sight from the road. After Christmas it was realised that no use had been made of this box and Track Ranger Jon Marsden-Smedley had seen some walkers ignoring the first part of the track where it crosses an open buttongrass plain thereby missing the box by several hundred metres. For these reasons this box was shifted (on 10th January 1988) to a location about 2 km from the road. This location was in the first belt of dense vegetation behind the buttongrass plain and it was assumed that all walkers would have been funnelled onto the main track by this point. This created a small problem with maintenance of the box since a round trip of 1 hour from the road was required to check it. This was not a serious problem since the North-East Ridge route is little used compared to the two main tracks so frequent checking of the box was not required.

The two "boxes on sticks" were both installed to face roughly east to minimise waterproofing problems. It would have been very easy to incorporate a logbook into these boxes if this had been thought of before they were constructed. This would probably have yielded some additional useful information because it appears that many walkers are prepared to fill in an intentions book but not a questionnaire. If a similar survey is ever repeated it is recommended that a logbook be incorporated into each questionnaire distribution/collection box.

3.2 Limitations of the Survey

3.2.1 Nature of the Survey

The major limitation on the accuracy of the results obtained was the nature of the survey itself. It relied almost entirely on the voluntary collection and completion of the questionnaires. A more statistically rigorous survey would have selected certain periods of the 18 weeks covered (bearing in mind the known distribution of walkers and factors such as public holidays) and made contact, preferably by interview, with 100% of walkers during the selected periods. So long as the selection of the sampling periods had been done correctly a "typical" cross-section of walkers would have been contacted and the results obtained could be extrapolated to the entire walker population with a

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known degree of certainty. The voluntary participation approach which was adopted inevitably introduces some bias into the results; one likely bias being that experienced local walkers who were more environmentally aware than the average were more likely to be sufficiently motivated to complete a questionnaire (it was obvious from a glance at the questionnaire that many of the questions related to environmental matters). It must be explained that this problem was considered in advance but it was doubted whether a more statistically rigorous survey would have produced significantly different results and anyway there was neither the time nor the money to attempt such a survey.

3.2.2 Lack of Strict Adherence to Questionnaire Instructions

*** Large Groups**

It was intended that each individual walker should complete a questionnaire at the end of their trip. In practice it was observed that it was common for only one member of a group to complete a questionnaire on behalf of the whole group. No consistent provision could be made for this in the processing of the questionnaires with the probable consequence that members of large groups are slightly underrepresented in the final data and it is impossible to calculate accurately the average group size. It is suggested that future surveys should accept that it is unlikely that more than one member of a group will complete a questionnaire and be designed accordingly.

*** What They Planned To Do or What They Did?**

It was observed that some participants completed their questionnaires during their trip or even before starting it rather than at the end as requested. This meant that the information provided related to their intentions, rather than what they actually did. This is particularly significant for participants in the Mt Anne Circuit walk which probably has a higher "drop-out" rate than most other walks in the region. From personal observation many parties which set out on the circuit get no further than the hut or the Eliza Plateau because of bad weather. Few parties are prepared to risk the steep section over Mt Lot except in good weather and the steepness of this section deters some even in perfect conditions. Hence it is possible that no more than 50% of those who indicate their intention to walk the Mt Anne Circuit in the Condominium Creek logbook actually complete it.

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*** Daywalkers**

From personal observation it would seem likely that daywalkers are under-represented in the final data. This was despite a notice on each of the questionnaire distribution/collection boxes requesting all walkers *including daywalkers* to complete a questionnaire. Observation suggested that daywalkers were less likely to register in the logbook (at Condominium Creek) than those doing longer walks, and hence may not have even seen this notice. It is also possible that many did not consider themselves "Wilderness Walkers" and hence ignored the questionnaires. Another problem was that the Wilderness Walker Survey was designed to be distributed only to walkers on longer routes and contained questions about campsites and sanitation irrelevant to daywalkers, who may have looked at these questions and decided that the survey was not meant for them.

3.3 Association with Wilderness Walker Survey

Since Lands, Parks and Wildlife was already planning to conduct the Wilderness Walker Survey in the area during the summer the Mt Anne Area User Survey was run in conjunction with this. The resulting questionnaire consisted of two A4 sheets stapled together with the Wilderness Walker Survey occupying the first half of the document and the Mt Anne Area User Survey the second. Both were printed with identical format and layout (see sample questionnaire in Section 6). To avoid duplication of questions the Mt Anne Area User Survey relied on some information extracted from the accompanying Wilderness Walker Survey, particularly the personal details of the respondent. This meant that the Mt Anne Area User Survey was almost useless when the accompanying Wilderness Walker Survey had not been completed. This occurred in 9 instances and may have been caused by the following: The Wilderness Walker Survey was being conducted in several locations around the state and contained the instruction "If you will be walking other tracks over the summer there is no need to fill out further questionnaires". This was certainly responsible for some of the unusable questionnaires where only the Mt Anne Area User Survey was completed (some respondents actually wrote on the Wilderness Walker Survey that they had completed one elsewhere and therefore did not bother to complete this one). The fact that the front cover was titled Wilderness Walker Survey would also have prevented some people who had previously

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completed Wilderness Walker Surveys from realising that this was a different survey at all.

A more common problem (12 questionnaires) was the opposite: the Wilderness Walker Survey was completed but the Mt Anne Area User Survey was not. This may have resulted from respondents getting bored with completing the rather long combined questionnaire but they may have been confused by the superficially similar appearance of the questionnaires and thought that they were starting to answer the same questionnaire again. Of the 32 partially completed questionnaires 21 had either the Mt Anne Area User Survey or the Wilderness Walker Survey entirely completed; only 11 stopped at random within one of the surveys. This suggests that only these 11 stopped because they could not be bothered completing the questionnaire, the other 21 were probably confused by its the two part nature; there would probably have been 21 more (9% more) usable responses if the questionnaire had not been in two parts.

The reliance on the Wilderness Walker Survey for some data also meant that a limitation of the Wilderness Walker Survey was reflected in the Mt Anne Area User Survey data. This problem was in question 5 (from which of the following did you get information relevant to your trip?). There was no category for "accompanying someone familiar with the area". From personal observation, it is common for one or two people familiar with an area to take several of their friends there; the "friends" frequently being totally dependent on the others as guides. While this category is covered by the "friends" response it makes no distinction between those who have obtained information from friends in advance in order to plan their trip and those who may be incapable of attempting the trip unless accompanied by their more experienced friends. This deficiency came to light when a boy aged about 10 who was accompanying his father asked the author how he should answer the question. It is recommended that, if a similar questionnaire is ever to be conducted in the future it should either be totally separate from the Wilderness Walker Survey (hopefully people would not be expected to complete both at the same time and place) or it should be more fully integrated into the Wilderness Walker Survey (it could take the form of extra questions in the Wilderness Walker Survey). Either of these approaches would overcome many of the problems encountered in running the two in conjunction.

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When Lands, Parks and Wildlife processed its statewide Wilderness Walker Survey data it was necessary to exclude those from Mt Anne completed by daywalkers because these were not included in the Wilderness Walker Survey in any other areas.

3.4 Preparation of Mt Anne Area User Survey

The questionnaires needed to be in the field by Christmas 1987 if an important part of the summer walking season was not to be missed. Since the project was only conceived in July 1987 and the author had other commitments until early December, the preparation of the questionnaire was rather rushed and there was no opportunity for a trial.

The problems resulting from this hurried preparation were not actually very severe.

The first batch of questionnaires contained several typographical errors, most of which were corrected in the second batch which was put out on 10th January, with all the earlier versions being removed. The typographical errors, while embarrassing, were unlikely to affect the answers obtained. One typographical error which remained throughout was a missing line in the box for question 21.

Some problems with layout remained throughout. It had been intended that all questions relating to camping would be grouped together so that respondents who answered "no" to the "did you stay overnight in the area?" question could be directed to jump all the camping-related questions. Actually the camping-related questions occurred in two groups so this was not possible. It was decided not to totally reorder the questions when the second batch of questionnaires was being produced because this would have complicated the final processing considerably.

3.5 Problem Questions

A few problems that could have been avoided if the questionnaire had been trialled first were discovered when processing commenced.

In question 19 there should have been an option for respondents who answered "yes" to "ban campfires" to jump the following question on restricting campfires to existing

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fireplaces. They could not answer this question without contradicting their answer to the previous one.

Question 21 part 7: "Do you consider that views of distant disturbance to the natural environment (eg road and HEC impoundment) detract from the natural qualities of the area?" was considered by some to be a leading question. The section in parenthesis could well have been omitted.

