Summary

This management plan provides the framework and guidelines on how Undara Volcanic and Forty Mile Scrub National Parks will be managed. It sets out the considerations, outcomes and strategies that are proposed to form the basis on which day-to-day management decisions are made.

This plan was prepared in September 1999 and, in accordance with s 111 of the Nature Conservation Act 1992, will be reviewed not later than 10 years after its approval. For further information on this plan or the planning process, please contact the Queensland Parks and Wildlife Service’s Far Northern regional centre in Cairns on (07) 4052 3092 during business hours.

Note that implementation of some management strategies might need to be phased in according to availability of resources.

Cover photograph: Barkers Cave, courtesy of H.J. Lamont, James Cook University.

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Introduction

This document is a management plan for both Undara Volcanic National Park and Forty Mile Scrub National Park. Much of the land in the parks has been used only for grazing and minor timber extraction. This allows long-term planning for the areas without significant constraints imposed by past activities.

Undara Volcanic National Park contains a range of superb and well-preserved features associated with Queensland’s Cainozoic volcanic history and includes a variety of volcanic vents and long lines of lava tubes. These lava tubes are the finest examples in Australia and also significant on an international basis. They occur in lava flows from the Undara Volcanos which was active about 190,000 years ago. These lava tubes contain specialised ecosystems which are significant in a national and international context. Bayliss Cave is rated as one of the world's most important biologically diverse caves.

The focus of management will be to protect the park’s geological values and to provide improved visitor services and facilities for day use and camping at designated campsites. Tourism is based currently on selected cave visits staged from the Undara Lava Lodge, located adjacent to the park. The management plan incorporates a range of strategies for managing such activities.

While not contiguous with Undara Volcanic National Park, Forty Mile Scrub National Park is located in close proximity and contains substantial and excellent examples of vine thickets vegetation rich in species diversity and is important for a range of fauna species. The two national parks are managed in a complementary and co-ordinated manner. It is anticipated that Undara Volcanic National Park will continue to be the major focus of visitors and management.

The plan proposes detailed strategies to protect natural and cultural values while allowing the public to continue enjoying the range of recreational activities that are available in the parks. Areas that are relatively undisturbed by human activity have been recognised in the parks and will be managed to ensure that they continue to be available for people seeking solitude and isolation in the context of nature-based recreation. Feral animal and weed control programs and the removal of stock from the parks will also help to protect the area’s ecosystems.

This plan has been prepared by the Queensland Parks and Wildlife Service (QPWS) in close consultation with the Undara Interim Management Advisory Committee and following consideration of public submissions on issues affecting the area.

1 Management directions and purpose

Directions

Undara Volcanic National Park and Forty Mile Scrub National Park will be managed as largely undeveloped national parks renowned for their contributions to representative samples of Queensland’s Cainozoic volcanic history and vegetation respectively.

Visitors to Undara Volcanic National Park will enjoy the park’s impressive geological landforms and examples of volcanic events in north Queensland. High quality visitor experiences will be provided through the adjacent commercial operation and through a variety of facilities to be established on the park. The main visitor activities will be camping, bushwalking, nature study, photography and birdwatching. The distinctive savannah landscapes will continue to be preserved with no loss of scenic amenity.

Low-key visitor facilities which are sensitively sited and managed will be located primarily in the park’s north-eastern section while the southern sections will remain largely remote and natural and be managed accordingly. Opportunities and facilities for groups to visit designated lava tubes and caves will be provided in appropriate areas close to the adjacent Undara Lava Lodge.

Appendix 1

Significance and values of Undara Crater and Lava Tubes as recorded on the Register of the National Estate

<table>
<thead>
<tr>
<th>Register criteria</th>
<th>Significance and values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1 Importance in the evolution of Australian flora, fauna, landscapes or climate.</td>
<td>High. The Undara Crater and Lava Tubes provide much information about past volcanic events in North Queensland. The physical characteristics of the flow indicate a gentle outpouring of lava (palaeohoe lava) that unlike many of the other flows in the region were able to form lava tubes. Old lava levels and the sequence of formation of the tubes can be determined clearly. Palaeodrainage of ancient rivers and creeks are indicated by the flows (Adkinson, 1990, 1992; Atkinson, Griffin and Stephenson 1972). The surface of the lava flows and the cave entrances support a semi-evergreen vine thicket that contains distinctive and ancient plant species that have strong affinities with Gondwana species (Kahn and Lawrie, 1987). Within the lava tubes are fossils distinctive communities of troglobitic species, many of which are undescribed and/or endemic to these systems. This includes isopods of the Superfamily Oniscoidea, spiders of the Family Pholcidae (Spermophora sp. nov B), Family Zodariidae, Family Nesticidae and a sightless hunting spider of unknown affinity, two species of Polydesmidae, centipedes (Chilopoda: Scutigeromorpha), silverfish (Thysanura), cockroaches (Family Blattellidae), two species of assassin bugs (Family Reduviidae) and a number of beetles (Family Staphylinidae) (Gray 1989; Howarth 1988).</td>
</tr>
<tr>
<td>A.2 Importance in maintaining existing processes or natural systems at the regional or national scale.</td>
<td>High. The Undara Lava Tubes are an important breeding area for cave-dwelling bats. Maternity colonies of the common bent-wing bat (Miniopterus schreibersii), little bent-wing bat (M. australis), little brown bat (Epotesicus fuscus) and eastern horseshoe bat (Rhinolophus megalophyllus) are found in a number of the lava tubes (Matthews 1985). Speleothem and evolution of troglobitic animals from their terrestrial counterparts is also in evidence within the lava tube ecosystems (Howarth 1988).</td>
</tr>
<tr>
<td>A.3 Importance in exhibiting unusual richness or diversity of flora, fauna, landscapes or cultural features.</td>
<td>High. Bayliss Cave contains at least 52 resident species of animals within the lava tube system, and also supports the most diverse assemblage of arthropods recorded for any cave in North Queensland (Howarth 1980).</td>
</tr>
<tr>
<td>C.1 Importance for information contributing to a wider understanding of Australian natural history, by virtue of its use as a research site; teaching site; type locality; reference or benchmark.</td>
<td>High. The Undara Crater and Lava Tubes have been an important research site for the study of the formation of lava tubes; the study of volcanism in the McBride Province; and the study of cave-dwelling fauna and their ecology. A number of major expeditions to the Undara Lava Tubes have been conducted over the last few decades in order to explore and map the caves and to collect specimens (Atkinson 1992, Grimes 1977). The Wall is a highly significant feature because it has been found to be analogous with volcanic features on the Moon, and has thus assisted in the interpretation of lunar features (Atkinson 1990, 1992; Atkinson, Griffin and Stephenson 1975).</td>
</tr>
</tbody>
</table>
Visitors to Forty Mile Scrub National Park will have an opportunity to appreciate examples of rainforest vegetation of a type previously more widespread in north Queensland. This will be achieved through day-use facilities as it is not intended that camping facilities will be developed in this national park.

**Purpose**

The major purpose of management will be to ensure that:

**Conservation**

- The volcanic features of Undara Volcanic National Park, particularly the lava tubes, caves and their associated biological systems, are given special protection.
- Sensitive habitats and threatened species, for example, vine thickets of Forty Mile Scrub National Park, are monitored and management programs take into account their known requirements.
- Sites of special significance, for example, perennial springs, designated caves and the Undara Crater are managed to minimise human interference.
- Burning for ecological purposes will be used to protect plant and animal communities from the potentially adverse effects of wildfires.
- Springs and aquifers which contain precious water supplies do not suffer impacts associated with proposed visitor facilities and increasing visitor numbers.
- Pest plant and animal control action plans are developed in conjunction with park neighbours.
- Programs to rehabilitate degraded sites, for example, fire and lantana affected areas, are undertaken.
- The uninterrupted vistas associated with the savannah landscape are retained.
- Actions are taken to declare small areas of adjoining lands currently under negotiation as national park.

**Recreation and tourism**

- Opportunities for a range of ecologically sustainable nature-based recreation and tourist activities focusing on examples of volcanic events and the savannah landscape are developed and managed to a high standard.
- Undara Volcanic National Park's geological processes/landforms as part of a set of attractions in the Cairns hinterland are promoted.
- Vehicle and walk-in camping opportunities are developed in Undara Volcanic National Park.
- Day-use facilities providing interpretation of the vegetation of Forty Mile Scrub National Park are developed.
- Visitor enjoyment of the parks is enhanced through improved interpretation and education of the key features.
- Sites which pose a potential risk to visitor safety are identified and access carefully controlled.
- Develop strategies for the management of cultural heritage values/places.

**Community involvement**

- Neighbours are aware of matters in which they have an interest, for example, fire management and weed control programs.
- Opportunities are provided for Aboriginal people and other local residents particularly concerned with the parks to be consulted and involved in planning and management.
2 Basis for management

2.1 Regional context

Undara Volcanic National Park and Forty Mile Scrub National Park are part of the extensive Einasleigh Uplands biogeographic region (Stanton and Morgan 1977) and also lie in the north-western portion of an area known as geological terms as the McBride Province, about 150km south-west of Ayrshire (map 1). Undara Volcanic National Park contains outstanding examples of well preserved volcanic features, developed in the Cainozoic era. These superb natural phenomena include lava tubes, craters, lava ponds and flows which are associated with unique fauna and vine thickets at the western extent of their natural range. Impressive perennial springs are also an integral part of the dominantly volcanically derived landscape.

The Undara Volcano produced lava fields covering an area of about 1550 sq km, derived from several flows; the longest (160km) flowed down precursors of Junction Creek and the Einasleigh River to the north-west. This flow also contains the best lava tube development, now evident as preserved lava caves and a line of depressions caused by roof collapse, and drainage of former lava ponds adjacent to and in alignment with the flow.

In Undara Volcanic National Park and Forty Mile Scrub National Park vegetation comprises open savannah woodland and grass plains with vine thickets generally restricted to stony, fire-resistant areas such as craters and depressions. The largest expanse of vine thicket occurs in Forty Mile Scrub National Park. Tea-tree Melaleuca brevifolia forms dense thickets in the vicinity of perennial springs on Undara Volcanic National Park and provides important areas of habitat for native animals. Much of these woodlands remain uncleared, altered only since European settlement through stock grazing activities, invasion of feral animals and weeds, and a changed fire regime.

The region has been used predominantly for cattle grazing since the early 1860s when European people moved into the area. Currently, cattle grazing is being phased out of Undara Volcanic National Park. Surface water is relatively scarce except in the vicinity of perennial springs, and in swamps following monsoonal rains.

Historically, the lava tubes were features of interest and received intermittent, unmanaged visitation. They were well recognised in the area by 1891 as indicated and described by Malland (1891). The spectacular lava tubes, other volcanic features, the savannah landscape and improved access have become an important focus for regional tourism. Development of a resort-style lodge on a special lease, business (tourist facility) purposes (subsequently referred to as the special business lease) adjacent to Undara Volcanic National Park and operated on a concessional basis (Undawal Pty Ltd and Dutana Pty Ltd) has catered for this need. Undara Lava Lodge is currently in its tenth season of operation although guided tours started in 1989. Annual public visitation to approved lava caves increased to about 32,000 during 1998-99. Current trends suggest further increases in visitor numbers.

Access to the parks is predominantly by vehicle-based visitors travelling on the sealed Kennedy Developmental Road and the Gulf Developmental Road. The growing demands made on the lava tube environment, particularly those used for tourism in the vicinity of Undara Lava Lodge, have the potential to degrade these features and threaten associated ecosystems.

There are no other national park areas of easy access within a 100km radius.

2.2 Planning area

The planning area consists of two national parks — Undara Volcanic National Park and Forty Mile Scrub National Park. The linking of these parks as a single management unit in this management plan is


Manidis Roberts Consultants et al. (1993) Environmental Code of Practice In the Wet Tropics World Heritage Area - prepared for The Queensland Electricity Supply Industry.


desirable as they share many similar management issues and will be managed in a co-ordinated and complementary manner.

Undara Volcanic National Park has been gazetted in four stages — Undara Crater of 600ha in June 1989, Yarramulla Holding portion of 17 000ha in August 1992, Mount Rosery Holding portion of 37 100ha in July 1993, and One Hundred Mile Swamp former special lease area portion of 6780ha in August 1994. The current area of Undara Volcanic National Park is about 61 500ha.

Forty Mile Scrub National Park has been gazetted in a number of stages — St Ronans Holding and Minnamoolka Holdings, tclt portions of 4619ha in June 1970 (in July 1988 with the introduction of digitised mapping, the park area was reduced to 4500ha); Mount Laing North Holding portion of 1680ha in December 1989; St Ronans portion of 100ha in November 1995; Minnamoolka Holdings portion of 50ha in November 1997. Forty Mile Scrub National Park currently has an area of about 6330ha.

A special business lease of 841ha lies adjacent to Undara Volcanic National Park. This area is a prime focus for visitor management to the park and consequently is discussed in this plan.

The southern portion of the former Mount Rosery Holding has become a resources reserve under the Nature Conservation Act 1992. The Department of Mines and Energy (DME) holds an interest in the land for the purposes of sapphire extraction. The chief executives of DME and QPWS are joint trustees of this reserve. A separate management plan is being compiled for this area. Consequently, consideration of the area will mostly be excluded from this plan.

2.3 Planning process

The purpose of management plans is to set clear directions for management of national parks. To do this, detailed management actions are proposed where necessary.

All comments, suggestions and submissions about management plans are considered when final plans are written.

Once approved, final plans are given effect under the Nature Conservation Act 1992. Under section 125, plans must be reviewed within 10 years.

The planning process started in November 1992 with the inaugural meeting of an Interim Management Advisory Committee at Mt Surprise. The committee’s input and discussion largely provided the basis for the plan. Community and government members of the committee include: Aboriginal representative (initially M. Thomas, replaced by B. Bing), Conservation Group representative (Queensland Conservation Council, initially R. Crisp, replaced by M. Thurgate), Department of Primary Industries, Fisheries and Forestry (J. Dickenson), Ethridge Shire Council (L. Lethbridg), Queensland Tourist and Travel Corporation (J. Smith), Landholders adjoining the parks (N. Cordon, Rosella Plains), Specialist Consultant Geologist (A. Ackin), James Cook University, Geology Department (Professor J. Stephenson), Queensland Fire and Rescue Authority (B. Cifuentes), Chillagoe Caving Club (L. Pearson), Undara Lake Lodge Resort (G. Collins), Queensland Parks and Wildlife Service (Regional Director, Chairperson).

