

# POLLUTION OF MOONS CAVE, BUCHAN, VICTORIA: A CASE STUDY IN CAVE RESERVE MANAGEMENT

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## *Abstract*

*Moons Cave is a former tourist cave in the main reserve at Buchan. It is downstream of the camping area; effluent from toilet and shower blocks flows through the cave. This paper summarises the history and management of the Buchan Caves Reserves, and describes investigations into this and other management problems. Legal and practical aspects of reservation, management, pollution control and cave protection are discussed.*

## Introduction

This paper describes pollution of Moons Cave (B2) in the Buchan Caves Reserve. This is only one aspect of a whole range of management problems which are evident. These problems are not new or unique and many relate to management decisions made in the past. They are noticeable now due to the increasing numbers of people utilizing the Reserve. Development decisions and expenditure in recent years have been directed largely towards rewiring the caves and to various camping amenities. However, past decisions which did not take into account the particular properties of limestone and cave processes are proving to have shortcomings. With this in mind we will discuss the history of cave discovery and subsequent reservation of Cave Reserves as background to current problems.

## History of Cave Discovery and Reservations

The caves of Buchan were probably known (to the white man) from the earliest days of settlement in the 1830s. The first geological map appeared in 1866 (Taylor), and a few years later Howitt was able to describe the geology of the area in some detail, with general reference to the numerous surface karst features and caves (Howitt 1876). The value of these caves must have been recognised from the outset, for by 1889 there were reserves at Spring Creek, Wilsons Cave and Dicksons Cave. It was realised not only that the caves had tourist potential, but that they were of considerable scientific importance as well (Stirling 1889).

Unfortunately, this early awareness of the value of the caves was not matched by adequate management; Ferguson (1898) reported that vandalism had extensively damaged some of the caves. A few years later, Dunn (1907) described extensive vandalism to Spring Creek Cave, and concluded that any new caves should be properly protected and developed; scrupulously preserving them from vandalism from the outset.

Just after the turn of the century, a fairly comprehensive survey of the cave areas was undertaken, and a considerable expansion in the area and number of cave reserves was recommended (Kitson 1907). This included the reservation of a considerable area of unoccupied Crown land as well as the conversion of several existing reserves (two of them mining reserves!) to cave reserves, and the excision of several areas from land already selected for agriculture.

Kitson clearly envisaged that the Buchan area would be of considerable interest to tourists:

“The known limestone caves of considerable extent are so rare in Victoria that it is very desirable to retain for the Crown all areas where there is any reasonable probability of discovering caves, especially when remembering the great number of tourists who annually visit the Jenolan (Fish River), Yarrangobilly, Wombeyan, Wellington, and other caves in NSW, and the Chudleigh caves in Tasmania.”

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To its credit, the government accepted the recommendations, and a series of seven areas around the district were reserved “for public purposes, and the protection of natural features.” These included Buchan, The Potholes, The Pyramids, Murrindal, Dicksons Cave, Wilsons Cave, and Slocombes Cave. Unfortunately, there has been little change in the area reserved in the seventy years since, and more recent discoveries have located numerous substantial and important caves which are not within any reserve. A summary of the reserves as they now stand is contained in the table (appendix 1).

Not long after gazettal of the main Buchan Caves Reserve, Frank Moon was appointed caretaker. In the next few years he was to discover and explore some of the most important caves in the reserve: Moons Cave, B2 (September 1906); Kitsons Cave, B8 (December 1906); as reported by Thorn (1907) and Teichert and Talent (1958).

Moons Cave was evidently popular with early visitors. As Heath (1907) described it:

“The Moon Cave is hardly less beautiful than the Kitson, and certainly more accessible, with the exception of the part known as “Across the Creek.” In this creek there is a fair flow of water, and at the crossing-place, which leads to some of the most beautiful portions of the cave, is the pool where the sightless fish may be seen; also eels which look suspiciously like small, black snakes, and make one dubious of making the necessary plunge through this icy-cold water waist high. This, especially if you have a camera under one arm and clothes under the other, dodging the hanging stalactites and stepping occasionally on a loose stone on the shingly bed of the creek, is rather an experience.

After again donning one’s clothes there is a torturous crawl, after the manner of the serpent, through what looks like an impossible opening leading through to the “Fairy Chamber.” The spectacle amply rewards the difficulties in reaching this beautiful chamber. Here one can comfortably stand erect and admire the sparkling jewel-like effect of the tiny stalactites encrusted onto the roof of the cave, gradually getting larger as they extend to the side where they taper down in long candle-like formation. Beyond this again the creek is lost in a fissure where the stalactites hang down in a Medusa-like formation almost touching the water, which reflects them with mirror-like clearness, when the light of the acetylene lamp is brought to bear on them.”