Question 5: "Did you stay overnight in the Mt Anne Area?" was intended to separate daywalkers from those undertaking longer trips but many who answered "yes" had actually camped by the roadside at Condominium Creek or elsewhere. Fortunately details provided in other questions allowed the separation of daywalkers without having to rely on this question.

Question 18: "What do you think the party size should be for a trip such as yours?" was sometimes answered with ticks or crosses. These were interpreted as indicating that the respondent's party was too large, small or of ideal size and the desired numerical answer was derived from the party size given in question 4 of the Wilderness Walker Survey.

3.6 Processing of Survey

The processing of the questionnaires was done by Lands, Parks and Wildlife using a Macintosh computer. All tabulations were produced using this system. Only a very limited amount of editing of data was possible. Three questionnaires containing obvious errors were located and checked, and the errors rectified.

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3.7 Data on Conduct of Survey

Notes:

- 1) Abbreviations: CC Condominium Creek
 RTC Red Tape Creek
 NER North-East Ridge
 LPW Lands, Parks and Wildlife
 TR Track Ranger
 MAAUS Mt Anne Area User Survey
 WWS Wilderness Walker Survey
- 2) Questionnaires had a unique serial number which was used to keep track of their points of origin and collection.
- 3) Questionnaires returned to Lands, Parks and Wildlife include those returned to the Track Rangers and myself as well as those returned directly to the department.
- 4) Questionnaires distributed by Track Rangers include those left in the three "self-serve" distribution boxes as well as those handed out in person.
- 5) Any questionnaire on which three or more questions had been answered was counted as a returned questionnaire.
- 6) A usable questionnaire was one in which virtually all the questions in both sections had been completed.
- 7) When the remaining first editions of the questionnaire (which contained several typographical errors) were removed on 10/1/88 they were thrown away without being counted. For this reason the proportion of questionnaires returned could be calculated only for questionnaires distributed from 10/1/88 onwards.
- 8) Number distributed is the number of questionnaires actually taken in the period from 10/1/88 to the end of the survey on 25/4/88. ie It does not include the unused questionnaires left in the boxes at the end of the survey.

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Questionnaires - Summary

Total Returned: 263
Processed: 231
Partially Completed: 32

21% of the estimated actual number of walkers departing Condominium Creek during the period of the survey (refer section 5) completed a usable form.

49% of forms distributed were returned completed in a usable manner. This implies that 43% of walkers took a form (assuming that none were removed by vandals ecetera).

Questionnaires Returned - Partially Completed

MAAUS completed, WWS blank: 9
WWS completed, MAAUS blank: 12
Partial completion WWS only: 6
WWS completed & part of MAAUS: 5
Total: 32

Questionnaires Returned by Place of Return

Returned to:	CC	RTC	NER	LPW	Total
Returned	128	73	9	53	263
	(49%)	(28%)	(3%)	(20%)	(100%)
Usable	105	68	5	53	231
	(45%)	(29%)	(2%)	(23%)	(100%)
% Usable	82%	93%	56%	100%	88%

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Questionnaires Returned (Total) by Origin

Origin:	TR	CC	RTC	NER	Total
Returned	30	141	81	11	263
Usable	25 (83%)	123 (87%)	75 (93%)	8 (73%)	231 (88%)

Questionnaires Returned (10/1/88 to 25/4/88) by Origin

Origin:	CC	RTC	NER	Total
Distributed	216	101	32	349
Returned	122 (57%)	62 (61%)	9 (28%)	193 (55%)
Usable	105 (49%)	60 (59%)	7 (22%)	172 (49%)

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Origin by Place of Return

Origin:	TR	CC	RTC	NER	Total
Place Returned					
CC returned	14	111	3	0	128
CC usable	9	93	3	0	105
RTC returned	9	8	56	0	73
RTC usable	9	8	51	0	68
NER returned	0	0	3	6	9
NER usable	0	0	2	3	5
LPW returned	7	22	19	5	53
LPW usable	7	22	19	5	53
Total returned	30	141	81	11	263
Total usable	25	123	75	8	231

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4 Results

The following sections contain tabulations of the results obtained from the questionnaires.

Notes:

- 1) Some totals are less than 231 due to non-response not being tabulated separately.
- 2) The questions from which the tables were obtained are indicated in the table headings. eg WW31 refers to Wilderness Walker Survey, question 31, AA15 refers to Mt Anne Area User Survey, question 15.
- 3) The results of question AA19 (restrict campfires) have not been reported due to the confused way in which many answered this question (as explained in 3.5).
- 4) The results of question AA5 (stay overnight?) have not been reported due to the confusion discussed in 3.5. Daywalkers and overnight walkers were separated on the basis of WW2 (duration of walk) and route information.
- 5) The definitions of experience are those used in question AA6. ie:
Novice: Never been on an overnight bushwalk.
Moderately experienced: 1 to 5 overnight bushwalks.
Very experienced: 6 or more overnight bushwalks.
- 6) Where numbers are small some categories have been combined in the tabulations.
eg Novice and moderately experienced.
eg Mildly detract and greatly detract.
- 7) Additional tabulations were performed for several questions to distinguish between:
More experienced/Less experienced walkers,
Tasmanians/Non-Tasmanians,
Mt Anne Circuit walkers/Other walkers.

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To avoid reproducing a lot of extra tables which contain very little additional information these have only been included where they show a significant difference between these groups.

8) It is not intended to discuss all the results in detail. Some comments on the more significant points follow the tables where appropriate.

9) Limitations of MAAUS.

These probable limitations are discussed at greater length in sections 3.2 and 5. They should be remembered when considering the significance of the MAAUS results.

The following types of walker are probably significantly under-represented in the results:

- * Members of large groups
- * Daywalkers
- * Tasmanian residents
- * Less experienced walkers

The following types of walker are probably significantly over-represented in the results:

- * Overseas residents
- * Mainland residents (less so than overseas residents)
- * Walkers visiting the North-East Ridge or Lake Timk.
- * Very experienced walkers.

The Management of Wilderness Bushwalking

Appendix 2 - Mount Anne Area User Survey

4.1 Personal Details

Personal Details (WW31-34) by Duration of Walk (WW2)

	Duration of Walk (days)					Total
	1	2	3	4	5+	
Sex						
Female	21	22	14	8	4	69 (31%)
Male	39	45	37	23	11	155 (69%)
Education						
High School	7	8	8	6	8	37 (16%)
Matriculation	8	8	8	2	2	28 (12%)
Technical	7	5	5	1	5	23 (10%)
University	38	47	30	22	0	137 (61%)
Age (yrs)						
<20	7	3	5	4	5	24 (11%)
20-29	21	27	26	15	4	93 (42%)
30-39	16	22	10	5	4	57 (26%)
40+	14	14	10	6	2	46 (21%)
Usual Residence						
Tasmania	25	51	26	18	3	123 (55%)
Mainland Australia	30	12	22	11	12	87 (39%)
Overseas	5	6	2	2	0	15 (7%)
Total						
	60	71	52	32	16	231
	26%	31%	23%	14%	7%	100%

ie 26% Daywalkers

74% Overnight walkers

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Mean Duration of Walk 2.5 days (all walkers)

Mean Duration of Walk 2.9 days (overnight walkers)

Comment: The approximately 2:1 male:female ratio and high level of education are in agreement with other information on Tasmanian bushwalkers.

The age distribution (almost half over 30) contradicts the popular image of bushwalking as a young person's activity.

55% of respondents are Tasmanian residents. This differs considerably from the results obtained from the Wilderness Walker Survey elsewhere (primarily on the Overland Track) where the proportion Tasmanians was only about half this. This probably reflects the different nature of the walks in the Mt Anne Area (none are as long as the Overland Track).

4.2 Trip Details

4.2.1 Start Date (WW3)

Fortnight Ending	Number of Walkers	% of Total	Notes
13/12/87	1	0%	Survey commenced 18/12/87
27/12/87	23	10%	Christmas
10/01/88	35	15%	New Year
24/01/88	30	13%	
07/02/88	26	11%	
21/02/88	13	6%	
06/03/88	31	14%	Labour Day
20/03/88	17	7%	
03/04/88	30	13%	Easter
17/04/88	16	7%	
01/05/88	5	2%	Survey ended 25/04/88

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4.2.2 Start Time (AA2)

Time	Number of Walkers	% of Total
Before 8am	17	8%
8am - 9am	16	8%
9am - 10am	19	9%
10am - 11am	41	19%
11am - noon	23	11%
noon - 1pm	38	18%
1pm - 2pm	14	7%
2pm - 3pm	9	4%
3pm - 4pm	9	4%
4pm - 5pm	9	4%
5pm - 6pm	7	3%
6pm - 7pm	4	2%
After 7pm	5	2%

Comment: The noon - 1pm peak probably represents walkers dropped by the bushwalkers transport bus service.