In accord with section 113 of the Nature Conservation Act 1992, advertisements giving notice of the preparation of a draft plan were published in newspapers in the Cairns and Atherton Tablelands regions.
2.4 Management obligations

Decisions concerning planning and management must consider relevant legislation, the needs of other government agencies with statutory duties, permits and agreements, and the influence of surrounding land use.

Legislation

Relevant legislation includes:
There are no formal native title claims over Undara Volcanic and Forty Mile Scrub National Parks at the time of writing this plan, however it is possible that native title may exist.

The Native Title Act 1993 provides for the recognition and protection of native title. The plan does not intend to affect, diminish or extinguish any native title rights. Work programs and management activities will consider the requirements of native title legislation to ensure native title rights are not compromised.

Nature Conservation Act 1992
Section 17 defines the management principles for national parks. The cardinal principle is to provide, to the greatest extent, for the permanent preservation of the area's natural condition and the protection of the area's cultural resources and values. The other principles are to present the area's cultural and natural resources and their values, and to ensure that the only use of the area is nature-based and ecologically sustainable.

Land Act 1994
This Act regulates the gazetted and de-gazetted of public roads, provides for the administration of leasehold and reserved land and controls changes in land tenure. The Special Business Lease granted to Underval Pty Ltd and Dutana Pty Ltd is administered under this Act.

Rural Lands Protection Act 1985
Relevant provisions of this Act primarily relate to the control of weeds and feral animals throughout Queensland. Section 73 devolves control of declared plants and animals on public land to the government department which manages the land.

Integrated Planning Act 1997
This Act provides for planning for orderly development and environmental protection. The parks and surrounding land are included in the Town and Strategic Plans of the Etheridge, Mareeba, Herberton and Dalrymple Shires.

Fire Service Act 1992
This Act provides fire management across Queensland. Conservation officers have powers under the Act to control fires on and lands adjoining protected areas. The Rural Fire Division of the Queensland Fire and Rescue Authority remains responsible for controlling fire management on lands other than national park and administers rural fire brigades across Queensland.

Cultural Records (Landscapes, Queensland and Queensland Estate) Act 1987
This Act, administered by the Environmental Protection Agency (EPA) Cultural Heritage Branch, protects cultural heritage places in Queensland including sites of cultural significance to Aboriginal people.

Queensland Heritage Act 1992
This Act, administered by EPA, provides protection for cultural places such as historic buildings, places, ruins or other features listed under the Act.


Fensham, R.J., Cannell, R.J., Fairfax, R.J. (1993) The invasion of Lantana camara in Forty Mile Scrub National Park, North Queensland (Unpub.)


Godwin, M.D. and Goosen, S. (1990) Internal report to QDEH on Review of Natural Resources of Spring Creek and Lynwater Holdings.


4 Bibliography


Permits and agreements

A number of activities within the parks and the adjoining special business lease are subject to permits or agreements which have considerable relevance in planning and management. These are:

• Deeds of agreement with Undaval Pty Ltd and Dutana Pty Ltd relating to commercial activities within the special business lease and the Undara Volcanic National Park. These agreements establish the broad framework for concessional rights and conditions negotiated by QPWS with Dutana Pty Ltd and Undaval Pty Ltd. Dutana Pty Ltd also has a commercial permit to operate in Undara Volcanic National Park.

• Deed of agreement with Undaval Pty Ltd relating to access on the special business lease by QPWS employees and their agents.

• Memorandum of understanding between QPWS and the Queensland Corrective Services Commission to establish a prisoner work camp in the Undara Volcanic National Park.

2.5 Values of Undara Volcanic and Forty Mile Scrub National Parks

Geology and landscape

A variety of volcanic vents ranging from shield volcanoes (Kakulani) to pyroclastic cones (Kakulani) and lava vents (Undara) are present in the Undara Volcanic National Park (Stephenson, Griffin, Sutherland 1980). The Undara Volcano which straddles the eastern boundary contains an impressive steep sided crater. 400m across and 48m deep, now heavily vegetated with vines thickets which is a rare and threatened plant community (Stephenson, Griffin, Sutherland 1980).

Long lines of partially preserved lava tubes are associated with the northern and north-western flanks from the Undara Volcano (White 1962). In the north-western flow the lava tube system possibly extends more than 110km although the most evident section of tube (north-west tube section) extends 33km from Undara Volcano. Barker's Cave, at 33km along the flow from Undara Volcano is the last known remnant cave along the tube line. This lava tube system is Australia's largest tube system and one of the longest tube systems in the world. It is also unusual if not unique in that it developed on a granitic basement.

The surviving segments of the tubes form caves and archives, generally oval to circular in cross section with impressive dimensions up to 14m high, 20m wide and more than 16m long. More than 60 caves and arches have been discovered in the system. Most caves are less than 200m long, but the north-west tube section contains Australia's longest lava cave, Bayliss Cave, which is about 1500m long (Atkinson 1993).

The Undara Volcano and associated volcanic features (lava tubes and flows) are highly significant geological phenomena in international and national contexts. The lava tubes in particular are remarkable and superlative examples of these natural phenomena. The eroded andesite and pyroclastic deposits form extensive plains derived from the numerous vents scattered across the landscape and provide the persistent relief throughout most of the parks.

Three catchment systems are represented in the park. Water eventually drains into the Lynd, Einsleigh and Herbert Rivers. The western portion of Undara Volcanic National Park is drained by several prominent creeks, comprising Fifteen Mile, Twelve Mile, Nine Mile, Six Mile and Spring Lamb Creeks, which form part of the Einsleigh River catchment. The upper reaches of these creek catchments are fed by perennial springs, derived probably entirely from the basaltic aquifer. These springs are extraordinary because of the high discharge volumes and continuity of flows even in dry times.

Much of Undara Volcanic National Park, particularly in its southern portion, may be considered to have moderate-high wilderness value (AHC National Wilderness Inventory 1994).
Vegetation

Vine thickets are near the driest extent of their range and are associated with some craters and lava tube collapses. They are distributed in patches throughout the parks, particularly in stony, fire-exclusive zones, with the peak development in the Forty Mile Scrub National Park. These vine thickets remain as ‘islands’ in a landscape largely dominated by extensive savannah woodlands of ironbark and bloodwood species and provide important animal refuges. On all the vine thickets in the region, Forty Mile Scrub vine thickets are believed to contain the greatest number of plant species. Vine thickets in Undara’s crater contain the only known occurrence of a small-leaved myrtaceous shrub Backhousia sp. yet to be fully described. The rare, white-flowered onion vine Ipomoea ainuramensis also occurs in vine thickets in the parks.

Springs are outstanding natural features in this usually dry volcanic/granitic terrain and consequently provide important habitats for a range of wildlife. Associated with these springs are swamps and dense thickets of black tea-tree Melaleuca brocata interspersed with a range of tree species including figs and eucalypts.

Native animals

Specialised habitats in Undara Volcanic National Park and Forty Mile Scrub National Park support a range of native animals including:

**Bats:** Barkers Cave is a major nursery site for the common bent-winged bat Miniopterus schreibersii, the eastern cove bat Eptesicus fuscus and the eastern horseshoe bat Rhinolophus megaphyllus. The total colony is estimated to comprise about 40,000 bats during the maternity period.

**Arthropods:** insects, shrimp and spiders: Bayliss Cave is one of the world’s most important, biologically diverse caves, supporting 24 species of specialised troglobitic cave animals. This phenomenon is attributed in part to the uniquely high carbon dioxide levels (up to 6 percent), stagnant air and high relative humidity, creating a highly specialised habitat (Howarth 1998).

**Macropods:** Forty Mile Scrub appears to be the dry western extent of the range of the rainforest dwelling red-legged pademelon Thylogale stigmatica. Another vine thickener, the black-striped wallaby Macropus dorsalis has the northern edge of the geological Province as its northern frontier. The antelope kangaroo Macropus antilopinus, a grassy woodland inhabitant, reaches its southern limit in this area and is particularly common in the Fifteen Mile Spring area of the Undara Volcanic National Park.

Cultural values

The Aboriginal cultural heritage of the two parks remains largely undocumented. A preliminary survey at Undara Volcanic National Park was carried out in 1993 on areas most frequently visited. Several sites have been located in the parks and consist primarily of artefacts strewn and scarred trees. The lava tubes themselves and the areas comprising the perennial springs have not been surveyed and as such, the assessment of these potentially significant places is yet to be determined. The traditional and historical associations of Aboriginal people with the park is yet to be investigated.

The non-Aboriginal cultural heritage of the area is yet to be assessed. There is evidence of pastoral use of the area such as fence lines and yards, as well as the old Mt Surprise road, telegraph lines and several blazed trees.

Recreation and tourism

The lava caves, diversity of landforms and habitats combine to make the parks an important and worthwhile venue for a range of nature-based activities including bush camping, bushwalking and cave visitation. Commercial tourism is playing an increasingly important role in the economy of this region. Because of their favourable location, the parks have the potential to contribute significantly to regional growth.

Table 6. Summary of key monitoring activities.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Timing, frequency and responsibility</th>
<th>Comment/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public access caves and associated facilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radar, carbon dioxide and oxygen levels</td>
<td>Annual basis, early and mid tourist season, and external specialist personnel and QPWS Rangers.</td>
<td>Data gathered will indicate the necessity and regularity of continued monitoring.</td>
</tr>
<tr>
<td><strong>Bats</strong></td>
<td>Maternity season: QPWS specialists/QPWS Rangers.</td>
<td>In progress. Photo reference sites to be established. Continued monitoring needs to be determined.</td>
</tr>
<tr>
<td><strong>Vegetation</strong></td>
<td>Annual basis, early and late tourist season: QPWS Rangers.</td>
<td></td>
</tr>
<tr>
<td><strong>Other native animals</strong></td>
<td>Annual, at start of tourist season: external specialist.</td>
<td></td>
</tr>
<tr>
<td><strong>Roof and wall stability</strong></td>
<td>At discretion of Mines Inspector, commercial tour guides.</td>
<td>Fresh rock falls or potentially hazardous situations to be reported to QPWS.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td>Annual basis, start and end of tourist season (thorough checks) combined with routine daily surveillance by QPWS Rangers and commercial tour guides.</td>
<td>Guides or commercial operator to report malfunction or damage to QPWS.</td>
</tr>
<tr>
<td><strong>Bayliss Cave</strong></td>
<td>Native animals</td>
<td>Biennial by external specialist. Specialise to advise on frequency of monitoring.</td>
</tr>
<tr>
<td><strong>Weed infestations</strong></td>
<td>Lantana, rubber vine and others</td>
<td>Continuing throughout year by QPWS Rangers. Annual weed report. Photo reference sites to be established.</td>
</tr>
<tr>
<td><strong>Feral animals</strong></td>
<td>Pigs</td>
<td>Continuing throughout year by QPWS Rangers. Ranger staff to compile a feral animal control plan.</td>
</tr>
<tr>
<td><strong>Prescribed burning</strong></td>
<td>Vegetation and fauna</td>
<td>Annual by QPWS specialists/QPWS Rangers. Emphasis on threatened species and habitats. Monitoring dependent on specialist advice and from fire research. Annual fire reports will be compiled by ranger staff. Photo reference sites to be established.</td>
</tr>
<tr>
<td><strong>Public impact areas</strong></td>
<td>Visitor facilities and roads/tracks</td>
<td>Continuing throughout year by QPWS Rangers, frequency variable, dependent on visitor influx and seasonal variation. Site inspections for erosion, compaction, site degradation etc.</td>
</tr>
<tr>
<td><strong>Tourist operations</strong></td>
<td>Visitor numbers</td>
<td>Annual by QPWS staff and commercial operator. Compile annual visitor statistics. QPWS to liaise with commercial operator. Monitor compliance with permit or agreement conditions.</td>
</tr>
</tbody>
</table>

| Guide presentation and commercial operation | Annual by QPWS staff and commercial operator. | |
• Encourage the use of Lotus Glen Prison-supervised work parties to assist in weed control and construction programs and ensure the Lotus Glen accommodation facilities are maintained to environmentally acceptable standards, compatible with standards set for existing facilities in the park.
• Establish a new workshop and move all appropriate gear acquired for parks' management on site as soon as practicable.
• Develop a remote facility, strategically located on the Mount Rosey Section of Undara Volcanic National Park, suitable for overnight park staff accommodation and equipment storage.
• Train and develop Ranger staff in a range of skills, appropriate for implementing this plan.

3.7 Research and monitoring

Background Information
Some research has been carried out on Cainozoic geological aspects, cave biology and vine thickets. There is a need to increase knowledge of the parks’ values to improve the basis for management, interpretation and presentation. Most current research involves bat dynamics in relation to the publicly accessible caves, biology of Boyths Cave and vine thickets. Basic documentation of cave locations and morphology is incomplete. Previous studies on native plant and animal characteristics and distributions remain largely undocumented or in a form not readily available to managers.

At present there is little effective monitoring of activities or situations in the parks to enable detection of deleterious changes.

Desired outcomes
• Adequate monitoring of management activities and relevant environmental variables are undertaken.
• Research with particular emphasis on current management issues is encouraged and supported.

Proposed guidelines and actions
• Collate past research, particularly about native vegetation and animals and determine relevance to management.
• Give priority to research studies which generate baseline information on park values. Highly relevant studies include:
  - cave ecology, bat dynamics and entomology in publicly accessible caves;
  - vine thicket rehabilitation in Forty Mile Scrub National Park;
  - fire management in relation to threatened species and habitats;
  - management and eradication techniques for rubber vine;
  - Cainozoic geology with emphasis on Undara volcanic environment;
  - regional native plants and animals with emphasis on rare or threatened species;
  - cave invertebrate palaeontology;
  - Aboriginal cultural heritage and knowledge;
  - non-Aboriginal cultural heritage and history of exploration and settlement;
  - radon accumulation in publicly accessible caves; and
  - promote collaborative research with various groups.

Priority areas for monitoring are given in Table 6.