Moons Cave was developed for use as a tourist show cave and was open for a number of years, but it was over-shadowed by the Royal and Fairy Caves, and its use eventually discontinued.

Moons Cave has been considerably vandalised over the years. Decoration has been broken and sampled by indiscriminant visitors and has also been muddied. The steps and railings have been allowed to deteriorate. In recent years a gate was installed by the Victorian Speleological Association (VSA) but this has been broken. Nevertheless, the cave entrance is situated in a quite impressive bluff known as Spion Kopje around which visitors can walk.

### Reserve Tenure and Management

The land comprising the various reserves is “permanently reserved” under Section 14 of the *Land Act* 1958 and earlier equivalents. This is as secure a form of tenure as it is possible to provide in Victoria, in that it requires an Act of parliament to revoke or amend a reserve.

Under the *Mines Act* 1958, reserves of this kind are exempted from mining, but the Minister for Lands has the power to allow exploration. This is quite a reasonable provision; it allows research into mineral resources, but would require a specific act of parliament to allow mining. However, under the *Extractive Industries Act* 1966, there is no exemption of reserves from quarrying for limestone. (Limestone is not a “mineral” under the *Mines Act*; rather, it is covered by the provisions of the *Extractive Industries Act* with respect to quarrying of building stone, sand, gravel, aggregate etc.) The consent of the Minister of Lands is required before an extractive industry lease can be granted on a reserve.

Nevertheless, this situation could lead to considerable conflict. Worse still, the public involvement provisions in the decision-making processes of the *Extractive Industries Act* (and, for that matter, the *Mines Act*) are so inadequate that the public may not ever find out about quarrying proposals until they are already a reality. As far as conservation goes, Victoria’s earth resources legislation is (still) something of a disaster.

Despite all this, the provisions of the *Land Act* are a reasonably effective vehicle for deliberative land management. At Buchan, this management has, in the past, been far from enlightened, or particularly active, but there are now many encouraging signs. Despite the shortcomings in the commitment of resources to the management task, at least the framework is there; the Act has teeth.