The very small number of late starters is surprising since it is quite feasible to leave Hobart after work on a Friday night, drive to Condominium Creek and walk up to the hut before dark.

4.2.3 Duration (WW2) by Experience Rating (AA7)

	Novice	Moderate Experience	Very Experienced	Total
Daywalkers	7 (12%)	23 (39%)	29 (49%)	59 (26%)
O'night Walkers	4 (2%)	41 (24%)	126 (74%)	171 (74%)
Total	11 (5%)	64 (28%)	155 (67%)	230 (100%)

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4.2.4 Major Purpose of Trip (AA1)

One Day Bushwalk	Overnight Bushwalk	Caving	Climbing
60 (26%)	167 (73%)	1 (0%)	2 (1%)

Comment: It had been expected that substantially more cavers would have been using the area. Since very few cars were observed at Galignite Creek all summer (refer section 5.9) it is probable that the small response by cavers is a true reflection of very little caving activity, not a non-response to the MAAUS by cavers.

4.2.5 Route (AA4) by Duration of Walk (WW2)

Route	Duration		Total
	One Day	Longer	
Condominium Creek to Eliza Plateau	24	20	44 (19%)
Condominium Creek to Mt Anne Summit	16	55	71 (31%)
Red Tape Creek to Lake Judd	13	12	25 (11%)
Mt Anne Circuit	0	49	49 (21%)
Schnells Ridge	4	3	7 (3%)
Lake Timk	0	3	3 (1%)
North-East Ridge Mt Anne	1	22	23 (10%)
Both Mt Anne & Lake Judd	2	6	8 (3%)
Total	60	170	230 (100%)

Comment: It had been expected that the Lake Judd Track would have been more heavily used. It is very likely that users of the North-East Ridge are over-represented (refer section 5.9).

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4.2.6 Route (AA4) by Experience Rating (AA7)

Route	Experience			Total
	Novice	Moderate	Very	
Condominium Creek to Eliza Plateau	5	11	28	44
Condominium Creek to Mt Anne Summit	2	23	45	70
Red Tape Creek to Lake Judd	2	8	15	25
Mt Anne Circuit	1	15	33	49
Schnells Ridge	0	3	4	7
Lake Timk	0	0	3	3
North-East Ridge Mt Anne	1	4	18	23
Both Mt Anne & Lake Judd	0	0	8	8
Total	11	64	154	229

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4.2.7 Use of Campsites - Number of Nights (AA6)

	Nights Spent			Total
	at Campsite			Person-Nights
	1	2	3+	
<u>Campsite</u>				
In High Camp Memorial Hut	49	16	6	105
Camped near Hut	8	5	0	18
Shelf Camp	45	7	3	68
Lake Picone	18	2	0	22
Judds Charm	33	2	0	37
Lake Judd	19	4	2	33
Condominium Creek	12	5	2	28
North-East Ridge	16	1	1	21
Red Tape Creek	4	0	0	4
Anne River Cable Crossing	7	0	0	7
Other	15	0	0	15
Total				358

Note: Nights at Condominium Creek and Red Tape Creek include daywalkers who based themselves there as well as overnight walkers.

4.2.8 First Trip to Mt Anne Area? (AA8)

	<u>Yes</u>	<u>No</u>	<u>Total</u>
Daywalkers	42 (70%)	18 (30%)	60 (26%)
Overnight Walkers	100 (58%)	71 (42%)	171 (74%)
Total	142 (61%)	89 (39%)	231 (100%)

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4.2.9 Number of Previous Trips to Mt Anne Area (AA9)

	Number of Previous Trips						Total
	1	2	3	4	5	6+	
Daywalkers	5	3	2	2	3	1	16
Overnight Walkers	23	13	3	5	1	21	66
Total	28	16	5	7	4	22	82

Comment: 35% of respondents (82 out of 231) had visited the area before, some many times. This correlates with the relatively high proportion of local walkers amongst the respondents.

4.3 Group Characteristics

4.3.1 Company (AA3) by Group Size (WW4)

	Number in Group					Total
	1	2	3	4	5+	
Company						
Alone	25	0	0	0	0	25 (11%)
Friends	0	114	30	32	18	195 (86%)
Club	0	2	0	5	1	8 (4%)
Total	25	116	30	37	19	227 (100%)

Comment: Average group size could not be calculated since there was no way of knowing how many members of an individual group had completed a questionnaire (it was obvious that there had been very poor compliance with the instruction that every member of a group was to complete a form).

There is some further discussion of group size, based on logbook data, in section 5.

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4.3.2 Desirable Group Size (AA18)

	Desirable Group Size						
	1	2	3	4	5	6	7+
Minimum	59	104	21	9	0	0	0
Ideal	2	43	46	87	7	5	2
Maximum	0	0	2	54	16	80	41

4.3.3 Mean Desirable Group Size

Minimum	1.9
Ideal	3.4
Maximum	5.9

Comment: The minimum and ideal numbers reflect the opinion expressed in "Safety in the Bush" and similar publications that two is the absolute minimum group size for safety and four the optimum. The maximum is significantly less than the eight recommended in "Safety in the Bush" as the maximum in alpine areas (for environmental reasons).

4.3.4 Mean Ideal Group Size

Daywalkers	3.4
Overnight Walkers	3.4
Total	3.4

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4.4 General

4.4.1 Information Source (WW5)

Magazines: Total	21 (9%)
Unspecified	9 (4%)
Wild	10 (4%)
Other	2 (1%)
Conservation Groups: Total	16 (7%)
Unspecified	2 (1%)
Wilderness Society	14 (6%)
Friends	109 (47%)
Clubs: Total	20 (9%)
Unspecified	2 (1%)
Hobart Walking Club	15 (6%)
Other	3 (1%)
Gearshops: Total	16 (7%)
Unspecified	6 (3%)
Paddy Pallins	4 (2%)
Other	6 (3%)
Guidebooks: Total	131 (57%)
Unspecified	13 (6%)
South-West Tasmania (Chapman)	88 (38%)
100 Walks in Tasmania (Thomas)	30 (13%)
Maps	65 (28%)
LP&W Pamphlets/Displays/Talks	11 (5%)
Media	1 (0%)
Tasbureau	2 (1%)
Previous Experience	73 (32%)

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Comment: Guidebooks are the most significant single information source (57% used). Previous experience is surprisingly low considering that 35% of respondents had visited the area before (4.2.9).

"Friends" covers a wide range of possibilities (refer section 3.3).

4.4.2 Equipment Carried (WW15)

Tent	171 (74%)
Handtrowel	54 (23%)
Axe	5 (2%)
Spade	2 (1%)
Machete	1 (0%)
First Aid Kit	178 (77%)

4.5 Attitudes

4.5.1 Motives (AA10) by Duration(WW2)

	Daywalkers	Overnight	Total
Adventure	20 (33%)	82 (48%)	102 (44%)
Wilderness Experience	32 (53%)	108 (63%)	140 (61%)
Physical Exercise	31 (52%)	95 (56%)	126 (55%)
Social Interaction	6 (10%)	42 (25%)	48 (21%)
Escape from City	21 (35%)	85 (50%)	106 (46%)
Mountain Landscape	52 (87%)	154 (90%)	206 (89%)
Cave Exploration	0	6 (4%)	6 (3%)
Other: Unspecified	4 (7%)	14 (8%)	18 (8%)
Photography	1 (2%)	1 (1%)	2 (1%)
Rock Climbing	0	1 (1%)	1 (0%)

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4.5.2 Features (AA11) by Duration(WW2)

	Daywalkers	Overnight	Total
Scenery	58 (97%)	161 (94%)	219 (95%)
Solitude	33 (55%)	106 (62%)	139 (60%)
Naturalness	38 (63%)	123 (72%)	161 (70%)
Quietness	40 (67%)	114 (67%)	154 (67%)
Geological features	32 (53%)	93 (54%)	125 (54%)
Trees and Plants	39 (65%)	110 (64%)	149 (65%)
Animals	12 (20%)	28 (16%)	40 (17%)
Caves	1 (2%)	8 (5%)	9 (4%)
Other (unspecified)	2 (3%)	7 (4%)	9 (4%)

4.5.3 Satisfaction (AA12)

	Daywalkers	Overnight	Total
Far Exceeded Expectations	15 (25%)	38 (22%)	53 (23%)
Well Satisfied	42 (71%)	115 (68%)	157 (69%)
Just Satisfactory	1 (2%)	7 (4%)	8 (3%)
Generally unsatisfactory	1 (2%)	10 (6%)	11 (5%)

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4.6 Environmental Concerns

4.6.1 Detractions from Natural Qualities (AA21)

	Didn't Notice	Noticed	Mildly Detract	Greatly Detract
Existence of Track	46 (21%)	95 (44%)	67 (31%)	9 (4%)
Track Work	29 (13%)	114 (52%)	70 (32%)	8 (4%)
Degraded Track	17 (8%)	25 (11%)	110 (50%)	70 (32%)
Hut	58 (28%)	118 (57%)	22 (11%)	10 (5%)
Other Walkers	68 (32%)	93 (44%)	41 (19%)	10 (5%)
Aircraft	80 (39%)	64 (31%)	38 (19%)	22 (11%)
Distant Disturbance	21 (10%)	32 (15%)	60 (28%)	102 (47%)

Comment: Substantially more respondents were concerned by degraded track than were concerned by track work. This implies that track "hardening" will be seen by most as less of a detraction from the natural qualities of the area than leaving the track to deteriorate.