Educational and scientific values
There is considerable scope for undertaking a range of interpretive and educational programs related particularly to geological values of the park (aspects of Cainozoic volcanism, exposures of granite basement and of the lava tubes afforded by the caves, combined with good preservation of the various volcanic vents). Potentially useful research opportunities include geological, archaeological, anthropological, biological, palaeontological and fire ecology.
3 Management strategies

3.1 Natural resource management

Geological and landform features

Background information

Three lava tubes relating to the Undara Volcano have been defined. Sixty-eight caves have been documented associated with these lava tubes. sixty of these are in the parks. These tube systems, associated caves, depressions related to tube collapse and other depressions considered to represent lava ponds have remained essentially undisturbed by human influence since formation.

Cave habitats are special, diverse and spatially restricted. These are susceptible to environmental modification through artificial air movement, ground-water changes, human-induced alteration to light, temperature, atmospheric composition, humidity and biological changes. They support rare, restricted and highly selective invertebrates and provide essential shelter for bats. Some support the most restricted invertebrate taxa known. Public visits have the potential to adversely affect cave wildlife.

In recent years some of the caves (restricted to the north-west tube line) have provided an attractive focus for public visitation on a commercially guided basis. Apart from some minor works to facilitate access to one cave, no infrastructure or hardening of surfaces has been implemented to accommodate this visitor influx. Access to the caves used by park visitors has been on unformed dirt tracks using 20-seater buses with parking areas immediately adjacent to caves.

The current level of visitor use in the public access caves is contributing to a degradation of these environments. This degradation includes wear on primary lava flow floor surfaces, disturbance to vegetation and animals, dust from silty floors deposited on cave walls, floor compaction, silting and erosion.

About 44 vents are scattered throughout the park, although most occur in the Yarramulla and Mount Rosey sections of Undara Volcanic National Park. Kalkani Volcano is the only defined vent which has incurred significant human disturbance in the form of quarrying and water tanks. Fences encroach on some vents but apart from Kalkani Volcano, no access tracks disturb these features. Undara Volcano straddles the park boundary with a significant portion of this important feature located in adjacent Scoria Holding.

Desired outcomes

- Geology, biological, scenic and cultural values of the lava tube system are protected.
- The lava tube system and associated caves are managed to prevent or minimise disturbance and degradation from visitor activities.
- Visitors are able to gain access to selected vents and gain an appreciation of the volcanic landscape.
- Vents damaged by human impact are rehabilitated.

Proposed guidelines and actions

- Allow public access to certain caves only on a guided basis. The Service will review access to other caves in the Undara Volcanic National Park for the purposes of free and independent visits. This opportunity will be considered if there is a clearly established need for this kind of experience.
- Caves available for public access are Arch and Wind Tunnel Complexes, Barkers and Road Caves, and Picnic Cave (surface only).
- Build structures in all public access caves to minimise adverse impact.
- Restrict lighting (if used) to Arch Complex with appropriate placement of generators if required to remove visual impact and abate noise. Where practical, use solar panels in preference to generators for power generation. Conduct environmental monitoring where lighting is used to ensure any adverse effects are mitigated or prevented should they occur.

3.6 Park management

Other agencies and utilities

Background information

Many factors controlled by outside agencies have an influence on the parks' values. These require liaison between QPWS as land managers and agencies involved in local planning and facilities management. Key elements include Queensland Transport, Department of Mines and Energy, Far North Queensland Electricity Board, Queensland Corrective Services Commission, Ethridge, Dalrymple, Mareeba and Herberton Shire Councils, management of the commercial facilities on the special business lease, Aboriginal people, Oasis Rural Fire Brigade, and local pastoral interests.

Maintenance of utilities, particularly main roads and electricity transmission lines involving clearance of native vegetation, is of concern.

Desired outcome

- Relevant agencies, individuals and groups are given timely and relevant information about management of the parks.

Proposed guidelines and actions

- Play a leading role in co-ordination and co-operation between agencies which have an interest or have the potential to impact on the parks. Liaise with local governments for effective rubbish removal along sections of major roads through the parks. Liaise with local governments to ensure no actions are taken about undeveloped gazetted roads crossing the parks which might adversely impact on park values.
- Determine if existing public utilities in the parks require permits under section 34 of the Nature Conservation Act 1992. Permit conditions can specify QPWS requirements including protection of native vegetation with limits on clearing, access to the facility and maintenance requirements, removal of construction and maintenance materials, notification before undertaking maintenance, use of herbicides, site rehabilitation, new structures, and other conditions deemed necessary by QPWS.
- Assess proposed services for their potential impact and allow them only where no significant impacts are identified and no alternative sites exist outside the parks. Where practical, new and upgraded services are to be in existing use corridors.

Staffing and infrastructure

Background information

The Ranger-in-charge and a support ranger are based at the Yarramulla Ranger Base.

Housing at this Base is not to Service standard for current levels of staff.

Lotus Glen Prison has entered into agreements related to a co-operative work program with QPWS whereby Lotus Glen provides supervisory staff for prisoner work parties. Facilities were established in early 1995 to accommodate this workforce.

Desired outcomes

- An appropriate number of staff and resources are allocated to implement this plan.
- Staff accommodation is adequate and meets all Service standards as soon as practically possible.

Proposed guidelines and actions

- QPWS intends to upgrade housing at this Base to Service standards for a minimum of two staff.
- Seek opportunities for Aboriginal employment and explore external funding arrangements.
- Review allocation of resources and staff annually and plan to rectify any deficiencies to enable effective parks management.
and collapse exit and longitudinal and cross sections of the cave, showing the granite basement and spring:
• plan of the area at Barkers Cave showing relationship of this cave to Barkers collapse and granite
eutrods and include location of facilities; and
• possible panels at Undara Lava Lodge depicting major volcanic provinces in north Queensland and
regional geology of McBrigge Province, highlighting Undara Volcano, its flows and lines of lava tubes;
and lava tube development and associated features (including collapse depressions from former lava
ponds) possibly incorporating block diagrams to enhance understanding by showing basement
topography/geology.
• At Forty Mile Scrub National Park day-use area and near the Dunns Bore vine thicket develop a self-
guided walk and associated interpretive material about the evolution and special characteristics of the
vine thicket and floristic relationships to rainforest.

Visitor safety

Background information
Safety issues of QPWS concern include fire from wildfire and prescribed burning operations; venomous
snakes; histoplasmosis from dusty environments in caves; rock falls in caves, pits and crevices; and
exposure and dehydration as parts of the park are remote and have no surface water and a difficult
landscape in which to navigate.

Suitable public information through direct contact or appropriate signs is required to reduce or eliminate
the risks associated with these areas or activities. Guides conducting underground cave tours are trained
in cave rescue and general safety matters to a level acceptable to Regional Director; Northern Region,
QPWS.

Desired outcome
• Visitors and park staff have adequate safety awareness and a reduced exposure to perceived risks.

Proposed guidelines and actions
• Provide information in recreation areas (specifically Undara Lava Lodge, Fifty Mile Spring, Kalkani,
and Forty Mile Scrub National Park day-use areas) advising of potential hazards in the parks. This
information should also be incorporated in visitor information brochures for the parks.
• Ensure all facilities are sited, designed and maintained to a safe standard.
• Ranger staff will be trained in workplace health and safety and first aid to a minimum level.
• A search and rescue/disaster plan will be developed for park operations and Ranger staff are trained in
search and rescue operations, including cave rescues and miscellaneous emergency procedures which
could involve counter disaster plans.
• Establish a registration system for all visitors using remote parts of Undara Volcanic National Park.
• Assist the Senior Mines Inspector in monitoring public access caves for roof and wall instability and
atmospheres that fail to meet stated criteria, on a basis to be specified by the Senior Mines Inspector. If
a potential hazard is detected immediate closure will be considered until appropriate to re-open.
• Determine if radon exposure is a potential risk to visitors and staff exposed regularly to cave
atmosphere.
• Install warning signs on all walking tracks relating to water availability and requirements.
• Provide adequate warning signs about features. Place warning signs at identified hazardous features
such as caves with elevated carbon dioxide levels, high dust levels or instability.
• Because of its relative accessibility and potentially lethal atmosphere, Boyiss Cave will be considered
for closure by gates which do not impede bats.
• Develop procedures for park closure and if necessary evacuation in the event of wildfires or
prescribed burning operations.
• Park staff will become familiar and participate in reviews of local counter disaster plans.

• Align tracks and vehicle parking areas to avoid the lava tubes and cave entrances where practical and
avoid siting any structures or roads on key landform features particularly tubes and volcanic vents.
• Create opportunities via walking tracks, particularly near Kalkani Volcano and Arch Complex for
visitors to experience collapsed lava tube and lava pond features. Align walking tracks marginal to these
features with some opportunity provided via spur tracks to enable closer inspection of these
geological features.
• Investigate options for monitoring the biota in caves subject to visitor impacts and, where practical,
establish monitoring projects as soon as possible.
• Allow only permitted scientific access to Undara Volcano. This strategy is necessary because of the
sensitivity of vegetation in the crater and its relative remoteness from other park features and facilities
which offer comparable visitor experiences.
• Investigate options to provide protection to the entire Undara Volcano, for example, through a
voluntary and co-operative agreement with the adjoining landholder.
• Rehabilitate the abandoned quarry site on Kalkani Volcano following assessment of the geology of the
exposure.
• Rehabilitate the abandoned quarry south of the Gulf Developmental Road in the Undara Volcanic
National Park.
• Assess the visual intrusion of all proposed developments, and minimise any such impact by appropriate
siting.
• Allow the areas clear for cultivation on the Yaramulla Section of Undara Volcanic National Park to
revegetate naturally.
• Extract no resources from volcanic vents or other topographically prominent positions.
• When undertaking land rehabilitation, or other land management practices, the resulting impact on
cultural heritage will be assessed and managed appropriately.

Catchment protection

Background information
Much of the parks consist of relatively flat terrain developed on various basaltic surfaces. The main relief
is provided by outcrops of granite basement rock and volcanic vents. On the gently undulating basaltic
plains, well drained, strongly structured clays and loams have developed. In places these soils reach a
depth of about 1.5 metres, but in substantial areas they are very stony (Grundy and Bryde 1989). These
soils appear stable in this weathering regime and no widespread erosion has been observed. However,
there are numerous tracks in the parks where erosion is occurring due to the development of ruts and
destruction of grass cover.

In the southern portion of Mount Rosey Section, dark, deep, moderately drained clay soils attain
thicknesses of about 1.5 metres and appear relatively stable in terms of erosion. Granitic areas have
weathered to produce well drained, shallow, sandy loams with coarser sands around the outcrop
margin. These soils tend to be prone to gully and sheet erosion where exposed, especially along vehicle
tracks. This situation is clearly evident along the track section just south of the Fifty Mile Spring.

The perennial spring environments and associated watercourses remain largely undisturbed on the
Mount Rosey Section except for cattle grazing, bore establishment and fencing. Existing tracks tend to
avoid these features.

Desired outcomes
• Hydrologic and catchment values of the national parks are protected.
• Perennial spring environments are identified, monitored and protected.

Proposed guidelines and actions
• Carefully plan track construction, maintenance and drainage to minimise erosion especially in granite-
derived soils.
• Identify and rehabilitate sections of existing tracks with significant erosion problems.
• Carefully site resource extraction areas for track material to avoid erosion and impact on catchment
values.
• Physical disturbance of the spring environments will be minimised by avoiding actions that might contaminate the water or significant lowering of water tables. This could attain special significance near lava tubes where specialised and unique cave animals might be affected.

Vegetation

**Background information**

Undara Volcanic National Park and the Forty Mile Scrub National Park support a diversity of vegetation habitats and species. About 400 native plant species have been identified associated with 53 habitats in and adjacent to the parks. Habitats have not been mapped.

Twelve species of native plants are of conservation significance.

Vine thickets associated with three well-defined habitats probably represent the most vulnerable communities in the parks due mostly to their fire sensitivity or potential for weed invasions. Loss of vine thickets is most evident in Forty Mile Scrub National Park where lantana has invaded areas disturbed by feral pigs. Wildfires have substantially reduced the vine thicket extent and severely threaten this community’s survival.

Information on native vegetation (particularly habitat distribution) and requirements for conservation and management are lacking. There is a need for better information about the vegetation, particularly the significant species and habitats on which future management directions could be based.

**Desired outcomes**

• Native plant communities in the parks are mapped and protected.
• Degraded habitats are rehabilitated.

**Proposed guidelines and actions**

• Map the vegetation of the parks to help management decision making including the development of a comprehensive fire management plan.
• Monitor grazing activities to ensure they are complying with stock grazing permit conditions or agreements.
• In the vine thickets of Forty Mile Scrub National Park - control the feral pig population,
  - maintain a fire break around the boundary fence,
  - use the fire management plan proposed specifically for this park,
  - concentrate initially on eliminating lantana from areas where infestations are relatively minor. Major lantana infestations will require a combination of herbicides, fire, and physical removal of roots to eradicate and control. This will be integrated with establishment of suitable shade trees to reduce weed regrowth.
• Encourage research into the most efficient means of vine thicket rehabilitation, the threatened and significant plant species to determine any special requirements for their continued survival, and into the impact of fire on sensitive communities and species.
• Establish a program to monitor the condition of vine thickets.

Native animals

**Background information**

Apart from some investigations dealing with bats and arthropods in the cave environment, systematic and effective documentation of native animals including invertebrates in the parks has been limited. Consequently there is the potential problem that native animal management will suffer due to lack of information concerning distribution, populations, ecology and conservation requirements of the individual species.

presentation to the public, consistent with current levels of understanding of scientific and park values.
• Investigate with operators of the Undara Lava Lodge the possibility of half-day tours to experience Barkers Cave and budget tours to concentrate on Arch Complex.
• Seek expert assistance to:
  - assess the potential impact on park aquifers of sewerage disposal system of the Undara Lava Lodge; and
  - assess the impact of water extraction on park waterable levels particularly in the vicinity of Road and Bayliss Caves.

Public contact

**Background Information**

Public contact involves providing opportunities for park interpretation, environmental education, publishing information, education sheets and brochures, and enforcing park regulations. Opportunities for park interpretation and education in Undara Volcanic National Park and Forty Mile Scrub National Park are not fully realised. In a limited context the Savanna Guides operating from the adjacent resort are performing this role.

There is no interpretative material readily available for the parks. The Lodge provides the primary contact between visitors and Undara Volcanic National Park through the Savannah Guides in the course of their cave-guiding duties. QPWS staff have a management presence but effectively have little public contact.

Visitors to the parks predominantly visit a few lava caves on a guided basis for a relatively short period and experience very little of volcanic vents or a range of other natural features and landscapes. Their knowledge and understanding of the values of these parks is consequently likely to be very limited.