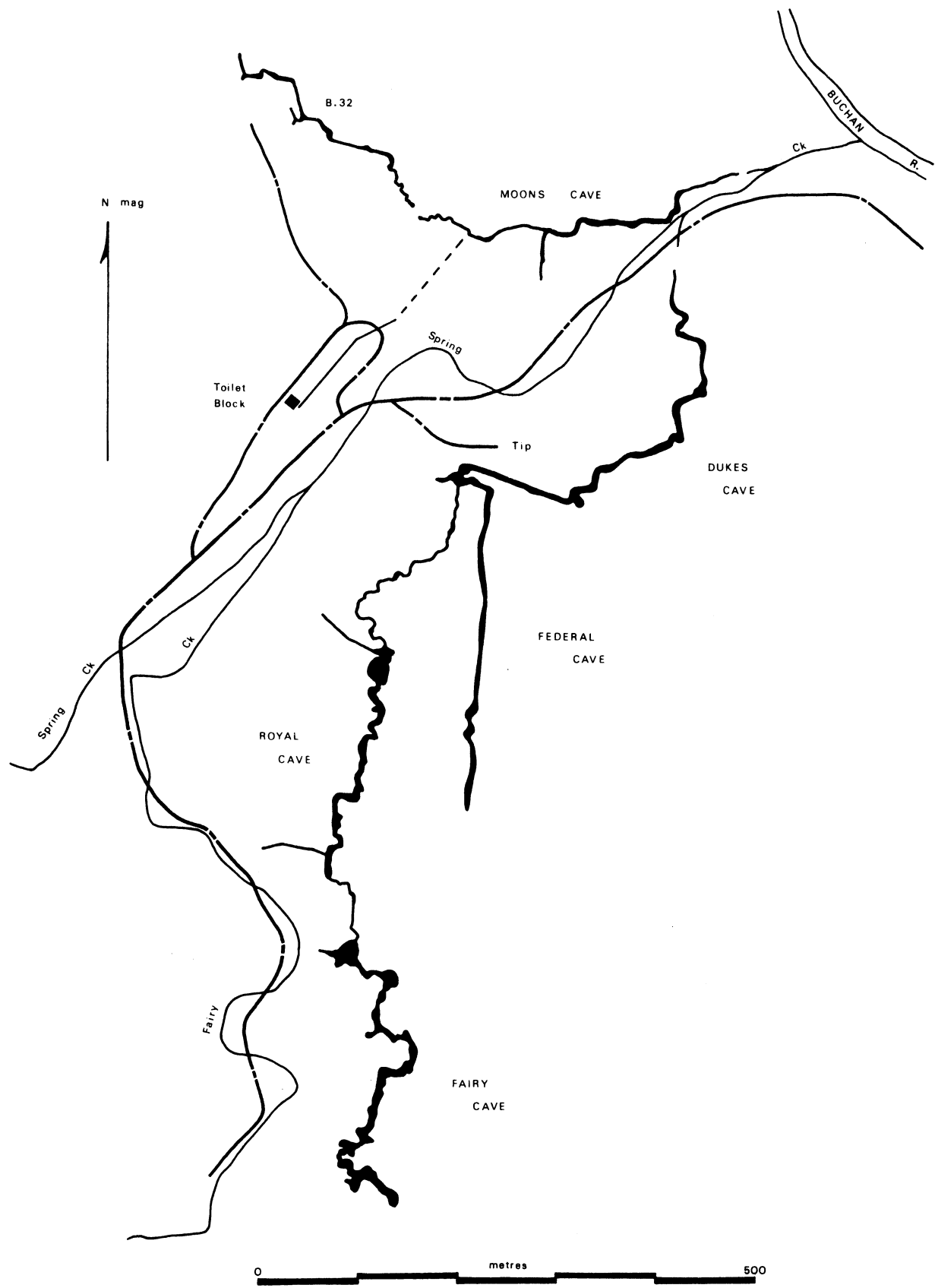


Fig. 1. Plan of the Main Buchan Caves Reserve

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At present the reserve is directly administered by the Department of Crown Lands and Survey, with a resident Superintendent responsible for the day-to-day management. An Advisory Committee (chaired by the Deputy Secretary for Lands, and comprised of representatives of the Departments of Tourism, Public Works and Mines) assists with reserve planning and development.

### Caves Pollution

Moons Cave pollution problems were first noticed in the late sixties when it was claimed the cave stream smelt and appeared as if it had raw sewage in it. (Anon. 1969a and b) The first attempt to prove this was in 1969 when a methylene blue dye reduction test was attempted. This test was inconclusive due to technical problems. In 1974 further tests were carried out. These relied on differential bacteria counts at 22°C and 37°C and coliform differentiation using McConky Agar Medium. Once again, the results were inconclusive but for different reasons. Certainly faecal coliforms were found but the pattern was not interpretable as both Moons Cave and Dukes Cave water had high counts whereas the Buchan River was clear. Both caves have bat colonies and the testing was not such that it could differentiate the source. The finding that Dukes Cave water had high counts was inexplicable at the time and remains so. This highlights the problem of bacteriological water testing; valid and conclusive testing relies on the facilities of a water testing laboratory with qualified personnel.

In the January and February 1975 tourist season another series of samples was taken and this time they were analysed by a microbiologist at the University of Melbourne. These conclusively showed human type 1 *Escherichia coli* in the outflow from the septic tank and high coliform counts in Moons Cave waters.

This finding was confirmed by subsequent fluorescein tracing carried out by Adrian Davey and Rudy Frank which connected the septic tank outflow and a sidestream which enters the main stream in the upstream section of Moons Cave.

We viewed these findings with considerable concern. The cave is part of an important and significant system within the Reserve. Such pollution made it an unpleasant, if not unhealthy, cave to be in. At various times of the year the cave is inhabited by bats (*Miniopterus schreibersii*). The effect of human faecal pollution on the bats is unknown. Further, the cave efflux runs into Spring Creek within the Caves Reserve and then into the Buchan River within the township area.

The findings were then made known to the Committee of Management in which we outlined the problem, and whilst not insisting that they rectify the problem immediately, we suggested a series of official water sampling tests at times of high and low usage of the reserve. These tests have confirmed our findings and plans are now being drawn up to modify facilities.

It should be noted that pollution control in Victoria is achieved by the issue of a waste discharge licence under the *Environment Protection Act*, 1970. The requirements of the Act bind the Crown and there is an obligation by the Lands Department as manager of the Reserve, not only to obtain a waste discharge licence for its facilities, but to undertake appropriate alterations so that the licence conditions and standards are met. The Environment Protection Authority, in consultation with the Health Department and other agencies sets the effluent standards which are the basis for the licence conditions. The existence of this system is providing added impetus to the controlling of pollution in situations like this.

One of the other aspects of this case was that the superintendent found that the septic tank had not been adequately maintained by the contractor and all the baffles had rotted away. These have now been replaced. It is not known how much this contributed to the pollution. However the system was not designed for the numbers of people now using the Reserve. Cave visitors numbered 53 000 in 1968, 66 000 in 1972 and have exceeded 100 000 in each of the past two years.

The Public Works Department is now drawing up plans to treat the effluent from all the toilet and shower blocks in the Reserve. A sewage treatment plant is not a viable proposition due to the very seasonal nature of the load and what is proposed is a pumping station and treatment of the effluent in lagoons. This work will be expensive but is fully warranted and will be a wise investment in the long term.

### Other Management Problems

Apart from the pollution problem described above, there are other management problems, some of which are mentioned below.