4.6.1.1 Experience (AA7) by

Detractions from Natural Qualities (AA21)

"Existence of Track"

Experience	Didn't Notice	Noticed	Detract
Novice/Moderate	23 (32%)	31 (44%)	17 (24%)
Very	23 (16%)	64 (44%)	59 (40%)
Total	46 (21%)	95 (44%)	76 (35%)

Comment: A significant proportion of walkers, particularly the more experienced, considered even the existence of a track to detract from the natural qualities of the area.

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4.6.1.2 Experience (AA7) by Detractions from Natural Qualities (AA21) "Hut"

Experience	Didn't Notice	Noticed	Detract
Novice/Moderate	17 (27%)	41 (65%)	5 (8%)
Very	41 (28%)	76 (53%)	27 (19%)
Total	58 (28%)	118 (57%)	32 (15%)

Comment: The presence of the hut was resented more by the more experienced walkers but the proportion who considered it a detraction was still quite low at 19%. Presumably this reflects the location of the hut. It is relatively close to the road in an area where the view is still dominated by the road and the HEC impoundment so its intrusion into the "wilderness qualities" of the area is minimal.

4.6.1.3 Experience (AA7) by Detractions from Natural Qualities (AA21) "Distant Distrbance"

Experience	Didn't Notice	Noticed	Detract
Novice/Moderate	6 (9%)	18 (28%)	41 (63%)
Very	15 (10%)	14 (9%)	121 (81%)
Total	21 (10%)	32 (15%)	162 (75%)

Comment: The more experienced walkers are significantly more sensitive to distant disturbances to the otherwise natural viewfield than less experienced walkers.

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4.6.1.4 Residence (WW34) by Detractions from Natural Qualities (AA21) "Existence of Track"

Residence	Didn't Notice	Noticed	Detract
Tasmania	19 (17%)	49 (43%)	47 (41%)
Other	25 (26%)	42 (43%)	30 (31%)
Total	44 (21%)	91 (43%)	77 (36%)

Comment: Tasmanian residents more than others considered even the existence of a track to detract from the natural qualities of the area.

4.6.2 Enjoyment (WW25)

	Didn't Notice	Noticed	Mildly Detract	Greatly Detract
Litter	143 (66%)	27 (12%)	35 (16%)	13 (6%)
Track Conditions	40 (18%)	103 (47%)	59 (27%)	18 (8%)
Big Parties	152 (73%)	19 (9%)	19 (9%)	17 (8%)
Crowded Hut	140 (70%)	34 (17%)	14 (7%)	13 (6%)
Dirty Hut	147 (71%)	20 (10%)	19 (9%)	21 (10%)
Sanitation	141 (67%)	7 (3%)	27 (13%)	35 (17%)

4.6.2.1 Residence (WW34) by Enjoyment (WW25) "Track Conditions"

Residence	Didn't Notice	Noticed	Detract
Tasmania	19 (16%)	47 (40%)	51 (44%)
Other	19 (20%)	54 (56%)	24 (25%)
Total	38 (18%)	101 (47%)	75 (35%)

Comment: Tasmanian residents are more aware of bad track conditions than others.

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4.6.3 Track Condition (WW23) by Experience (AA7)

Track Condition	Experience		Total
	Novice/Moderate	Very	
Acceptable	15 (20%)	24 (16%)	39 (17%)
Reasonable	41 (55%)	75 (49%)	116 (51%)
Deteriorating	14 (19%)	42 (28%)	56 (25%)
Heavily Damaged	5 (7%)	11 (7%)	16 (7%)

4.6.4 Concerns (AA17)

	Didn't Notice	Noticed	Moderate Concern	Greatly Concerned
Track Degradation	32 (15%)	61 (28%)	90 (42%)	33 (15%)
Erosion and Trampling	18 (8%)	37 (17%)	118 (54%)	45 (21%)
Cleared Campsites	129 (62%)	57 (28%)	14 (7%)	7 (3%)
Campsite Vegetation	124 (61%)	53 (26%)	17 (8%)	10 (5%)
Fireplaces	120 (58%)	47 (23%)	18 (9%)	23 (11%)
Firewood Gathering	122 (59%)	23 (11%)	34 (16%)	28 (14%)

Other Concerns:

Unspecified	2
Lake Pedder	11
Trig Towers	3
Toilet Paper	4
Logging Roads	1
Jubilee Range Fire	5
Toilet at Hut	5

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Appendix 2 - Mount Anne Area User Survey

4.7 Overuse - Track

4.7.1 Number of other Groups Encountered on TRACK (AA13) by Duration (WW2)

Number of other Groups per Day	Daywalkers	Overnight	Total
0	13 (22%)	42 (25%)	55 (24%)
1-2	25 (42%)	74 (44%)	99 (43%)
3-5	18 (30%)	44 (26%)	62 (27%)
6-10	4 (7%)	8 (5%)	12 (5%)
>10	0	1 (1%)	1 (0%)

4.7.2 Encounters on TRACK (AA14)

	Didn't Notice	Noticed	Moderate Concern	Very Concerned
Number of Groups	61 (39%)	82 (52%)	10 (6%)	4 (3%)
Group Size	72 (46%)	67 (43%)	9 (6%)	8 (5%)
Group Behaviour	90 (59%)	45 (29%)	11 (7%)	7 (5%)

4.7.2.1 Route (AA4) by Encounters on TRACK (AA14)

"Number of Groups"

Route	Didn't Notice	Noticed	Moderate Concern	Very Concerned
Circuit	25 (64%)	12 (31%)	2 (5%)	0
Other	51 (38%)	71 (52%)	9 (7%)	5 (4%)
Total	76 (43%)	83 (47%)	11 (6%)	5 (3%)

Comment: The Mt Anne Area is not yet sufficiently heavily used for overcrowding on the track to be a problem.

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4.8 Overuse - Campsites

4.8.1 Encounters at HUT or CAMPSITES (AA15)

Location	Number of Groups Encountered			
	0	1	2	3+
In High Camp Hut	18 (25%)	34 (48%)	13 (18%)	6 (8%)
Camped near Hut	5 (42%)	3 (25%)	2 (17%)	2 (17%)
Shelf Camp	30 (55%)	22 (40%)	3 (5%)	0
Lake Picone	16 (80%)	3 (15%)	0	1 (5%)
Judds Charm	24 (71%)	4 (12%)	5 (15%)	1 (3%)
Lake Judd	20 (83%)	3 (13%)	0	1 (4%)

4.8.2 Encounters at HUT or CAMPSITES (AA16)

	Didn't Notice	Noticed	Moderate Concern	Very Concerned
Overcrowding	68 (67%)	18 (18%)	13 (13%)	2 (2%)
Loss of Privacy	55 (54%)	34 (33%)	10 (10%)	3 (3%)
Behaviour of Other Users	73 (74%)	10 (10%)	8 (8%)	7 (7%)

Comment: Concern about overcrowding at the hut and campsites is slightly higher than concern at overcrowding on the tracks but it is not yet a major problem.

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4.9 Attitudes to Solutions

4.9.1 Overuse (WW24)

	Yes	No	Unsure
Fees	33 (15%)	151 (70%)	33 (15%)
Limit on Group Size	136 (62%)	65 (30%)	18 (8%)
Limit on Walker Numbers	60 (29%)	113 (54%)	37 (18%)
Track & Campsite Closures	128 (60%)	48 (23%)	37 (17%)
MIB Education	196 (90%)	11 (5%)	10 (5%)
Promotion of Other Areas	125 (60%)	49 (23%)	35 (17%)
Track Rangers	90 (42%)	84 (39%)	40 (19%)

4.9.1.1 Residence (WW34) by Overuse (WW24)

"Promotion of Other Areas"

Residence	Yes	No	Unsure
Tasmania	55 (51%)	32 (30%)	20 (19%)
Other	67 (70%)	15 (16%)	14 (15%)
Total	122 (60%)	47 (23%)	34 (17%)

Comment: Tasmanian residents are significantly less enthusiastic than others to see alternative areas promoted. This probably reflects a resentment of the large number of mainland walkers on some popular tracks and a desire keep them out of areas which are, at present, largely unknown except to local walkers.