**Desired outcomes**

• A high standard of information and interpretive opportunities to enable park visitors to more fully understand, enjoy and respect for the area is developed.
• Visitors are aware of potential impacts created by their visit and support the implementation of expressed management actions.

**Proposed guidelines and actions**

• Use the proposed Kalkani day-use area as the primary focus for information on Undara Volcanic National Park and the proposed Forty Mile Scrub National Park day-use area as the primary focus for information on that park.
• Promote employment and training of local Aboriginal people in planning area management. This could also involve developing skills in natural and cultural heritage interpretation and presentation.
• Ensure cultural heritage information is appropriate for interpretation and presentation.
• On Undara Volcanic National Park liaise with commercial operators to ensure:
  - promotion of the area is accurate and appropriate;
  - approval is obtained for appropriate placement of any proposed interpretive panels;
  - dissemination of relevant information about the park to visitors; and
  - presentation of high quality audio/visual material relates park values to visitors.
• Develop and implement an interpretive plan for the parks. Until then the following will guide priorities:
  - interpretive panels at Kalkani day-use area illustrating geological cross section through Kalkani and Silent Hill Volcanoes; regional geology of McBride Province showing vents and flows, highlighting Undara Volcano, its flows and lines of lava tubes; and walking tracks and special features;
  - plan at Wind Tunnel Cave showing relationship of walking tracks to the volcanic features and longitudinal profile of Wind Tunnel Cave;
  - plan at Arch Complex showing relationship of Picnic collapse and lava pond to this complex including walking trails and parking areas and longitudinal profiles through Stephensons and Left Arch Caves;
  - plan at Road Cave showing walking track, parking area and road access relative to the cave entrance.
Commercial operations

Background information

Undara Lava Lodge with a range of accommodation capacities has been developed on a special business lease located in bushland adjacent to Undara Volcanic National Park. Most people arrive at the resort by car or coach. Because of current access arrangements to Undara Volcanic National Park, the commercial operation exerts control on vehicular access to the caves. Activities offered from the Undara Lava Lodge include spotlighting, bushwalking, scenic flights and cave tours.

Commercially guided tours to Wind Tunnel and Arch Complexes, Road, Daves and Barkers Caves have occurred since 1989. During 1993, about 20,000 people visited the Lodge. Visitor numbers are growing.

In 1992, QPWS formally entered into an agreement with Undaval Pty Ltd and Dutana Pty Ltd to provide commercial tours to selected caves in the lava tube system on Undara Volcanic National Park.

At present this guiding operation is provided through the current commercial operator using the Gulf Savannah Guides Association. The operator, organises all commercial tours and is responsible for the quality of the guiding service. The guides are trained in public contact techniques. Visitors leave from the Lodge and are conveyed by small buses to the caves. A variety of tours are offered to four caves. Access to Wind Tunnel Complex and Barkers Cave is restricted during November-February due to bat breeding. In excessively wet periods, sections of other caves are flooded and consequently can also be closed to visitors. Wind Tunnel Complex and Picnic Cave are visited intermittently by half-day or full-day tours. Tours are arranged to avoid visitor overlap at cave sites. Inevitably some overlap occurs if more than 20 visitors subscribe for a given tour. The current tour structure generally precludes visits to Barkers Cave by either budget or half-day tours and visits to Arch Complex by budget tours.

At present, there is no free or independent public access past the Lodge to reach these caves.

Vehicle access has been developed to the main visitor caves and parking areas are adjacent to the cave entrances.

Desired outcomes

Tourist facilities and activities on the special business lease are compatible with the surrounding natural values, do not adversely impact on national park values, and support visitors to Undara Volcanic National Park.

Commercial activities conducted on the parks, are compatible with the purposes of management, are managed to ensure minimal impacts on natural and cultural values, and that costs to, and access for park visitors, are fair and reasonable.

Proposed guidelines and actions

Ensure co-operation with the operator of Undara Lava Lodge occurs over:

- provision of recreation opportunities, services, facilities and access;
- potential for impact by domestic animals such as cats and dogs;
- visitor understanding of the relationship of Undara Lava Lodge to the park;
- fire management and weed/feral animal control; and
- potential for adverse impact of water extraction from aquifers.

Monitor commercial activities to determine impacts on park values, quality of visitor experience and act to modify or restrict activities where appropriate.

QPWS staff will provide advice to commercial operators about the actual and likely impacts associated with use of the parks.

Monitor commercial activities on the special business lease and Undara Volcanic National Park to ensure they comply with the agreement and commercial permit between QPWS and Dutana Pty Ltd/Undaval Pty Ltd or commercial permit in the case of another commercial operator.

Monitor the quality of the guiding service to ensure it provides high quality information and

Barkers Cave provides an important habitat for several bat species. Little is known about the significance of many other caves in Undara Volcanic National Park.

Similarly, studies have demonstrated the vital importance of the Undara cave environment to the evolution of many recently discovered troglobitic species.

Desired outcomes

- The distribution, abundance and habitat preferences of rare, threatened or significant animal species are identified and mapped.
- Cave and lava tube habitats are better understood and managed to protect native animals.
- The diversity and distribution of native wildlife is maintained.

Proposed guidelines and actions

- Use existing resource information as a basis for establishing a resource register and start developing a comprehensive database.
- Identify rare, threatened or significant species and develop relevant management strategies.
- Identify management requirements for and an understanding of native wildlife with emphasis on rare and threatened species.
- Train ranger staff in resource inventory skills.

Proposed guidelines and actions

- Develop a weed control plan.
- With vegetation surveys, map and monitor priority weed species such as lantana and rubber vine, and implement integrated control measures to eradicate where possible and contain current distributions.
- Ranger staff will complete an annual weed status report, detailing actions and progress in control, combined with updated weed distribution data. Significant weed infestations should be plotted onto 1:25 000 scale base plans and used for continuing control programs.
- Rubber vine eradication and control will focus on areas where there is an inadvertent risk of weed spread by visitors, particularly in the Fifteen Mile Spring and Twelve Mile Spring of Undara Volcanic National Park where public visitation is proposed. Where infestations occur outside moist situations, rocky areas or vine thickets, management should be directed to building up sufficient fuel levels to allow for the passage of hot fires. The effects of this strategy will require careful monitoring to ensure that park values are not impaired. Strategic access tracks will be established around major rubber vine
infestations to facilitate fire management and systematic use of appropriate herbicides.
• Lantana eradication and control will focus on vine thickets environments of Forty Mile Scrub National Park where systematic programs using a combination of fire, herbicide and physical removal will be used.
• Eradicate the cotton plant infestation in the Yarramulla Section of Undara Volcanic National Park.
• Liaise with appropriate agencies and neighbours to ensure weed control is performed in areas within their jurisdiction.

Introduced animals

Background information

Several types of feral animals have been recorded in and adjacent to the parks. Currently the species of major concern are pigs, rabbits and wild cats. Cane toads have also been recorded. Introduced animals degrade the natural environment in ways such as to cause erosion, devalue native habitats, promote the spread of weeds and compete with native animals for resources. Feral cats pose a direct threat to the viability of some native animals. The population density of these animals is unknown.

Feral pigs pose the main threat to ecosystem stability. During the dry season, dams, cattle troughs and the perennial spring environments on the Mount Rosey Section of the Undara Volcanic National Park become an important focus for pig activity.

In Forty Mile Scrub National Park, vine thicket loss has been attributed primarily to pig disturbance of root systems, allowing lantana invasion and creating an unfavourable fire regime.

Castle and horses cause erosion, foul water, spread weeds and graze and trample vegetation. Fences can be damaged. Following destocking, some stray animals will remain. Cattle and horses stray into the parks from adjoining properties and, unless removed, these animals have the potential to become feral.

Desired outcome

• The impact of introduced animals is reduced.

Proposed guidelines and actions

• Develop an introduced animal control plan.
• Give high priority to controlling and eradicating the feral pig population in the Forty Mile Scrub National Park, and the spring environments on Mount Rosey Section of Undara Volcanic National Park.
• Liaise with neighbours and other agencies involved in introduced animal control.
• Determine the effectiveness of control programs by routine monitoring.
• Eradicate any species found to be newly invading.
• Remove stray cattle and horses remaining in parts of the parks after stock grazing permits and authorities have expired.

3.2 Fire management

Background information

Knowledge of Aboriginal fire regimes in the vicinity of Undara Volcanic National Park and Forty Mile Scrub National Park remain uncertain. Contemporary fire management throughout Undara Volcanic National Park and Forty Mile Scrub National Park and adjoining areas has been variable where practices have ranged from no deliberate burning to extensive burning. ‘Cool’ burns are used to minimise fuel and encourage new growth for stock. Unfortunately, fires lit along the Kennedy Developmental Road have intruded into the parks and become wildfires. In Forty Mile Scrub National Park vine thickets, fires have caused substantial damage. Vine thickets throughout the parks are particularly susceptible to damage by fire. Apart from damaging park values, wildfires threaten human life and property.

Access for fire control in the parks and adjoining land is variable, ranging from sealed highways to rough

<table>
<thead>
<tr>
<th>Track and destination</th>
<th>Character and priority</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalkani day-use area to Kalkani Crater.</td>
<td>graded, drained; high</td>
<td>Incorporate a ‘rin’ walk with interpretation of key topographic features.</td>
</tr>
<tr>
<td>Kalkani day-use area to Silent Hill Volcano.</td>
<td>graded, drained; rough; medium</td>
<td>Avoiding by the widest margin Kennys Cave which is potentially dangerous — entrance will be fenced.</td>
</tr>
<tr>
<td>Close Dam Bore to Old Racecourse Bore.</td>
<td>rough; high</td>
<td>Investigate opportunities for FIV to visit vine thicket and a lava tube.</td>
</tr>
<tr>
<td>Racecourse Crater and Racecourse Knob and return to Old Racecourse Bore.</td>
<td>high</td>
<td>The track from vent (V55) to Racecourse Crater should pass just east of deep gully with well developed vine thicket.</td>
</tr>
<tr>
<td>Spur track to Mount Doyle.</td>
<td>rough; low</td>
<td>Off track linking Close Dam Bore to Forty Mile Spring.</td>
</tr>
<tr>
<td>Spur track to spot height 753 in The Granites.</td>
<td>rough; low</td>
<td>Off road linking Close Dam Bore to Forty Mile Spring.</td>
</tr>
<tr>
<td>Fifteen Mile Spring campsite to spring Head.</td>
<td>rough; low</td>
<td>Generally following water course.</td>
</tr>
<tr>
<td>Fifteen Mile Spring campsite to Twelwe Mile Spring and swamp area.</td>
<td>rough; low</td>
<td>Forms a large loop, return via Fifteen Mile Creek.</td>
</tr>
<tr>
<td>Barkers Cave vehicle park to Barkers Knob.</td>
<td>rough; high</td>
<td>Return track via lava pond with vine thicket.</td>
</tr>
<tr>
<td>Barkers Knob south vehicle park to Twelve Mile Swamp.</td>
<td>rough; high</td>
<td>Passes through a mixture of country.</td>
</tr>
<tr>
<td>Arch Complex car park around southern side of vine thicket associated with lava pond to Picnic Cave.</td>
<td>hardened pathway; high</td>
<td>Loop return to park. Limited spur access should be provided to the vine thicket to view the collapse.</td>
</tr>
<tr>
<td>Forty Mile Scrub day-use area.</td>
<td>rough; medium</td>
<td>Short loop track through vine thicket.</td>
</tr>
<tr>
<td>Undara Lava Lodge to Pinnacle Rock (Granite Range).</td>
<td>rough; low</td>
<td>Track starts in the special business lease.</td>
</tr>
</tbody>
</table>
Walking

No walking tracks have been developed in the parks. Some tracks have been developed in the special business lease and are used by visitors. There is a need to develop walking tracks to various key features in the parks to widen available recreation opportunities.

The general aridity of the landscape and hazardous conditions in some caves impose particular constraints and pose a potentially dangerous situation for unprepared or unskilled hikers. The distribution and biological importance of cave animals is largely unknown, and many caves are considered hazardous due to instability or above average carbon dioxide levels. Vine thickets might be susceptible to high levels of visitor impact.

Walking tracks will be developed in accord with approved plans and for those identified priority sites shown in Table 5. Walking tracks will be maintained to standards appropriate for their classification.

tracks suitable only for high clearance 4WD vehicles. Generally, property tracks are poor quality and offer limited mobility due to the extreme stoniness of the terrain. Some areas are distant from currently available water sources which pose considerable problems in fire management and control.

A draft fire management plan has been developed for Forty Mile Scrub National Park. Fire management practices in protected areas in north Queensland are based on experience derived for a range of environments in this region.

Desired outcomes
• Human life and property are protected from the effects of fire as far as practically possible.
• Fire-sensitive habitats and species are protected from the effects of fire as far as practically possible.

Proposed guidelines and actions
• Develop a fire management plan for the parks and manage in accord with that plan. In the interim, fire management will be guided by the draft fire management plan for Forty Mile Scrub National Park where relevant.
• Develop and document:
  - an approved wildfire response plan in accord with guidelines for response plans;
  - brief annual fire reports which cover the extent of prescribed burns and wildfires in any one year and recommend a burning program for ensuing year/years; and
  - a database recording tracks, bores, fire breaks, equipment, and staff.
• To ensure adequate control during prescribed burning and for wildlife management:
  - upgrade and if necessary develop access for fire management purposes, for example, Yaramulla Ranger Base to New Racecourse Bore; and
  - investigate sites for strategic water points.
• Guidelines for a fire management plan for both parks will include:
  - burning on a mosaic basis with not less than two year rotation period. Burn not greater than half the area in any given year;
  - burning annually parallel to main roads particularly the Kennedy Developmental Road and around important structures;
  - use of ground and aerial ignition to create a local mosaic pattern of many small fires only when humidity and fuel moisture conditions allow;
  - identification of weed areas, sensitive habitats and species, public areas and significant structures to be given special procedural planning;
  - arrangements for possible closure of parks during burning operations or wildfire;
  - work with Oasis Rural Fire Brigade, Rural Fires Division of the Queensland Fire and Rescue Authority, and other relevant authorities to ensure co-ordination of fire management programs;
  - advice to park neighbours of fire management programs and the ecological basis of burning and
  - encouraging research into the effects of fire on native plants and animals.