For many years garbage from the reserve has been disposed of in a sinkhole on the hill above and between Dukes and Royal Caves. Over the years it has been pointed out to the various superintendents that this was an undesirable practice. During 1976 VSA has resumed exploration in Dukes Cave and passed the rockfall and connected Dukes Cave and Federal Cave which in turn is connected to Royal Cave. Frank Moon recorded this connection 60 or 70 years ago but there has been little systematic exploration since this time and there was also rockfall which blocked the connection. Federal Cave entrance was bricked up a few years ago as a result of the gate being broken and some vandalism. This entrance was opened up this year to assess the cave for reopening as a tourist cave. About this time a strong smell of burning rubbish began to be encountered in the tourist section of Royal Cave where the Federal Cave connection comes in. This was of immediate concern and Federal Cave was bricked up again and VSA was asked to see if they encountered any such smells in the new sections of Dukes Cave. Nothing could be detected and it cannot be concluded that our exploration or sump lowering activities have changed the cave breathing pattern to cause these unpleasant smells. The best explanation is that the smell was entering via some of the tiny holes in the vicinity of Federal Cave and then wafting through to Royal Cave. The upshot of all this is that the tip in the doline will be covered with dirt and the management will purchase a garbage truck which will then take rubbish to the shire tip.

The shire tip is also an anachronism in terms of karst management as it is on the headwaters of Fairy Creek which flows into Spring Creek in the Reserve and must be connected to the stream in the Tourist Cave Complex although we have not demonstrated this. The Reserve Management may yet regret the siting of this shire tip.

Other management problems associated with the Reserve relate to vandalism in the caves. VSA has installed gates on Spring Creek Cave, Moons Cave, Dukes Cave and Root Cave at the request of the Reserve Management. Both the Spring Creek Cave and the Moons Cave gates have been broken. Despite bans on unauthorised caving in the Reserve, and despite active management supervision, uncontrolled caving still exists. The decision to gate Root Cave was a negative approach to a management problem. This cave has an entrance which overlooks a medium sized rockfall chamber. Tourists had worn a track up to it and the cave was being used as a repository for soft drink cans and the like. Instead of gating the cave an alternative approach would have been to use the entrance balcony as a self-guided feature. With a minimum of expenditure, a signposted track, a hand rail balcony at the entrance and tourist-operated floodlights could have been installed. This would have been more in keeping with the obvious need for further interpretive and educational facilities within the Reserve.

## Summary and Conclusions

We have written in considerable detail about the history and reservation of the caves of the Buchan area in order that the background of management can be looked at as a whole. We have described direct management problems within the Buchan Caves Reserve which demonstrate a lack of understanding of karst resources. We have indicated that the framework for deliberative management of the reserve is generally found, and given the allocation of sufficient management resources, has considerable potential for solving these and other problems.

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## APPENDIX 1

### RESERVES IN THE BUCHAN DISTRICT

Reserve	Area	Location	Feature	Comments
Main Buchan Caves Reserve	289 ha	In the Buchan township	Principal tourist caves, several disused tourist caves, and numerous other caves; some interesting surface karst features; vegetation on limestone cleared but reserve includes extensive remnant of bushland on volcanics; Spring Creek Falls; camping area.	Caves area and camping park actively managed and extensively developed. Numerous inadequacies; heavy visitor pressure.
Wilsons Cave	Approx. 8 ha	East Buchan adjoining road	One well-known spacious cave extensively damaged; minor cliffs; mainly cleared with some regeneration.	Not managed; extensively vandalised; noxious weeds.
Slocombes Cave	3.6 ha.	The Basin, on a good track west of the main road.	One extensive cave; cleared land; a few dolines.	Not managed; damage to cave not too extensive.
The 18 Acre Reserve	7.3 ha	The Potholes adjoining main road.	Numerous dolines and potholes; relatively undisturbed bushland.	Not managed; periodically burned and grazed; rubbish, vegetation. Landscape and caves are particularly important.
Part Allotment 22A	2.4 ha	"	Numerous dolines and potholes, cleared.	Not managed; grazed; some caves heavily visited and deteriorating.
The Pyramids	35 ha	Murrindal River 1 km walk or drive across paddocks from main road.	Cliffs, pinnacles, caves, numerous surface karst features; important palaeontological sites; good remnant jungle and forest on limestone; spectacular and interesting views.	Not managed; grazed, damage by rockhounds; surface vegetation, landscape, and to a lesser extent, the caves, are particularly important.
Murrindal	3.2 ha	Murrindal adjoining main road	Murrindal and Lilly Pilly tourist caves; several other caves; some original vegetation.	Limited management — main caves protected, part developed, and used for occasional tourist parties. Numerous inadequacies; considerable tourist potential.
Dicksons Caves	1 ha	Between the Potholes and Murrindal close to main road.	Two well-known and easily accessible caves; cleared.	Not managed; extensively damaged; rubbish.