4.9.1.2 Residence (WW34) by Overuse (WW24)

"Track Rangers"

Residence	Yes	No	Unsure
Tasmania	54 (48%)	37 (33%)	21 (19%)
Other	34 (35%)	43 (45%)	19 (20%)
Total	88 (42%)	80 (38%)	40 (19%)

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Comment: Track Rangers are favoured by Tasmanian residents much more than by others. This probably reflects a feeling amongst local walkers that Track Rangers are protecting "their" walking areas. Amongst visitors Track Rangers are more likely to be resented as a "policeman" checking on their behaviour.

4.9.2 Overuse (AA19)

	Yes	No	Unsure
Restrict Camping	158 (71%)	46 (21%)	19 (9%)
More Huts	61 (28%)	126 (57%)	33 (15%)
More Toilets	134 (61%)	53 (24%)	33 (15%)
Ban Campfires	145 (67%)	42 (19%)	30 (14%)
Free Permits	88 (42%)	81 (38%)	43 (20%)
\$ Permits	26 (13%)	141 (68%)	40 (19%)
Fee For Use	32 (16%)	151 (74%)	20 (10%)

Comment: The proportion (42%) who supported free permits was higher than might have been expected but there is obviously strong opposition to any system of user regulation involving payment for permission to visit that area. It is unfortunate that the option of hut fees was not explored in this question.

4.9.2.1 Experience (AA7) by Overuse (AA19)

"Restrict Camping"

Experience	Yes	No	Unsure
Novice/Moderate	58 (81%)	6 (8%)	8 (11%)
Very	100 (66%)	40 (26%)	11 (7%)
Total	158 (71%)	46 (21%)	19 (9%)

Comment: Restrictions on camping are opposed by far more of the more experienced walkers who, presumably, are accustomed to selecting their own campsites and do not want to lose this privilege.

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4.9.2.2 Experience (AA7) by Overuse (AA19)

"More Huts"

Experience	Yes	No	Unsure
Novice/Moderate	31 (44%)	26 (37%)	14 (20%)
Very	30 (20%)	100 (67%)	19 (13%)
Total	61 (28%)	126 (57%)	33 (15%)

Comment: The more experienced walkers are substantially more opposed to additional huts. Presumably these walkers have seen the effect of huts in other areas.

4.9.2.3 Experience (AA7) by Overuse (AA19)

"Ban Campfires"

Experience	Yes	No	Unsure
Novice/Moderate	40 (57%)	16 (23%)	14 (20%)
Very	105 (71%)	26 (18%)	16 (11%)
Total	145 (67%)	42 (19%)	30 (14%)

Comment: The more experienced walkers are, presumably, more aware of the problems that campfires can cause.

4.9.2.4 Residence(WW34) by Overuse (AA19)

"Ban Campfires"

Residence	Yes	No	Unsure
Tasmania	74 (64%)	29 (25%)	12 (10%)
Other	69 (71%)	12 (12%)	16 (16%)
Total	143 (67%)	41 (19%)	28 (13%)

Comment: Tasmanian residents are significantly less opposed to campfire than others. They may feel that they are sufficiently experienced in local conditions to judge when it is safe to light a fire.

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Appendix 2 - Mount Anne Area User Survey

4.10 Possible Options (AA20) by Route(AA4)

	Route		
	Circuit	Other	Total
No Restriction on Walker Numbers + Substantial Track Upgrading	17 (38%)	80 (50%)	97 (48%)
Limitation on Walker Numbers + Minor Track Upgrading	28 (62%)	79 (50%)	107 (52%)

Comment: Circuit walkers, familiar with the more remote parts of the Mt Anne Area, are much less keen to see substantial track upgrading which could detract from its "wilderness qualities".

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Appendix 2 - Mount Anne Area User Survey

5 Integration of Data

The aim of this section is to compare the data on visitors obtained from different sources.

The sources of information are:

- * Mt Anne Area User Survey (MAAUS).

- * Pedestrian Counters.

- * Logbooks.

The only logbooks in the Mt Anne Area are at Condominium Creek, High Camp Memorial Hut and Mt Anne summit. All the following information referred to as "logbook" was extracted from the logbook at Condominium Creek (the other two offered little additional information).

Note that logbook data and overall MAAUS data are not directly comparable since the logbook data was collected only at Condominium Creek whereas the MAAUS data was collected from walkers using all three main access points to the Mt Anne Massif.

5.1 Walker Numbers: MAAUS/Logbook

Start Date of Walk	Number MAAUS forms	Number Logbook entries	MAAUS as % of Logbook
18/12/87 to 27/12/87	23 (10%)	20 (3%)	115%
28/12/87 to 10/01/88	35 (15%)	89 (15%)	39%
11/01/88 to 24/01/88	30 (13%)	79 (13%)	38%
25/01/88 to 07/02/88	26 (11%)	60 (10%)	43%
08/02/88 to 21/02/88	13 (6%)	50 (8%)	26%
22/02/88 to 06/03/88	31 (13%)	106 (17%)	29%
07/03/88 to 20/03/88	17 (7%)	40 (7%)	43%
21/03/88 to 03/04/88	30 (13%)	84 (14%)	36%
04/04/88 to 17/04/88	16 (7%)	42 (7%)	38%
18/04/88 to 25/04/88	5 (2%)	36 (6%)	14%
Total	226 (230)	606	37%

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Note:

- 1) 4 MAAUS forms were undated and 1 related to a trip commenced prior to 18/12/87, hence total for this period 230.
- 2) MAAUS forms were distributed at 3 points; hence it is possible for the number of MAAUS forms to exceed the number of logbook registrations.

Comment: The numbers completing the MAAUS forms in each fortnight show the same general trend as the number of logbook registrations.

5.2 Walker Numbers: Pedestrian Counter/Logbook

As discussed in 2.4, the results from the Condominium Creek pedestrian counter appear to be fairly reliable. This counter recorded 370 users in the total time it was installed (21/3/88 to 26/4/88). Examination of the logbook suggests that 274 counts would have been expected in this period (it was assumed that Mt Anne Circuit walkers (50) would be counted once, all other walkers (112) twice).

The implication is that 74% of walkers registered.

Alternatively; the actual number of walkers is 1.35 times the logbook registrations.

If this factor is applied to the 606 registrations during the whole period of the survey the corrected total becomes 818 walkers in the period 18/12/87 to 25/4/88.

172 walkers departing from Condominium Creek in this period completed MAAUS forms. This 21% of the corrected total of 818 or 28% of the 606 actual logbook registrations. Alternatively, the number of walkers who registered in the logbook is 3.52 times the number completed MAAUS forms.

5.3 Coverage of MAAUS

The MAAUS ran from 18/12/87 to 25/4/88 (130 days).

Logbook entries for this period were 606 out of the annual (year ending 25/4/88) total of 785.

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ie 77% of logbook registrations for the year occurred in the 36% of the year covered by the MAAUS.

This confirms that bushwalking in southwest Tasmania is primarily a summer activity and that the MAAUS covered the main period of use of the Mt Anne Area.

5.4 Usual Residence of Walkers

Usual Residence	MAAUS data	Logbook Data
Tasmania	123 (55%)	361 (67%)
Mainland Australia	87 (39%)	157 (29%)
Overseas	15 (7%)	19 (4%)
Not stated	6	69

Comment: This suggests that interstate and, especially, overseas visitors were more likely to complete a MAAUS form than locals and hence are over-represented in the MAAUS results. This same logic would suggest that the bulk of the 26% of walkers who do not register in the logbook are also Tasmanians. If correct this would make the actual proportion of Tasmanians even higher and their under-representation in MAAUS even more pronounced.

5.5 Duration of Walk

	Duration of Walk (days)					Total
	1	2	3	4	5+	
MAAUS data	60	71	52	32	16	231
	26%	31%	23%	14%	7%	
Logbook data	245	125	133	70	33	606
	40%	21%	22%	12%	5%	

Comment: This supports the suggestion in 3.2.2 that daywalkers are significantly under-represented in MAAUS.

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Appendix 2 - Mount Anne Area User Survey

Multiplying out the above logbook data gives the following for the period of the MAAUS:

606 visitors

1353 person-days spent in the area

747 person-nights spent in the area.