3.3 Cultural heritage management

Background information
Evidence of Aboriginal occupation includes stone artefacts and scarred trees associated with caves, vine thickets and springs. No systematic survey for archaeological sites has been undertaken, apart from a preliminary assessment of visitor impact on identified sites in the vicinity of publicly accessed caves. This work suggested that some artefact scatters in these areas might have been lost or damaged. Accounts by early explorers and settlers in the region indicated a substantial presence of Aborigines. By the early 1900s only 40 years following European settlement, the Aboriginal population of this region had decreased significantly.

Preliminary consultation with Aboriginal people associated with Undara Volcanic National Park and Forty Mile Scrub National Park has not identified significant spiritual or cultural sites. At this stage, Aboriginal people with links to this area remain largely unidentified. Considerably more effort is required to canvass
Aboriginal opinions and knowledge relating to the parks. Aboriginal cultural sites are protected under the Cultural Record (Landscape Queensland and Queensland Estate) Act 1987.

European settlement started in the early 1860s. Relics of this early pastoral activity are believed to be non-existent in the parks. Significant relics from later pastoral activity include a wooden fork whip used for water extraction at the Fifteen Mile Spring and an assortment of corrugated iron/pole and concrete/pole sheds at the Yaramulla Ranger Base. The old Mt Surprise Road is evident, particularly south of the Lodge and is currently used as access to some of the lava caves.

**Desired outcomes**
- Aboriginal cultural places are protected and managed in accord with the wishes of identified custodians of those sites and if appropriate made available for interpretation to visitors.
- Non-Aboriginal cultural heritage is conserved, managed and presented in accordance with best practice and established guidelines including the Burra Charter.

**Proposed guidelines and actions**
- Identify, document and assess Aboriginal places and determine management requirements.
- Liaise with appropriate Aboriginal people when undertaking works.
- Undertake cultural heritage assessment and Aboriginal consultation to determine cultural values prior to allowing or undertaking any development works such as walking tracks and other public facilities.
- Ensure that staff recognise the significance of Aboriginal and non-Aboriginal cultural heritage and management requirements.
- Prepare an inventory and assessment of places related to non-Aboriginal exploration and pastoral use, determine their significance and develop management strategies.
- Ensure track maintenance or proposed development in Undara Volcanic National Park does not adversely impact on the cultural heritage significance of the old Mt Surprise Road.
- Continue efforts to locate and involve Aboriginal people with heritage matters in the parks.
- Undertake the assessment and management of Aboriginal and non-Aboriginal cultural heritage places in accordance with best practice methods defined in such guides as the Burra Charter and the Draft Guidelines for protection, management and use of Aboriginal and Torres Strait Islander Cultural Heritage Places.

### 3.4 Resource use management

#### Grazing

**Background information**
Stock grazing is not permitted on either Undara Volcanic or Forty Mile Scrub National Parks.
Small numbers of stray stock enter the parks from neighbouring properties.

**Desired outcome**
- Minimal impact results from stock intruding from neighbouring properties.

**Proposed guidelines and actions**
- To minimise straying stock, maintain boundary fences and create reasonable access along these fences, and maintain sufficient yards and facilities to manage stray stock.
- Remove stray stock in accordance with Nature Conservation Regulation 1994.
- Control bora and tracks to help minimise straying stock.

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**Vehicle access**

Well maintained roads and managed vehicle access are important for protecting the parks' values, natural resource management programs and for providing opportunities for visitors to use and enjoy the parks.

Currently, there is no public access to Undara Volcanic National Park beyond Yaramulla Ranger Base or the Undara Lava Lodge. Public vehicle access to the park is on an undedicated road which is used primarily by guests of the Undara Lava Lodge. Public vehicle access to and within the Undara Volcanic National Park primarily will be along declared roads.

Vehicle access to Forty Mile Scrub National Park will continue to be along the Kennedy Developmental Road.

Vehicle access for visitors will be in accord with priority routes shown in Table 4.

<table>
<thead>
<tr>
<th>Site</th>
<th>Issues</th>
<th>Status</th>
<th>Management intent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access from the Gulf Developmental Road to the special business lease and to the Yaramulla Ranger Base</td>
<td>Adequate maintenance and appropriate signs and dedicated access.</td>
<td>Primary public and commercial operator vehicle access in Undara Volcanic National Park.</td>
<td>Initiate moves to have this access road gazetted and provide relevant directional signs.</td>
</tr>
<tr>
<td>Undara Lava Lodge to Arch Complex and Road and Barkers Caves</td>
<td>Ongoing maintenance required to achieve standard to minimise erosion and dust.</td>
<td>Currently unformed tracks.</td>
<td>Upgrade to ensure appropriate access for commercial operator.</td>
</tr>
<tr>
<td>Yaramulla Ranger Base to Wind Tunnel Complex</td>
<td>Ongoing maintenance requirement for commercial operator.</td>
<td>Main access route to Wind Tunnel complex.</td>
<td>Upgrade and re-align to provide appropriate access.</td>
</tr>
<tr>
<td>Yaramulla Ranger Base—Fifteen Mile Spring</td>
<td>Undeveloped and used for fire control. Provides access to Mc Doyle.</td>
<td>Main public and commercial operator access in Undara.</td>
<td>Develop to an all-weather standard 4WD and dry season 2WD road.</td>
</tr>
</tbody>
</table>
Camping in Undara Volcanic National Park will focus on sites which have a capacity to provide a reliable water supply. Selected sites are shown in Table 3. These will generally be natural springs and bores and tanks. The springs are a significant component of the hydrologic system of the park and are outstanding and important features in the area’s dry environment providing important habitats for native animals. These areas are prone to contamination of their groundwater and are likely to be sensitive to impacts generally associated with visitor use. Springs have become a focal point for feral pigs and rubber vine infestation.

Table 3. Proposed areas for campsites in Undara Volcanic National Park

<table>
<thead>
<tr>
<th>Site</th>
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</thead>
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<tr>
<td>Fifteen Mile Spring</td>
<td>Significant vegetation (black teatree). Water source for cattle. Water quality. Cultural heritage importance (Aboriginal campsite). Good access 60m road reserve.</td>
<td>Currently closed - proposed vehicle access.</td>
<td>Prepare a site plan based on: • facilities with a natural character; • camping only at designated sites (15 or fewer). • ensure uses and activities have little or no impact on the hydrology of the springs, e.g. no campsites closer than 50m from the spring watercourse and more than 500m from the head of the spring; toilets located more than 100m from watercourses. Development can only take place following a favourable Environmental Impact Assessment (EIA).</td>
</tr>
<tr>
<td>Twelve Mile Spring</td>
<td>As above.</td>
<td>Currently closed. Proposed for walk in only.</td>
<td>Prepare a site plan based on above.</td>
</tr>
<tr>
<td>Old Racecourse Bore</td>
<td>Lacks public vehicular access and water supply.</td>
<td>Currently closed. Proposed for walk in access.</td>
<td>Maintain water supply and storage at New Racecourse Bore for management purposes. Primitive character camping for hikers only. Prepare a site plan for the area.</td>
</tr>
</tbody>
</table>

Road material extraction

Background Information
Extraction of material suitable for maintaining roads in the parks occurs on a limited scale in three areas — the northern end of the former Yarramulla Holding, Barkers Knob and from Bilgolla Holding, which is outside Undara Volcanic National Park. A network of roads and tracks is and will continue to be maintained for fire and other management purposes. Access to the lava caved used by tourists requires substantial maintenance and upgrading.

Desired outcomes
- Where necessary, any sites in the parks used for road material extraction are managed to minimise any adverse environmental cultural and visual impacts.

Proposed guidelines and actions
- Allow limited extraction of road material from the parks only when no alternative sources are practically available. Extraction of road material from within the parks is only for maintenance and upgrading of access and management roads within the parks.
- Approval to extract material from the parks will be given by the Regional Director, Northern Region, QPWS, after considering an assessment of the likely impacts and ensuring that any site is: • more than 2km from lava tubes, caves and visitor nodes; • more than 1km from cultural sites and sites of scientific significance; and • more than 500m from volcanic vents and structures.
- Provide input to State and local government authorities to ensure sensitive sites of extraction points adjacent to the parks.
- Identify sites within and adjacent to the parks which have the potential to satisfy the desired outcomes and take account of the factors listed above.
- Rehabilitate disused extraction sites and existing sites after use to provide for the sustained re-establishment of native habitats.

Water extraction

Background information
Water is a scarce resource in Undara Volcanic National Park and Forty Mile Scrub National Park. A bore network was developed to service former grazing and domestic needs. Volcanic rocks appear to provide the main aquifer. The probability of elevated arsenic levels exists in some granitic areas near Barkers Knob but might be more widely distributed. Yields from bores on Yarramulla Section, considered typical for the area, have been highly variable. Where tested, water quality has been acceptable for human consumption.

The southern end of the adjacent special business lease is within 500m of the north-western lava tube on the Mount Rosey Section. Although unlikely, there is potential for bores to be developed on the southern extremity of the special business lease which might impact adversely on watertable levels in Undara Volcanic National Park adjacent to the north-western lava tube.

Desired outcomes
- Water designated for human consumption is safe and within stated health standards.
- Water quality and quantity in aquifers and springs is protected and any impacts from water extraction in and adjacent to the parks are identified and minimised.

Proposed guidelines and actions
- Avoid any actions having the potential to significantly draw down water tables or pollute aquifers and springs. This might be particularly important in the vicinity of lava tubes.
- Do not allow water extraction from within the parks for agriculture or domestic purposes unless on a temporary basis for emergency needs.
• Disconnect mills where practicable following destocking.
• Undertake regular monitoring of groundwater used for human consumption. Particular care is required where groundwater is extracted from basement aquifers. National Health and Medical Research Council and Australian Water Resources Council standards should be used. Site bores for domestic purposes at appropriate distances from septic facilities.
• Monitor water extraction rates and if deemed necessary, seek technical advice on the potential impact of the water extraction from adjacent tourist lodge on water tables.

3.5 Recreation, tourism and visitor use

Recreation opportunities

Background information
A pattern of visitor use and recreation using caves, vents and springs predates gazetted of Undara Volcanic National Park. Primarily, this use was in the form of guided tours and continues today from the adjacent Undara Lava Lodge. This commercial operation has had a major influence on visitor use patterns and recreation opportunities in the Undara Volcanic National Park.

Visitor activities are based on low-key nature-based recreation, for example, cave viewing, bushwalking, nature appreciation and birdwatching. Visitors are able to enjoy a relatively undeveloped natural area with impressive landscape features. At present there are no campsite, walking tracks or other day-use facilities in the parks. Currently, on Undara Volcanic National Park, visitor access and facilities associated with visits to the caves and volcanic cones are managed through commercial tours offered from the adjacent Undara Lava Lodge. Camping and accommodation associated with these visits are confined to the vicinity of the Lodge. Day-use facilities have been established on Forty Mile Scrub National Park.

It is anticipated that recreational opportunities in Undara Volcanic National Park and Forty Mile Scrub National Park will concentrate in particular areas. These sites and areas can be classified according to the categories shown in Table 1. For example, preliminary assessment of the features of the parks has identified a number of sites which should receive special protection and other areas which are appropriate for relatively high level of visitor use. Table 1 indicates the overall framework within which Undara Volcanic National Park and Forty Mile Scrub National Park will be managed. Details about management issues and intent for particular sites are shown in Tables 2 and 3.

Desired outcome
• A range of ecologically sustainable, nature-based recreation opportunities reflecting the values of the parks are available to visitors.

Proposed guidelines and actions
• Provide a range of recreation opportunities, visitor facilities and services which highlight and are in keeping with the parks’ distinctive features.
• Manage identified sites and areas within the Undara Volcanic National Park and Forty Mile Scrub National Park in accord with Table 1.

Visitor facilities and access

Background information
At present there are few visitor facilities such as car parks, toilets, picnic and camping areas on the parks. Existing developments at areas of high visitor use largely pre-date the gazetted of the area as national park. Proposed park facilities should be sited and designed appropriately to avoid conflict among users and degradation of natural and cultural values.

Planning of access in the parks is critical for the protection and management of the natural and cultural

<table>
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<tr>
<th>Site</th>
<th>Issues</th>
<th>Status</th>
<th>Management intent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified caves</td>
<td>Public safety. Significant geological and biological values.</td>
<td>Some caves could become available for unguided access.</td>
<td>Determine conditions of access. In general visitor group numbers will not exceed 22 and no more than one group will visit a particular cave at any time. Develop adequate facilities at caves designated for unguided public access (i.e. minimal boardwalks). Restrict access to defined walkways. Access to known caves allowed on an unguided basis.</td>
</tr>
<tr>
<td>Kalkani Volcano</td>
<td>Significant geologic feature. Past human disturbance. Lack of visitor facilities.</td>
<td>A walk up the Kalkani Crater is open to the public.</td>
<td>Establish day-use area. Interpretive area to be the centre for dissemination of information on Undara Volcanic National Park. The Kalkani day-use area will act as the entry from which free and independent visitors can radiate to take advantage to visit volcanoes, vine thickets, and a lava tube if such opportunities are identified in the vicinity. No structures are to be built on the slopes of Kalkani. Rehabilitate abandoned quarry site and remove disused water tank and rehabilitate pad. No resource extraction.</td>
</tr>
<tr>
<td>Undara Volcano</td>
<td>Highly significant feature and vine thicket vegetation. Remote location.</td>
<td>Maintain current closure.</td>
<td>No commercially guided access. Allow permitted scientific access via a strategic park management track (terminate in the vicinity of South Dam yard).</td>
</tr>
<tr>
<td>Silent Hill Volcano</td>
<td>Proximity to potentially hazardous site.</td>
<td>Proposed for day-use.</td>
<td>No overnight camping and loop walking track access to summit from Kalkani Volcano. Investigate safety fencing and place warning signs as necessary.</td>
</tr>
<tr>
<td>Racecourse Volcano</td>
<td>Fencing encroaches on the vent. No visitor access.</td>
<td>Proposed for day-use.</td>
<td>Provide opportunity for 'crater walk' from Claws Dam Bore to Racecourse Knob/Racecourse Crater using existing strategic access track with spur tracks to vents. No facilities other than water supply. Investigate fence relocation.</td>
</tr>
<tr>
<td>40 Mile Scrub National Park</td>
<td>Highly significant patch of vine thicket vegetation.</td>
<td>Proposed for day-use.</td>
<td>Establish a day-use area. Provide a self-guided walk and interpretive display at day-use area.</td>
</tr>
<tr>
<td>Site</td>
<td>Issues</td>
<td>Status</td>
<td>Management intent</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Barkers Cave</td>
<td>Major nursery site for bats. Poorly situated infrastructure (parking areas, viewing platform). Problems with dust and interference with bat movement.</td>
<td>Guided tours (March–October).</td>
<td>Up to 22 visitors with only one group in the cave at a time. Provide viewing platform to allow surface viewing of bat emergence and monitor the impact of bat viewing on bat emergence. No access beyond ‘tree root’ zone (300m) from cave entrance and protect primary cave floor and associated secondary deposits. Upgrade existing access track and parking area and develop interpretive panels.</td>
</tr>
<tr>
<td>Wind Tunnel Cave</td>
<td>Lack of and poorly situated existing visitor facilities – parking areas. Problems with dust.</td>
<td>Guided tours (March–October).</td>
<td>Up to 22 visitors with simultaneous visits by multiple groups and ensure that groups do not mix within the cave. Upgrade and re-align the existing parking area. Maintain the existing access track. Develop interpretive display.</td>
</tr>
<tr>
<td>Arch Complex</td>
<td>Lack of and poorly situated existing visitor facilities – toilet, viewing platform, parking areas. Problems with dust in cave.</td>
<td>Guided tours only (all year).</td>
<td>Up to 22 visitors with simultaneous visits by multiple groups and minimise group mixing within the cave. Visitor facilities to include lighting, improved parking, toilet and upgraded track to the cave entrance. Provide walking tracks (so vine chicket vegetation, lava pond features and lava tube collapse) and interpretive panels. Ewamin Cave — no public access. Picnic Cave — access all year for surface visitation only; only one group to visit any given time; construct safe viewing platform which does not impede bat emergence; monitor the impact of visitation to determine its impact during the bat maternity season. Any request for increases in specified group numbers is to be negotiated with QPWS in accordance with established guidelines.</td>
</tr>
<tr>
<td>Road Cave</td>
<td>External facilities prone to fire damage. Inappropriate location of existing parking area and alignment of track. Dust problems (vehicles).</td>
<td>Guided tours only (all year).</td>
<td>Up to 22 visitors — one group at a time. Upgrade parking and track access to the cave and establish disabled access. Promote vegetation growth at the entrance to minimise the potential for cave siltation. Develop interpretive display. Any request for increases in specified group numbers is to be negotiated with QPWS in accordance with established guidelines.</td>
</tr>
</tbody>
</table>

Values of the parks and visit in delivering and maintaining quality recreational experiences. Public road access to and in the parks primarily is along gazetted roads. Forty Mile Scrub National Park is bisected by the sealed Kennedy Developmental Road, linking Charmers Towers to Cairns. The northern part of Undara Volcanic National Park is crossed by the sealed Gulf Developmental Road which links with Mt. Surprise. A good quality dirt road provides the main access into the Yarramula Ranger Base and Undara Lava Lodge. Elsewhere access is of poor quality, suitable only for high clearance 4WD vehicles.

Currently, there is no public vehicle access into Undara Volcanic National Park beyond Yarramula Ranger Base or the Undara Lava Lodge. Guided tours in the park mostly use all terrain vehicles. Public vehicle access to the park is on a private road that also provides access to the Undara Lava Lodge.

Scenic flights over Undara Volcanic National Park are conducted by the current commercial operator from a near all-weather airstrip on the special business lease. The airstrip is used primarily for servicing resort requirements, tourist transport and, if necessary, emergency evacuations. QPWS maintains an informal arrangement with the operator for the use of the airstrip.

**Desired outcomes**
- Efficient public access to designated sites in the parks is developed and does not compromise conservation values.
- Facilities are designed, sited and maintained to have minimal impact on the parks’ values and provide a range of recreation opportunities.
- A range of walking experiences allow visitors to enjoy and appreciate the parks’ values.

**Proposed guidelines and actions**
- Visitor facilities at and access to identified sites and areas will be managed in accordance with Tables 1 and 2.
- Prepare site development plans for all proposed day-use and camping areas in accordance with guidelines in Table 2.
- Liaise with the commercial operator of the Undara Lava Lodge to ensure an integrated approach to the provision of visitor facilities, infrastructure and site planning.
- Provide formal public vehicle access to Undara Volcanic National Park on a dedicated road.
- Liaise with the Endera Shire Council to ensure the main access road off the Gulf Developmental Road is maintained in reasonable condition with adequate warning signs.
- Formalise an agreement with Undara Pty Ltd/Dutanica Pty Ltd for QPWS use of the Lodge airstrip.
- Set a minimum height of 500 feet above ground level for flying over the parks.

**Management intent for selected activities**

**Day visits**
The majority of day visits to Undara Volcanic National Park focus on visiting one or more significant geological features listed in Table 2.

All visitor caves currently have limited facilities some with poor and inappropriately located access. For example, parking and dust caused by vehicle access in the vicinity of cave entrances is a major problem. Vehicle parking areas and visitor facilities will be located away from cave entrances. Proposals to redevelop visitor access are well advanced.

No toilets facilities are available at any of the publicly accessed caves. Management will focus on providing limited access based on day-use areas and rehabilitation of degraded slopes.

In Forty Mile Scrub National Park, the only visitor facilities will be a day-use site on the Kennedy Developmental Road. See Table 2.
### Table 1. Guidelines for categories of visitor opportunities

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Visitor facility</th>
<th>Special protection</th>
<th>Semi-remote</th>
<th>Remote</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>Geologically and culturally significant features, or habitats, including lava tube systems, caves, cones and depressions and springs. <strong>Modified to highly modified areas.</strong> Opportunities for large numbers of visitors to experience and appreciate the special features of the parks.</td>
<td>Natural areas containing highly significant geologic features/landforms, habitats or vegetation communities. Remote and largely unmodified environments. Scientific research. Possibility of limited recreation under strict conditions</td>
<td>Natural areas that might be close to sites of important geologic features/landforms, animal habitat/corridors, sites of cultural significance. Largely unmodified environments. Walk-in recreation opportunities including overnight camping.</td>
<td>Remote and natural areas providing opportunities for self-reliant recreation. Unmodified environments. Opportunities for remote area camping at non-designated sites.</td>
</tr>
</tbody>
</table>

### Map 3 Proposed visitor facilities and access

- **Legend**
  - Camping area
  - Day use area
  - Toilets
  - Volcanic Vent
  - Water Bore
  - National Park Boundary
  - Unsealed road
  - Special access track
  - Walking track

- **1. Undara Lava Lodge**
- **2. Yaramulla Homestead (Ranger Base)**
- **3. Airstrip**
- **4. Undara Volcano**
- **5. Racecourse Crater and Racecourse Knob**
- **6. Barkers Knob**
- **7. Pinnacle Rock**
- **8. Barkers Cave**
- **9. Road Cave**
- **10. Arch Complex**
- **11. Wind Tunnel Complex**
- **12. Lotus Glen Base**
- **13. Kalkani Volcano**
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<tr>
<td><strong>Description</strong> (physical character and recreation experience)</td>
<td>Geologically and culturally significant features, or habitats, including lava tube systems, caves, cones and depressions and springs.</td>
<td>Natural areas containing highly significant geologic features/landforms, habitats or vegetation communities.</td>
<td>Natural areas that might be close to sites of important geologic features/landforms, animal habitat/corridors, sites of cultural significance.</td>
<td>Remote and natural areas providing opportunities for self-sufficient recreation.</td>
</tr>
<tr>
<td><strong>Modified to highly modified areas.</strong></td>
<td>Remote and largely unmodified environments.</td>
<td>Largely unmodified environments.</td>
<td>Unmodified environments.</td>
<td></td>
</tr>
<tr>
<td><strong>Opportunities for large numbers of visitors to experience and appreciate the special features of the parks.</strong></td>
<td>Scientific research. Possibility of limited recreation under strict conditions.</td>
<td>Walk-in recreation opportunities including overnight camping.</td>
<td>Opportunities for remote area camping at non-designated sites.</td>
<td></td>
</tr>
<tr>
<td><strong>Access</strong></td>
<td>Access provisions for intensive management and for commercial operators using up to 22-seater buses.</td>
<td>For park management purposes only or for scientific research. No public vehicle access.</td>
<td>Public vehicle access will be usually within 500m–1km of maintained campsite.</td>
<td>No motorised use.</td>
</tr>
<tr>
<td><strong>Style of management</strong></td>
<td>High degree of on-site management activity and infrastructure including barriers to constrain pedestrian and vehicular movement, car parks, seats, toilets, viewing platforms and walking tracks.</td>
<td>Infrequent Ranger presence and usually only for specific management purposes. No opportunities for guided tours.</td>
<td>Ranger presence for specific management purposes. Limited opportunities for guided tours.</td>
<td>Minimal on-site management including occasional patrols.</td>
</tr>
<tr>
<td></td>
<td>Interpretive facilities at all sites where guided tours take place.</td>
<td>Management infrastructure and interpretation for protection of site only such as Undara Crater and Bayliss Cave.</td>
<td>Limited on-site interpretation and visitor facilities.</td>
<td>Directional and interpretive signs off site such as Six Mile Spring.</td>
</tr>
<tr>
<td></td>
<td>Access and facilities managed to minimise impacts.</td>
<td>No visitor facilities unless considered essential such as Racecourse Knob.</td>
<td>No visitor facilities.</td>
<td></td>
</tr>
</tbody>
</table>

**Map 3 Proposed visitor facilities and access**

**Legend**

- Camping area
- National Park Boundary
- No Camping
- Unsealed road
- Day use area
- Toilet
- Special access track
- Volcanic Vent
- Walking track
- Water Bore

1. Undara Lava Lodge
2. Yaramulla Homestead (Ranger Base)
3. Airstrip
4. Undara Volcano
5. Racecourse Crater and Racecourse Knob
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<tbody>
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<td>Barkers Cave</td>
<td>Major nursery site for bats. Poorly situated infrastructure (parking areas, viewing platform). Problems with dust and interference with bat movement.</td>
<td>Guided tours (March–October).</td>
<td>Up to 22 visitors with only one group in the cave at a time. Provide viewing platform to allow surface viewing of bat emergence and monitor the impact of bat viewing on bat emergence. No access beyond 'tree root' zone (300m) from cave entrance and protect primary cave floor and associated secondary deposits. Upgrade existing access track and parking area and develop interpretive panels.</td>
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<tr>
<td>Wind Tunnel Cave</td>
<td>Lack of and poorly situated existing visitor facilities – parking areas. Problems with dust.</td>
<td>Guided tours (March–October).</td>
<td>Up to 22 visitors with simultaneous visits by multiple groups and ensure that groups do not mix within the cave. Upgrade and re-align the existing parking area. Maintain the existing access track. Develop interpretive display.</td>
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<td>Arch Complex</td>
<td>Lack of and poorly situated existing visitor facilities – toilet, viewing platform, parking areas. Problems with dust in cave.</td>
<td>Guided tours only (all year).</td>
<td>Up to 22 visitors with simultaneous visits by multiple groups and minimise group mixing within the cave. Visitor facilities to include lighting, improved parking, toilet and upgraded track to the cave entrance. Provide walking tracks (so vine chicket vegetation, lava pond features and lava tube collapse) and interpretive panels. Ewamin Cave — no public access. Picnic Cave — access all year for surface visitation only; only one group to visit any given time; construct safe viewing platform which does not impede bat emergence; monitor the impact of visitation to determine its impact during the bat maternity season. Any request for increases in specified group numbers is to be negotiated with QPWS in accordance with established guidelines.</td>
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<td>Road Cave</td>
<td>External facilities prone to fire damage. Inappropriate location of existing parking area and alignment of track. Dust problems (vehicles).</td>
<td>Guided tours only (all year).</td>
<td>Up to 22 visitors — one group at a time. Upgrade parking and track access to the cave and establish disabled access. Promote vegetation growth at the entrance to minimise the potential for cave siltation. Develop interpretive display. Any request for increases in specified group numbers is to be negotiated with QPWS in accordance with established guidelines.</td>
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Currently, there is no public vehicle access into Undara Volcanic National Park beyond Yarrabia Ranger Base or the Undara Lava Lodge. Guided tours in the park mostly use unformed dirt tracks. Public vehicle access to the park is on a private road that also provides access to the Undara Lava Lodge.

Scenic flights over Undara Volcanic National Park are conducted by the current commercial operator from a near all-weather airstrip on the special business lease. The airstrip is used primarily for servicing resort requirements, tourist transport and, if necessary, emergency evacuations. QPWS maintains an informal arrangement with the operator for the use of the airstrip.

**Desired outcomes**
- Efficient public access to designated sites in the parks is developed and does not compromise conservation values.
- Facilities are designed, sited and maintained to have minimal impact on the parks' values and provide a range of recreation opportunities.
- A range of walking experiences allow visitors to enjoy and appreciate the parks' values.

**Proposed guidelines and actions**
- Visitor facilities at, and access to, identified sites and areas will be managed in accordance with Tables 1 and 2.
- Prepare site development plans for all proposed day-use and camping areas in accordance with guidelines in Table 2.
- Liaise with the commercial operator of the Undara Lava Lodge to ensure an integrated approach to the provision of visitor facilities, infrastructure and site planning.
- Provide formal public vehicle access to Undara Volcanic National Park on a dedicated road.
- Liaise with the Enderby Shire Council to ensure the main access road off the Gulf Developmental Road is maintained in reasonable condition with adequate warning signs.
- Formalise an agreement with Undara Pty Ltd/Dutana Pty Ltd for QPWS use of the Lodge airstrip.
- Set a minimum height of 500 feet above ground level for flying over the parks.

**Management intent for selected activities**

**Day visits**
The majority of day visits to Undara Volcanic National Park focus on visiting one or more significant geological features listed in Table 2.

All visitor caves currently have limited facilities some with poor and inappropriately located access. For example, parking and dust caused by vehicle access in the vicinity of cave entrances is a major problem. Vehicle parking areas and visitor facilities will be located away from cave entrances. Proposals to redevelop visitor access are well advanced.

No toilets facilities are available at any of the publicly accessed caves. Management will focus on providing limited access based on day-use areas and rehabilitation of degraded slopes.