If these are multiplied by 1.30 to extrapolate to 12 months and 1.35 for the "pedestrian counter correction factor" then the totals become:

1064 visitors per year

2375 person-days per year spent in the area

1311 person-nights per year spent in the area.

Note that this is only walkers who have entered via Condominium Creek.

5.6 Group Size

	Number in Group					Total
	1	2	3	4	5+	
MAAUS data (Number of individuals)	25 11%	116 51%	30 13%	37 16%	19 8%	227
Logbook data (Number of individuals)	42 7%	236 39%	105 17%	108 18%	115 19%	606
Logbook data (Number of parties)	42 18%	118 50%	35 15%	27 11%	14 6%	236

Comment: This supports the suggestion in 3.2.2 that large groups are significantly under-represented in MAAUS.

The logbook data gives an average group size of 2.6 persons. The MAAUS data could not be used to obtain an average group size since there was no way of knowing how many members of individual groups had completed questionnaires (it was obvious that there had been very poor compliance with the instruction that every member of a group was to complete a form).

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According to the logbook the largest single group was a party of 18 from the Eastern Shore Ramblers who made a day trip to Mt Eliza on 6/3/88. The largest group to attempt the Mt Anne Circuit was a group of 10 from Launceston Church Grammar School on 11-15/4/88. Apart from one other group of 14 (no details given) who spent 2 days climbing Mt Anne, no other groups exceeded 9 in numbers.

5.7 Route

Route	MAAUS	Logbook
Condominium Creek to Eliza Plateau	44 27%	194 32%
Condominium Creek to Mt Anne Summit	71 43%	230 38%
Mt Anne Circuit	49 30%	174 29%
Total	164	598

Note:

- 1) only the routes commencing from Condominium Creek have been included to make the MAAUS data directly comparable to the Logbook data.
- 2) 8 logbook entries did not state route, hence total 598 not 606.

Comment: The logbook data shows a slightly higher proportion of walkers going only to the Eliza Plateau than the MAAUS data. This supports the suggestion in 3.2.2 that daywalkers (primarily Condominium Creek to Eliza Plateau route) are slightly under-represented in the MAAUS.

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Appendix 2 - Mount Anne Area User Survey

5.8 Observation of Walker Behaviour

The period from 11:30 am on 31/3/88 to the evening of 1/4/88 (Good Friday) was spent at Condominium Creek observing walker behaviour and checking the accuracy of the pedestrian counter.

Of 22 walkers who set off in this period 18 registered in the logbook (82%). Although a small sample this compares well with the 74% registration calculated in 5.2.

Those who failed to register were two pairs of daywalkers. Neither pair looked very experienced and neither pair was away for more than a few hours. Although the numbers involved are too small to be of much significance this observation suggests that daywalkers are under-represented in the logbook, which means that their under-representation in MAAUS is even greater.

5.9 Estimate of Total Walker Numbers

In this section an attempt is made to extrapolate the data on user numbers to whole area and the whole year. The assumptions used inevitably introduce a substantial degree of uncertainty.

The following numbers of MAAUS respondents started from each access point. Data derived from 4.2.5.

	Daywalkers	Overnight walkers
Condominium Creek	48	124
Red Tape Creek	25	15
Gelignite Creek	1	25
Total	74	164

In section 5.2 the available data for Condominium Creek was discussed and the following multiplying factors established:

Number of MAAUS forms x 3.52 = Number of logbook entries

Number of logbook entries x 1.35 = Number counted by pedestrian counter

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Number of logbook entries(period of MAAUS) x 1.30 = Number of logbook entries
(whole year)

Combining these gives:

Number of MAAUS forms x 6.19 = Total Annual Number of Walkers

If it is assumed that these same multiplying factors can be applied to the number of completed MAAUS forms at each access point (this is unlikely but no better estimate can reasonably be made) then the total walker numbers estimated as follows:

	Daywalkers	Overnight walkers	Total
Condominium Creek	297	767	1064
Red Tape Creek	155	93	248
Gelignite Creek	6	155	161
Total	458	1015	1473

If it is assumed that all overnight trips from Red Tape Creek and Gelignite Creek involved only one night out the the following totals can be calculated:

In year ending 25/04/88:

Total visitors to Mt Anne Area: 1473
Total Person-days spent in Mt Anne Area: 3032
Total Person-nights spent in Mt Anne Area: 1559

Person-days spent in the area

Condominium Creek	2375 (from 5.5)
Red Tape Creek	341
Gelignite Creek	316
Total	3032

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Person-nights spent in the area

Condominium Creek	1311 (from 5.5)
Red Tape Creek	93
Gelignite Creek	155
Total	1559

Comment: It is probable that the above figures are an over-estimate and they could be substantially in error.

* The assumptions on which they are based are unlikely to be exactly correct.

* The logbook/pedestrian counter multiplying factor was based on the assumption that all walkers who indicated that they were attempting the Mt Anne Circuit actually completed it. This is unlikely (as discussed in 3.2.2). It is possible that this multiplying factor should be as low as 1.25 or 1.3, not the 1.35 used. This factor is also heavily dependent on the reliability of the pedestrian counter results which are discussed in 2.2.4.

* The proportion of walkers registering in the logbook is probably higher in the non-summer months. The casual daywalkers who probably form a high proportion of the non-registrants are unlikely visitors outside the summer.

* The number of walkers departing from Gelignite Creek is almost certainly too high. The author made at least thirteen return trips to the Mt Anne Area during the period of the MAAUS and very rarely observed any cars at Gelignite Creek. This was confirmed by the Lands, Parks and Wildlife Rangers who use the road daily. Note that the route from Gelignite Creek differs from the other routes in that it is not described in any bushwalking route guides. Hence users are likely to be experienced local walkers who are more likely to have been motivated to complete a questionnaire (as discussed in 3.2.1). Therefore the application of the same multiplying factor as used for the other routes was probably not appropriate. This also suggests that walkers from Gelignite Creek are over-represented in MAAUS.

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Appendix 2 - Mount Anne Area User Survey

Minimum Estimate of Visitor Numbers

In view of these uncertainties it is worth trying to make a minimum estimate of numbers.

Condominium Creek numbers are reasonably well known thanks to the logbook, so they are reduced by 10% to allow for uncertainties with the pedestrian counter etc.

Red Tape Creek numbers are less certain but seem reasonable, say reduce these by 30%.

Gelignite Creek numbers seem very high so assume that most users completed MAAUS forms.

These assumptions lead to the following:

	Daywalkers	Overnight walkers	Total
Condominium Creek	267	690	957
Red Tape Creek	116	70	186
Gelignite Creek	2	40	42
Total	385	800	1185

Total visitors to Mt Anne Area: 1185

Total Person-days spent in Mt Anne Area: 2476

Total Person-nights spent in Mt Anne Area: 1290

Range in Estimated Visitor Numbers

Using the above figures and rounding estimates to the nearest hundred, it can be stated with reasonable confidence that visitor numbers in the year ended 25/04/88 lie in the following ranges:

Total visitors to Mt Anne Area: 1100-1500

Total Person-days spent in Mt Anne Area: 2400-3000

Total Person-nights spent in Mt Anne Area: 1300-1600

The Management of Wilderness Bushwalking

Appendix 2 - Mount Anne Area User Survey

6 Mount Anne Area User Survey Questionnaire

The actual questionnaire was printed in A5 format. It comprised an eight page booklet (two sheets of paper stapled together and folded). The Wilderness Walker Survey occupied the first half and the Mt Anne Area User Survey the second.

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Appendix 2 - Mount Anne Area User Survey

Page 1 of Questionnaire

Wilderness Walker Survey

Over this summer a number of walking tracks within the World Heritage Area are being surveyed to find out bushwalker's attitudes to environmental problems. The results will be used to improve the Department of Lands, Parks and Wildlife's management of this unique region.

By filling in this questionnaire you will be having your say in the future management of the park and aiding its survival as one of the world's great wilderness areas.

General Instructions

- If you are walking in a group each individual should fill in a questionnaire.
- Where boxes are provided there are a number of possible answers, tick your preference.
- If you will be walking other tracks over the summer there is no need to fill out further questionnaires.
- No names and addresses will be collected with this survey so you can afford to be honest! Tell us what you really did, not what you think the Department of Lands, Parks and Wildlife would like to hear.

Thanks for your help.