In Forty Mile Scrub National Park, the only visitor facilities will be a day-use site on the Kennedy Developmental Road. See Table 2.
• Disconnect mills where practicable following destocking.
• Undertake regular monitoring of groundwater used for human consumption. Particular care is required where groundwater is extracted from basement aquifers. National Health and Medical Research Council and Australian Water Resources Council standards should be used. Site bores for domestic purposes at appropriate distances from septic facilities.
• Monitor water extraction rates and if deemed necessary, seek technical advice on the potential impact of the water extraction from adjacent tourist lodge on waterbodies.

3.5 Recreation, tourism and visitor use

Recreation opportunities

Background information

A pattern of visitor use and recreation using caves, vents and springs predates gazetted of Undara Volcanic National Park. Primarily, this use was in the form of guided tours and continues today from the adjacent Undara Lava Lodge. This commercial operation has had a major influence on visitor use patterns and recreation opportunities in the Undara Volcanic National Park.

Visitor activities are based on low-key nature-based recreation, for example, cave viewing, bushwalking, nature appreciation and birdwatching. Visitors are able to enjoy a relatively undeveloped natural area with impressive landscape features. At present, there are no campsite, walking tracks or other day-use facilities in the parks. Currently, on Undara Volcanic National Park, visitor access and services associated with visits to the caves and volcanic cones are managed through commercial tours offered from the adjacent Undara Lava Lodge. Camping and accommodation associated with these visits are confined to the vicinity of the Lodge. Day-use facilities have been established on Forty Mile Scrub National Park.

It is anticipated that recreational opportunities in Undara Volcanic National Park and Forty Mile Scrub National Park will concentrate in particular areas. These sites and areas can be classified according to the categories shown in Table 1. For example, preliminary assessment of the features of the parks has identified a number of sites which should receive special protection and other areas which are appropriate for relatively high level of visitor use. Table 1 indicates the overall framework within which Undara Volcanic National Park and Forty Mile Scrub National Park will be managed. Details about management issues and intent for particular sites are shown in Tables 2 and 3.

Desired outcome

• A range of environmentally sustainable, nature-based recreation opportunities reflecting the values of the parks are available to visitors.

Proposed guidelines and actions

• Provide a range of recreation opportunities, visitor facilities and services which highlight and are in keeping with the parks’ distinctive features.
• Manage identified sites and areas within the Undara Volcanic National Park and Forty Mile Scrub National Park in accord with Table 1.

Visitor facilities and access

Background information

At present, there are few visitor facilities such as campgrounds, toilets, picnic and camping areas on the parks. Existing developments at areas of high visitor use largely pre-date the gazetted area as national park. Proposed park facilities should be sized and designed appropriately to avoid conflict among users and degradation of natural and cultural values. Planning of access in the parks is critical for the protection and management of the natural and cultural

<table>
<thead>
<tr>
<th>Site</th>
<th>Issues</th>
<th>Status</th>
<th>Management intent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unspecified caves</td>
<td>Public safety. Significant geological and biological values.</td>
<td>Some caves could become available for unguided access.</td>
<td>Determine conditions of access. In general visitor group numbers will not exceed 22 and no more than one group will visit a particular cave at any time. Develop adequate facilities at caves designated for unguided public access (i.e. minimal boardwalks). Restrict access to defined ways. Access to known caves allowed on an unguided basis.</td>
</tr>
<tr>
<td>Kalkani Volcano</td>
<td>Significant geologic feature. Past human disturbance. Lack of visitor facilities.</td>
<td>A walk up the Kalkani Crater is open to the public.</td>
<td>Establish day-use area. Interpretive area to be the centre for dissemination of information on Undara Volcanic National Park. The Kalkani day-use area will act as the centre from which free and independent visitors can radiate to take advantage to visit volcanoes, vine thickets, and a lava tube if such opportunities are identified in the vicinity. No structures are to be built on the slopes of Kalkani. Rehabilitate abandoned quarry site and remove disused water tank and rehabilitate pad. No resource extraction.</td>
</tr>
<tr>
<td>Undara Volcano</td>
<td>Highly significant feature and vine thicket vegetation. Remote location.</td>
<td>Maintain current closure.</td>
<td>No commercially guided access. Allow permitted scientific access via a strategic park management track (terminate in the vicinity of South Dam yard).</td>
</tr>
<tr>
<td>Silent Hill Volcano</td>
<td>Proximity to potentially hazardous site</td>
<td>Proposed for day-use.</td>
<td>No overnight camping and loop walking track access to summit from Kalkani Volcano. Investigate safety fencing and place warning signs as necessary.</td>
</tr>
<tr>
<td>Racecourse Volcano</td>
<td>Fencing encroaches on the vent. No visitor access.</td>
<td>Proposed for day-use.</td>
<td>Provide opportunity for 'crater walk' from Clive Dam Bore to Racecourse Knob/Racecourse Crater using existing strategic access tract with spur tracks to vents. No facilities other than water supply. Investigate fence relocation.</td>
</tr>
<tr>
<td>40 Mile Scrub National Park</td>
<td>Highly significant patch of vine thicket vegetation.</td>
<td>Proposed for day-use.</td>
<td>Establish a day-use area. Provide a self-guided walk and interpretive display at day-use area.</td>
</tr>
</tbody>
</table>
Camping

Camping in Undara Volcanic National Park will focus on sites which have a capacity to provide a reliable water supply. Selected sites are shown in Table 3. These will generally be natural springs and bores and tanks. The springs are a significant component of the hydrologic system of the park and are outstanding and important features in the area's dry environment providing important habitats for native animals. These areas are prone to contamination of their groundwater and are likely to be sensitive to impacts generally associated with visitor use. Springs have become a focal point for feral pigs and rubber vine infestation.

Table 3. Proposed areas for campsites in Undara Volcanic National Park

<table>
<thead>
<tr>
<th>Site</th>
<th>Issues</th>
<th>Status</th>
<th>Management Intent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fifteen Mile Spring</td>
<td>Significant vegetation (black tressa). Water source for cattle. Water quality. Cultural heritage importance (Aboriginal campsites). Good access 60m road reserve.</td>
<td>Currently closed - proposed vehicle access.</td>
<td>Prepare a site plan based on: • facilities with a natural character; • camping only at designated sites (15 or fewer); • ensure uses and activities have little or no impact on the hydrology of the springs. e.g. no campsites closer than 50m from the spring watercourse and more than 500m from the head of the springs; toilets located more than 100m from watercourses. Development can only take place following a favourable Environmental Impact Assessment (EIA).</td>
</tr>
<tr>
<td>Twelve Mile Spring</td>
<td>As above.</td>
<td>Currently closed. Proposed for walk in only.</td>
<td>Prepare a site plan based on above.</td>
</tr>
<tr>
<td>Old Racecourse Bore</td>
<td>Lacks public vehicular access and water supply.</td>
<td>Currently closed. Proposed for walk in access.</td>
<td>Maintain water supply and storage at New Racecourse Bore for management purposes. Primitive character camping for hikers only. Prepare a site plan for the area.</td>
</tr>
</tbody>
</table>

Road material extraction

Background Information

Extraction of material suitable for maintaining roads in the parks occurs on a limited scale in three areas — the northern end of the former Yaramulla Holding, Barkers Knob and from Billigilla Holding, which is outside Undara Volcanic National Park. A network of roads and tracks is and will continue to be maintained for fire and other management purposes. Access to the lava caves used by tourists requires substantial maintenance and upgrading.

Desired outcomes

- Where necessary, any sites in the parks used for road material extraction are managed to minimise any adverse environmental, cultural and visual impacts.

Proposed guidelines and actions

- Allow limited extraction of road material from the parks only when no alternative sources are practically available. Extraction of road material from within the parks is only for maintenance and upgrading of access and management roads within the parks.
- Approval to extract material from the parks will be given by the Regional Director, Northern Region, DPIWFS, after considering an assessment of the likely impacts and ensuring that any site is:
  - more than 2km from lava tubes, caves and visitor nodes;
  - more than 1km from cultural sites and sites of scientific significance; and
  - more than 500m from volcanic vents and structures.
- Provide input to State and local government authorities to ensure sensitive siting of extraction points adjacent to the parks.
- Identify sites within and adjacent to the parks which have the potential to satisfy the desired outcomes and take account of the factors listed above.
- Rehabilitate disused extraction sites and existing sites after use to provide for the sustained re- establishment of native habitats.

Water extraction

Background Information

Water is a scarce resource in Undara Volcanic National Park and Forty Mile Scrub National Park. A bore network was developed to service former grazing and domestic needs. Volcanic rocks appear to provide the main aquifer. The probability of elevated arsenic levels exists in some granitic areas near Barkers Knob but might be more widely distributed. Yields from bores on Yaramulla Section, considered typical for the area, have been highly variable. Where tested, water quality has been acceptable for human consumption.

The southern end of the adjacent special business lease is within 500m of the north-western lava tube on the Mount Rosey section. Although unlikely, there is potential for bores to be developed on the southern extremity of the special business lease which might impact adversely on waterable levels in Undara Volcanic National Park adjacent to the north-western lava tube.

Desired outcomes

- Water designated for human consumption is safe and within stated health standards.
- Water quality and quantity in aquifers and springs is protected and any impacts from water extraction in and adjacent to the parks are identified and minimised.

Proposed guidelines and actions

- Avoid any actions having the potential to significantly draw down watercables or pollute aquifers and springs. This might be particularly important in the vicinity of lava tubes.
- Do not allow water extraction from within the parks for agriculture or domestic purposes unless on a temporary basis for emergency needs.
Aboriginal opinions and knowledge relating to the parks. Aboriginal cultural sites are protected under the Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987.

European settlement started in the early 1860s. Relics of this early pastoral activity are believed to be non-existent in the parks. Significant relics from later pastoral activity include a wooden fork whip used for water extraction at the Fifteen Mile Spring and an assortment of corrugated iron/pole and concrete/pole sheds at the Yaramulla Ranger Base. The old Mt Surprise Road is evident, particularly south of the Lodge and is currently used as access to some of the lava caves.

**Desired outcomes**

- Aboriginal cultural places are protected and managed in accord with the wishes of identified custodians of these sites and if appropriate made available for interpretation to visitors.
- Non-Aboriginal cultural heritage is conserved, managed and presented in accordance with best practice and established guidelines including the Burra Charter.

**Proposed guidelines and actions**

- Identify, document and assess Aboriginal places and determine management requirements.
- Liaise with appropriate Aboriginal people when undertaking works.
- Undertake cultural heritage assessment and Aboriginal consultation to determine cultural values prior to allowing or undertaking any development works such as walking tracks and other public facilities.
- Ensure that staff recognise the significance of Aboriginal and non-Aboriginal cultural heritage and management requirements.
- Prepare an inventory and assessment of places related to non-Aboriginal exploration and pastoral use, determine their significance and develop management strategies.
- Ensure track maintenance or proposed development in Undara Volcanic National Park does not adversely impact on the cultural heritage significance of the old Mt Surprise Road.
- Continue efforts to locate and involve Aboriginal people with heritage matters in the parks.
- Undertake the assessment and management of Aboriginal and non-Aboriginal cultural heritage places in accordance with best practice methods defined in such guides as the Burra Charter and the Draft Guidelines for protection, management and use of Aboriginal and Torres Strait Islander Cultural Heritage Places.

### 3.4 Resource use management

#### Grazing

**Background information**

Stock grazing is not permitted on either Undara Volcanic or Forty Mile Scrub National Parks. Small numbers of stray stock enter the parks from neighbouring properties.

**Desired outcome**

- Minimal impact results from stock intruding from neighbouring properties.

**Proposed guidelines and actions**

- To minimise straying stock, maintain boundary fences and create reasonable access along these fences, and maintain sufficient yards and facilities to manage stray stock.
- Remove stray stock in accordance with Nature Conservation Regulation 1994.
- Control bores and dams to help minimise straying stock.

### Vehicle access

Well maintained roads and managed vehicle access are important for protecting the parks' values, natural resource management programs and for providing opportunities for visitors to use and enjoy the parks.

Currently, there is no public access to Undara Volcanic National Park beyond Yaramulla Ranger Base or the Undara Lava Lodge. Public vehicle access to the park is on an undedicated road which is used primarily by guests of the Undara Lava Lodge. Public vehicle access to and within the Undara Volcanic National Park primarily will be along declared roads.

Vehicle access to Forty Mile Scrub National Park will continue to be along the Kennedy Developmental Road.

Vehicle access for visitors will be in accord with priority routes shown in Table 4.

<table>
<thead>
<tr>
<th>Site</th>
<th>Issues</th>
<th>Status</th>
<th>Management intent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access from the Gulf Developmental Road to the special business lease and to the Yaramulla Ranger Base</td>
<td>Adequate maintenance and appropriate signs and dedicated access.</td>
<td>Primary public and commercial operator vehicle access in Undara Volcanic National Park.</td>
<td>Initiate moves to have this access road gazetted and provide relevant directional signs.</td>
</tr>
<tr>
<td>Undara Lava Lodge to Arch Complex and Road and Barkers Caves</td>
<td>Ongoing maintenance required to achieve standard to minimise erosion and dust.</td>
<td>Currently unformed tracks.</td>
<td>Upgrade to ensure appropriate access for commercial operator.</td>
</tr>
<tr>
<td>Yaramulla Ranger Base to Wind Tunnel Complex</td>
<td>Ongoing maintenance requirement for commercial operator.</td>
<td>Main access route to Wind Tunnel complex.</td>
<td>Upgrade and re-align to provide appropriate access.</td>
</tr>
<tr>
<td>Yaramulla Ranger Base-Fifteen Mile Spring</td>
<td>Undeveloped and used for fire control. Provides access to Mt Doyle.</td>
<td>Main public and commercial operator access in Undara.</td>
<td>Develop to an all-weather standard 4WD and dry season 2WD road.</td>
</tr>
</tbody>
</table>
Walking

No walking tracks have been developed in the parks. Some tracks have been developed in the special business lease and are used by visitors. There is a need to develop walking tracks to various key features in the parks to widen available recreation opportunities.

The general aridity of the landscape and hazardous conditions in some caves impose particular constraints and pose a potentially dangerous situation for unprepared or unskilled hikers. The distribution and biological importance of cave animals is largely unknown, and many caves are considered hazardous due to instability or above average carbon dioxide levels. Vine thickets might be susceptible to high levels of visitor impact.