R. H. Annells
Secretary
Department of Lands, Parks and Wildlife

Trip Information

1. Describe the route of your trip

2. Duration of walk (days)

3. Date on which you started walking / / 8

4. Number in Party (one if solo)

5. From which of the following did you get information relevant to your trip, (tick one or more):

- Bushwalking magazines (which one/s) ☐

- Conservation groups (which one/s) ☐

- Friends ☐

- Bushwalking/ Mountaineering club (which one/s) ☐

Department of Lands, Parks and Wildlife:

- Maps/route notes ☐
- Pamphlets ☐
- Displays ☐
- Talks/slideshows ☐

- Media (TV, radio, newspapers) ☐

- Bushwalking gearshops (which one/s) ☐

- Track guide books (which one/s) ☐

- Tas bureau ☐

- Previous experience ☐

- Other (please state) ☐

Rubbish

6. What did you do with rubbish on your trip? (tick one or more)

- Left it at the hut/campsite ☐

- burnt, bashed and buried it ☐

- Carried it all out ☐

- Burnt some, carried rest out ☐

- Other (please state) ☐

7. On your walk did you pick up any rubbish left by other people and take it out with you?

Yes ☐ No ☐

Fire

8. On how many nights did you (or your group) light a campfire?

All Most Half Few None
☐ ☐ ☐ ☐ ☐

The Management of Wilderness Bushwalking

Appendix 2 - Mount Anne Area User Survey

Page 2 of Questionnaire

<p>9. Did you or your group carry a fuel stove/s?</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>10. If yes, on how many nights was it/were they used?</p> <p>All <input type="checkbox"/> Most <input type="checkbox"/> Half <input type="checkbox"/> Few <input type="checkbox"/> None <input type="checkbox"/></p> <p>11. On how many nights did you use both a campfire and a fuelstove?</p> <p>All <input type="checkbox"/> Most <input type="checkbox"/> Half <input type="checkbox"/> Few <input type="checkbox"/> None <input type="checkbox"/></p> <p>12. What do you think would be the best policy on campfires in the area you visited?</p> <ul style="list-style-type: none">• No restrictions except existing legal constraints (i.e. day of Total Fire Ban) <input type="checkbox"/>• Fuel Stove Only areas' in sensitive environments, e.g. alpine and rainforest areas (campfires banned in these regions) <input type="checkbox"/>• No campfires at all (fuelstoves only) except for emergencies and management purposes. <input type="checkbox"/>• Other (please state) <input type="text"/>	<ul style="list-style-type: none">• Machete <input type="checkbox"/>• First aid kit <input type="checkbox"/> <p>Sanitation</p> <p>16. On this trip in areas without toilets did you:</p> <ul style="list-style-type: none">• Dig a shallow hole and bury all faecal waste? <input type="checkbox"/>• Cover all faecal waste with leaves and twigs? <input type="checkbox"/>• Cover with rocks? <input type="checkbox"/>• Leave uncovered? <input type="checkbox"/>• Other (please state) <input type="text"/> <p>17. In areas without toilets what average distance did you go to the toilet away from water courses (streams, creeks, tarns)? <input type="text"/> metres</p> <p>18. From campsites/huts? <input type="text"/> metres</p> <p>19. What method did you use to wash yourself:</p> <ul style="list-style-type: none">• Used normal soap directly in creeks, rivers and tarns <input type="checkbox"/>• Used soap and washed away from creeks, rivers and tarns <input type="checkbox"/>• Washed without soap <input type="checkbox"/>• Other (Please state) <input type="text"/> <p>20. What method did you use to wash cooking utensils:</p> <ul style="list-style-type: none">• Used normal soap directly in creeks, rivers and tarns <input type="checkbox"/>• Used soap and washed away from creeks etc. <input type="checkbox"/>• Used a scourer or sand and washed away from creeks etc. <input type="checkbox"/>• Other (Please state) <input type="text"/> <p>Walking</p> <p>21. What sort of shoes did you wear on the trip</p> <ul style="list-style-type: none">• Strong lug sole boots• Sandshoes/runners
<p>Campsites</p> <p>13. If you camped out in a tent did you find it necessary to do any of the following:</p> <ul style="list-style-type: none">• Dig drainage channels around your tent? <input type="checkbox"/>• Gather local vegetation for bedding? <input type="checkbox"/>• Cut local vegetation for tentpoles? <input type="checkbox"/>• Clear any new campsites? <input type="checkbox"/>• Modify any of the campsites you camped at? <input type="checkbox"/> <p>14. If you had to modify any campsites what modifications did you make?</p> <p>_____</p> <p>15. Of the following which did you or your group take on the trip:</p> <ul style="list-style-type: none">• Tent <input type="checkbox"/>• Handtrowel <input type="checkbox"/>• Axe <input type="checkbox"/>• Spade <input type="checkbox"/>	<p>(question continued over page)</p>

The Management of Wilderness Bushwalking

Appendix 2 - Mount Anne Area User Survey

Page 3 of Questionnaire

<ul style="list-style-type: none"> • Lightweight walking boots <input type="checkbox"/> • Other (please state) <input type="checkbox"/> <p>22. On your walk did you walk through the middle of sections of muddy track or avoid the mud where possible:</p> <ul style="list-style-type: none"> • Walk through <input type="checkbox"/> • Mostly walk through <input type="checkbox"/> • Half & half <input type="checkbox"/> • Mostly Avoid <input type="checkbox"/> • Avoid <input type="checkbox"/> <p>23. Did you find the condition of the track:</p> <ul style="list-style-type: none"> • Acceptable - no repairs needed <input type="checkbox"/> • Reasonable - few repairs needed <input type="checkbox"/> • Deteriorating - much of it needs repair <input type="checkbox"/> • Heavily damaged - many areas in need of repair <input type="checkbox"/> <p>Overuse</p> <p>24. For the track you walked on would you support:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Yes</th> <th>No</th> <th>Unsure</th> </tr> </thead> <tbody> <tr> <td>• Introducing fees - the more heavily an area is used the more it costs to go there</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• A limit on the size of walking parties</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• A limit on the number of walkers on the track</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• The closing of damaged campsites and tracks</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• A walker education campaign to get people to decrease their impact on the area</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Promotion of other areas/ tracks not so heavily used</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Track rangers stationed on the major walking tracks</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table>		Yes	No	Unsure	• Introducing fees - the more heavily an area is used the more it costs to go there	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• A limit on the size of walking parties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• A limit on the number of walkers on the track	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• The closing of damaged campsites and tracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• A walker education campaign to get people to decrease their impact on the area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• Promotion of other areas/ tracks not so heavily used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• Track rangers stationed on the major walking tracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Enjoyment</p> <p>25. Below is a list of factors that may have detracted from the enjoyment of your walk. For each of them indicate how they affected you:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Didn't notice</th> <th>Noticed but didn't detract</th> <th>Mildly detract</th> <th>Greatly detract</th> </tr> </thead> <tbody> <tr> <td>• Litter</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Track conditions</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Big walking parties</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Crowded huts/camps</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Dirty huts/camps</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Poor sanitation (faeces, toilet paper visible)</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table> <p>26. Did you suffer from gastroenteritis (stomach upsets, vomiting, diarrhoea) on your walk?</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Minimal Impact Bushwalking</p> <p>27. Have you heard of the term 'Minimal Impact' or 'No Trace' bushwalking?</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>If no go to question 29</p> <p>28. If yes, from what source/s:</p> <ul style="list-style-type: none"> 1. Walking the Wilderness' pamphlet <input type="checkbox"/> 2. Walk Softly Audiovisual/video <input type="checkbox"/> 3. Minimal Impact Bushwalking comic poster <input type="checkbox"/> 4. '50 Million years evolving...' poster <input type="checkbox"/> 5. Walking the Wilderness' poster <input type="checkbox"/> 6. Phantom Walker' schools kit <input type="checkbox"/> 7. Talking to rangers <input type="checkbox"/> 8. Bushwalking magazines <input type="checkbox"/> 9. Bushwalking Club <input type="checkbox"/> 10. Friends <input type="checkbox"/> 11. Conservation groups <input type="checkbox"/> 12. Media (TV, Radio, Newspapers) <input type="checkbox"/> 		Didn't notice	Noticed but didn't detract	Mildly detract	Greatly detract	• Litter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• Track conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• Big walking parties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• Crowded huts/camps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• Dirty huts/camps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• Poor sanitation (faeces, toilet paper visible)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Appendix 2 - Mount Anne Area User Survey

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

The questions asked in this section will help to identify what types of people participate in wild country walking and aid the Department of Lands, Parks and Wildlife in its future planning for such areas. No names or addresses should be attached to this questionnaire and all information will be regarded as strictly confidential.

31. Sex ☐ Female ☐ Male

32. Age years

33. What education level have you completed?

- ☐ • High school or below
- ☐ • Matriculation
- ☐ • Technical education
- ☐ • Tertiary (University/College)

34. What is your usual place of residence?

- ☐ • Tasmania
- ☐ • Western Australia
- ☐ • Victoria
- ☐ • New South Wales
- ☐ • Queensland
- ☐ • South Australia
- ☐ • Northern Territory
- ☐ • Australian Capital Territory
- ☐ • Overseas (please state country)

Office Use Only
Number

9	5	3	1
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At the end of your walk please hand this questionnaire back to a ranger. If you can't find Her/him leave it in the survey mailbox provided at the end of your walk. If this is not possible please mail it to:

**Wilderness Education Project,
Department Lands, Parks and Wildlife
134 macquarie st
Hobart, 7000**

Thank you very much for your assistance

The Management of Wilderness Bushwalking

Appendix 2 - Mount Anne Area User Survey

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Mt. Anne Area User Survey

This survey of users of the Mt. Anne Area is additional to the Wilderness Walker Survey. It is being conducted by the Centre for Environmental Studies, University of Tasmania in conjunction with the Department of Lands, Parks and Wildlife. The results will be used to improve the management of the area.

Thanks for your help.

Nick Sawyer
Project Coordinator

1. What is the major purpose of your trip?

- one day bush walk ☐
- overnight bushwalk ☐
- caving ☐
- other (please specify) ☐

2. Time at which you started walking?

3. Are you:

- alone ☐
- with friends and/or family ☐
- with an organisation or club (please specify) ☐
- with a commercially guided group (please specify) ☐

4. What route did you take?

- Condominium Creek to Mt. Eliza ☐
- Condominium Creek to Mt. Eliza and Mt. Anne summit ☐
- Redtape Creek to Lake Judd ☐
- Mt. Anne Circuit (ie Condominium Creek to Redtape Creek via Mt. Lot and Lonely Tarns) ☐
- Schnells Ridge ☐
- Other (please specify) ☐

5. Did you stay overnight in the Mt. Anne area?

Yes ☐ No ☐

If No' go to question 7

6. How many nights did you spend at each of the following campsites:

- stayed in High Camp Memorial Hut ☐
- camped near High Camp Memorial Hut ☐
- shelf camp ☐
- Lake Pionce ☐
- Judds Charm ☐
- Lake Judd ☐
- Condominium Creek ☐
- Other (please specify) ☐

7. How do you rate yourself as a bushwalker?

- Novice (never been on an overnight bushwalk) ☐
- Moderately experienced (less than 6 overnight bushwalks) ☐
- Very experienced (6 or more overnight bushwalks) ☐

8. Is this your first trip to the Mt. Anne area?

Yes ☐ No ☐

If 'Yes' go to question 10

9. If 'No', how many previous trips have you made?

10. Which were your motives for undertaking this trip (tick those that you considered important)

- Adventure ☐
- A 'Wilderness Experience' ☐
- Physical exercise ☐

(question continues overpage)

The Management of Wilderness Bushwalking

Appendix 2 - Mount Anne Area User Survey

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<ul style="list-style-type: none"> • Interaction with other persons in your group <input type="checkbox"/> • Escape from city life <input type="checkbox"/> • Enjoyment of the mountain landscape <input type="checkbox"/> • Cave exploration <input type="checkbox"/> • Other (please specify) <input type="checkbox"/> 	<p>(please explain the behaviour that concerned you, if any did)</p> <p>_____</p> <p>_____</p> <p>_____</p>																														
<p>11. Which features of the area did you enjoy the most? (Please tick those that you considered most important)</p> <ul style="list-style-type: none"> • Scenery <input type="checkbox"/> • Solitude <input type="checkbox"/> • Naturalness <input type="checkbox"/> • Quietness <input type="checkbox"/> • Geological features <input type="checkbox"/> • Trees and plants <input type="checkbox"/> • Animals <input type="checkbox"/> • Caves <input type="checkbox"/> • Other (please specify) <input type="checkbox"/> 	<p>• Other (please explain)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>noticed didn't notice</th> <th>but not concerned</th> <th>mod- erate concern</th> <th>very con- cerned</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>_____</p> <p>_____</p>	noticed didn't notice	but not concerned	mod- erate concern	very con- cerned																										
noticed didn't notice	but not concerned	mod- erate concern	very con- cerned																												
<p>12. What did you think of your trip?</p> <ul style="list-style-type: none"> • Far exceeded expectations <input type="checkbox"/> • Well satisfied <input type="checkbox"/> • Just satisfactory <input type="checkbox"/> • Generally unsatisfactory (please explain) <input type="checkbox"/> 	<p>15. If you stayed overnight, how many other groups did you encounter each night, (as near as you can recall):</p> <ul style="list-style-type: none"> • stayed in High Camp Memorial Hut <input type="checkbox"/> • camped near High Camp Memorial Hut <input type="checkbox"/> • at shelf camp <input type="checkbox"/> • at Lake Poone <input type="checkbox"/> • at Judds Charm <input type="checkbox"/> • at Lake Judd <input type="checkbox"/> • at other campsites (please specify) <input type="checkbox"/> 																														
<p>13. On average, how many other groups did you encounter on the track each day (excluding those at campsites?)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>0</th> <th>1-2</th> <th>3-5</th> <th>6-10</th> <th>10+</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	0	1-2	3-5	6-10	10+						<p>16. If you did encounter any other groups at campsites or the hut, were you concerned by:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>noticed didn't notice</th> <th>but not concerned</th> <th>mod- erate concern</th> <th>very con- cerned</th> </tr> </thead> <tbody> <tr> <td>• overcrowding of the campsite/hut</td> <td style="height: 40px;"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>• loss of privacy</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>• the behaviour of some of the other users of the campsite/hut (please explain)</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		noticed didn't notice	but not concerned	mod- erate concern	very con- cerned	• overcrowding of the campsite/hut					• loss of privacy					• the behaviour of some of the other users of the campsite/hut (please explain)				
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<p>14. If you did encounter any other groups on the track (not at campsites) were you concerned by:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>noticed didn't notice</th> <th>but not concerned</th> <th>mod- erate concern</th> <th>very con- cerned</th> </tr> </thead> <tbody> <tr> <td>• the number of groups met</td> <td style="height: 40px;"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>• the size of some of the groups met</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>• the behaviour of some of the groups met</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		noticed didn't notice	but not concerned	mod- erate concern	very con- cerned	• the number of groups met					• the size of some of the groups met					• the behaviour of some of the groups met					<p>• other (please explain)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>noticed didn't notice</th> <th>but not concerned</th> <th>mod- erate concern</th> <th>very con- cerned</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>_____</p> <p>_____</p>	noticed didn't notice	but not concerned	mod- erate concern	very con- cerned						
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17. Did any of the following concern you during your trip?

	noticed didn't but not notice	mod- erate concern	very con- cerned
• walking on badly degraded sections of track			
• erosion and trampling of vegetation associated with the track			
• the number of cleared campsites			
• clearance of vegetation associated with campsites			
• fireplaces			
• evidence of firewood gathering			

If you were disturbed by any other environmental effects noticed on your trip, what were they?

18. What do you think the party size should be for a trip such as yours?

- maximum ☐
- ideal ☐
- minimum ☐

19. If it became necessary to prevent overcrowding and degradation of the Mt. Anne area, would you support the following measures?

	Yes	No	Unsure
• restrict camping to designated sites			
• construct more huts in the area			
• construct toilets at frequently used campsites			

	Yes	No	Unsure
• ban campfires			
• restrict campfires to existing fireplaces			
• require permits (issued free) for access to the area (to limit the number of people in the area at any one time)			
• require permits (for which a fee is payable) for access to the area (to limit the number of people in the area at any one time)			
• payment of fee to use the area (no other restriction on use)			

20. The following are possible options to prevent further degradation of the Mt. Anne area. Please tick which you would prefer:

(a) no restriction on visitor numbers in conjunction with substantial upgrading of tracks to protect the environment (e.g. boardwalk across alpine plateau areas); ☐

(b) some form of limitation on the number of walkers in the area at any one time in conjunction with minor track upgrading; ☐

21. Do you consider that any of the following detract from the natural qualities of the area?

	noticed didn't but no notice	mildly detract	greatly detract
• the existence of the track itself			
• track work such as boardwalk and steps on steep slopes			
• badly degraded sections of track (e.g. eroded track or trampled vegetation)			

Appendix 2 - Mount Anne Area User Survey

	noticed didn't notice	but no detract	mildly detract	greatly detract
• the hut				
• evidence of other walkers				
• aircraft passing overhead				
• views of distant disturb- ance to the natural environ- ment (e.g. road and HEC impound- ment)				
• other (please specify)				

Any Further Comments on issues affecting management of the Mt. Anne area ...

Thanks for your cooperation

Please follow the directions at the end of the Wilderness Walker Survey for how to hand in this questionnaire