Walking tracks will be developed in accord with approved plans and for those identified priority sites shown in Table 5. Walking tracks will be maintained to standards appropriate for their classification.

tracks suitable only for high clearance 4WD vehicles. Generally, property tracks are poor quality and offer limited mobility due to the extreme stoniness of the terrain. Some areas are distant from currently available water sources which pose considerable problems in fire management and control.

A draft fire management plan has been developed for Forty Mile Scrub National Park. Fire management practices in protected areas in north Queensland are based on experience derived for a range of environments in this region.

**Desired outcomes**
- Human life and property are protected from the effects of fire as far as practically possible.
- Fire-sensitive habitats and species are protected from the effects of fire as far as practically possible.

**Proposed guidelines and actions**
- Develop a fire management plan for the parks and manage in accord with that plan. In the interim, fire management will be guided by the draft fire management plan for Forty Mile Scrub National Park where relevant.
- Develop and document:
  - an approved wildfire response plan in accord with guidelines for response plans;
  - brief annual fire reports which cover the extent of prescribed burns and wildfires in any one year and recommend a burning program for ensuing year/years; and
  - a database recording tracks, bores, fire breaks, equipment, and staff.
- To ensure adequate control during prescribed burning and for wildlife management:
  - upgrade and if necessary develop access for fire management purposes, for example, Yaranulla Ranger Base to New Racecourse Bore; and
  - investigate sites for strategic water points.
- Guidelines for a fire management plan for both parks will include:
  - burning on a mosaic basis with not less than a two-year rotation period. Burn not greater than half the area in any given year;
  - burning annually parallel to main roads particularly the Kennedy Developmental Road and around important structures;
  - use of ground and aerial ignition to create a local mosaic pattern of many small fires only when humidity and fuel moisture conditions allow;
  - identification of weed areas, sensitive habitats and species, public areas and significant structures to be given special procedural planning;
  - arrangements for possible closure of parks during burning operations or wildfires;
  - work with Oasis Rural Fire Brigade, Rural Fires Division of the Queensland Fire and Rescue Authority, and other relevant authorities to ensure co-ordination of fire management programs;
  - advice to park neighbours of fire management programs and the ecological basis of burning and
  - encouraging research into the effects of fire on native plants and animals.

### 3.3 Cultural heritage management

**Background information**

Evidence of Aboriginal occupation includes stone artefacts and scarred trees associated with caves, vine thickets and springs. No systematic survey for archaeological sites has been undertaken, apart from a preliminary assessment of visitor impact on identified sites in the vicinity of publicly accessed caves. This work suggested that some artefact scatters in these areas might have been lost or damaged. Accounts by early explorers and settlers in the region indicated a substantial presence of Aborigines. By the early 1900s only 40 years following European settlement, the Aboriginal population of this region had decreased significantly.

Preliminary consultation with Aboriginal people associated with Undara Volcanic National Park and Forty Mile Scrub National Park has not identified significant spiritual or cultural sites. At this stage, Aboriginal people with links to this area remain largely unidentified. Considerably more effort is required to canvass
infections to facilitate fire management and systematic use of appropriate herbicides.

- Lantana eradication and control will focus on vine thicket environments of Forty Mile Scrub National Park where systematic programs using a combination of fire, herbicide and physical removal will be used.
- Eradicate the cotton plant infestation in the Taramulla Section of Undara Volcanic National Park.
- Liaise with appropriate agencies and neighbours to ensure weed control is performed in areas within their jurisdiction.

**Introduced animals**

**Background information**

Several types of feral animals have been recorded in and adjacent to the parks. Currently the species of major concern are pigs, rabbits and wild cats. Cane toads have also been recorded. Introduced animals degrade the natural environment in ways such as to cause erosion, deplete native habitats, promote the spread of weeds and compete with native animals for resources. Feral cats pose a direct threat to the viability of some native animals. The population density of these animals is unknown.

Feral pigs pose the main threat to ecosystem stability. During the dry season, dams, cattle troughs and the perennial spring environments on the Mount Rosey Section of the Undara Volcanic National Park become an important focus for pig activity. In Forty Mile Scrub National Park, vine thicket loss has been attributed primarily to pig disturbance of root systems, allowing lantana invasion and creating an unfavourable fire regime.

Cattle and horses cause erosion, foul water, spread weeds and graze and trample vegetation. Fences can be damaged. Following desalting, some stray animals will remain. Cattle and horses stray into the parks from adjoining properties and, unless removed, these animals have the potential to become feral.

**Desired outcome**

- The impact of introduced animals is reduced.

**Proposed guidelines and actions**

- Develop an introduced animal control plan.
- Give high priority to controlling and eradicating the feral pig population in the Forty Mile Scrub National Park, and the spring environments on Mount Rosey Section of Undara Volcanic National Park.
- Liaise with neighbours and other agencies involved in introduced animal control.
- Determine the effectiveness of control programs by routine monitoring.
- Eradicate any species found to be newly invading.
- Remove stray cattle and horses remaining in parts of the parks after stock grazing permits and authorities have expired.

### 3.2 Fire management

**Background information**

Knowledge of Aboriginal fire regimes in the vicinity of Undara Volcanic National Park and Forty Mile Scrub National Park remain uncertain. Contemporary fire management throughout Undara Volcanic National Park and Forty Mile Scrub National Park and adjoining areas has been variable where practices have ranged from no deliberate burning to extensive burning. "Cool" burns are used to minimise fuel and encourage new growth for stock. Unfortunately, fires lit along the Kennedy Developmental Road have intruded into the parks and become wildfires. In Forty Mile Scrub National Park vine thickets, fires have caused substantial damage. Vine thickets throughout the parks are particularly susceptible to damage by fire. Apart from damaging park values, wildfires threaten human life and property.

Access for fire control in the parks and adjoining land is variable, ranging from sealed highways to rough

<table>
<thead>
<tr>
<th>Table 5. Proposed walking track developments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Track and destination</strong></td>
</tr>
<tr>
<td>Kalkani day-use area to Kalkani Crater.</td>
</tr>
<tr>
<td>Kalkani day-use area to Silent Hill Volcano.</td>
</tr>
<tr>
<td>Close Dam Bore to Old Racecourse Bore.</td>
</tr>
<tr>
<td>Racecourse Crater and Racecourse Knob and return to Old Racecourse Bore.</td>
</tr>
<tr>
<td>Spur track to Mount Doyle.</td>
</tr>
<tr>
<td>Spur track to spot height 753 in The Granites.</td>
</tr>
<tr>
<td>Fifteen Mile Spring campsite to spring Head.</td>
</tr>
<tr>
<td>Fifteen Mile Spring campsite to Twelve Mile Spring and swamp area.</td>
</tr>
<tr>
<td>Barkers Cave vehicle park to Barkers Knob.</td>
</tr>
<tr>
<td>Barkers Knob south vehicle park to Twelve Mile Swamp.</td>
</tr>
<tr>
<td>Arch Complex car park around southern side of vine thicket associated with lava pond to Picnic Cave.</td>
</tr>
<tr>
<td>Forty Mile Scrub day-use area.</td>
</tr>
<tr>
<td>Undara Lava Lodge to Pinnacle Rock (Granite Range).</td>
</tr>
</tbody>
</table>
Commercial operations

Background information

Undara Lava Lodge with a range of accommodation capacities has been developed on a special business lease located in bushland adjacent to Undara Volcanic National Park. Most people arrive at the resort by car or coach. Because of current access arrangements to Undara Volcanic National Park the commercial operation exerts control on vehicular access to the caves. Activities offered from the Undara Lava Lodge include spotlighting, bushwalking, scenic flights and cave tours.

Commercially guided tours to Wind Tunnel and Arch Complexes, Road, Daves and Barkers Caves have occurred since 1989. During 1993, about 20 000 people visited the Lodge. Visitor numbers are growing.

In 1992, QPWS formally entered into an agreement with Undeavl Pty Ltd and Dutana Pty Ltd to provide commercial tours to selected caves in the lava tube system on Undara Volcanic National Park.

At present this guiding operation is provided through the current commercial operator using the Gulf Savannah Guides Association. The operator organises all commercial tours and is responsible for the quality of the guiding service. The guides are trained in public contact techniques. Visitors leave from the Lodge and are conveyed by small buses to the caves. A variety of tours are offered to four caves. Access to Wind Tunnel Complex and Barkers Cave is restricted during November-February due to bat breeding. In excessively wet periods, sections of other caves are flooded and consequently can also be closed to visitors. Wind Tunnel Complex and Picnic Cave are visited intermittently by half-day or full-day tours. Tours are arranged to avoid visitor overlap at cave sites. Inevitably some overlap occurs if more than 20 visitors subscribe for a given tour. The current tour structure generally precludes visits to Barkers Cave by either budget or half-day tours and visits to Arch Complex by budget tours.

At present, there is no free or independent public access past the Lodge to reach these caves.

Vehicle access has been developed to the main visitor caves and parking areas are adjacent to the cave entrances.

Desired outcomes

- Tourist facilities and activities on the special business lease are compatible with the surrounding natural values, do not adversely impact on national park values, and support visitors to Undara Volcanic National Park.
- Commercial activities conducted on the parks, are compatible with the purposes of management, are managed to ensure minimal impacts on natural and cultural values, and that costs to, and access for park visitors, are fair and reasonable.

Proposed guidelines and actions

- Ensure co-operation with the operator of Undara Lava Lodge occurs over:
  - provision of recreation opportunities, services, facilities and access;
  - potential for impact by domestic animals such as cats and dogs;
  - visitor understanding of the relationship of Undara Lava Lodge to the park;
  - fire management and weed/feral animal control; and
  - potential for adverse impact of water extraction from aquifers.
- Monitor commercial operations to determine impacts on park values, quality of visitor experience and act to modify or restrict activities where appropriate.
- QPWS staff will provide advice to commercial operators about the actual and likely impacts associated with use of the parks.
- Monitor commercial activities on the special business lease and Undara Volcanic National Park to ensure that they comply with the agreement and commercial permit between QPWS and Dutana Pty Ltd/Undeavl Pty Ltd or commercial permit in the case of another commercial operator.
- Monitor the quality of the guiding service to ensure it provides high quality information and

Barkers Cave provides an important habitat for several bat species. Little is known about the significance of many other caves in Undara Volcanic National Park.

Similarly, studies have demonstrated the vital importance of the Undara cave environment to the evolution of many recently discovered troglobiotic species.

Desired outcomes

- The distribution, abundance and habitat preferences of rare, threatened or significant animal species are identified and mapped.
- Cave and lava tube habitats are better understood and managed to protect native animals.
- The diversity and distribution of native wildlife is maintained.

Proposed guidelines and actions

- Use existing resource information as a basis for establishing a resource register and start developing a comprehensive database.
- Identify rare, threatened or significant species and develop relevant management strategies.
- Identify management requirements for and an understanding of native wildlife with emphasis on rare and threatened species.
- Train ranger staff in resource inventory skills.

Introduced plants

Background information

Thirteen introduced plant species have been identified in Undara Volcanic National Park and Forty Mile Scrub National Park. In 1994 cotton seed Gossypium sp. was found to have been accidentally introduced onto the Yaramulla Section of Undara Volcanic National Park with stock grazing operations. Cotton plants have germinated over about 2000 sq.m and could spread further unless control measures are taken.

Rubber vine Cryptostegia grandiflora and lantana Lantana camara constitute the most significant threat to habitat survival. In Forty Mile Scrub National Park, lantana has engulfed about three-quarters of the vine thickets, with infestation densities estimated at about 3000 plants/ha (Pennham et al. 1993). Rubber vine is also present in this park, but at this stage infestation is limited.

In the Mount Rosey Section of Undara Volcanic National Park, rubber vine is a severe threat in most drainage lines and is spreading.

Desired outcomes

- The extent of introduced species is reduced and establishment of new species prevented.
- The distribution and occurrence of introduced plants are known.

Proposed guidelines and actions

- Develop a weed control plan.
- With vegetation surveys, map and monitor priority weed species such as lantana and rubber vine, and implement integrated control measures to eradicate where possible and contain current distributions.
- Ranger staff will complete an annual weed status report, detailing actions and progress in control, combined with updated weed distribution data. Significant weed infestations should be plotted onto 1:25 000 scale base plans and used for continuing control programs.
- Rubber vine eradication and control will focus on areas where there is an inadvertent risk of seed spread by visitors, particularly in the Fifteen Mile Spring and Twelve Mile Spring of Undara Volcanic National Park where public visitation is proposed. Where infestations occur outside moist situations, rocky areas or vine thickets, management should be directed to building up sufficient fuel levels to allow for the passage of hot fires. The effects of this strategy will require careful monitoring to ensure that park values are not impaired. Strategic access tracks will be established around major rubber vine
• Physical disturbance of the spring environments will be minimised by avoiding actions that might contaminate the water or significant lowering of water tables. This could attain special significance near lava tubes where specialised and unique cave animals might be affected.

Vegetation

Background information

Undara Volcanic National Park and the Forty Mile Scrub National Park support a diversity of vegetation habitats and species. About 400 native plant species have been identified associated with 53 habitats in and adjacent to the parks. Habitats have not been mapped.

Twelve species of native plants are of conservation significance.

Vine thickets associated with three well-defined habitats probably represent the most vulnerable communities in the parks due mostly to their fire sensitivity or potential for weed invasions. Loss of vine thicket is most evident in Forty Mile Scrub National Park where lantana has invaded areas disturbed by feral pigs. Wildfires have substantially reduced the vine thicket extent and severely threaten this community's survival.

Information on native vegetation (particularly habitat distribution) and requirements for conservation and management are lacking. There is a need for better information about the vegetation, particularly the significant species and habitats on which future management directions could be based.

Desired outcomes

• Native plant communities in the parks are mapped and protected.
• Degraded habitats are rehabilitated.

Proposed guidelines and actions

• Map the vegetation of the parks to help management decision making including the development of a comprehensive fire management plan.
• Monitor grazing activities to ensure they are complying with stock grazing permit conditions or agreements.
• In the vine thickets of Forty Mile Scrub National Park
  - control the feral pig population,
  - maintain a fire break around the boundary fence,
  - use the fire management plan proposed specifically for this park,
  - concentrate initially on eliminating lantana from areas where infestations are relatively minor. Major lantana infestations will require a combination of herbicides, fire, and physical removal of roots to eradicate and control. This will be integrated with establishment of suitable shade trees to reduce weed regrowth.
• Encourage research into the most efficient means of vine thicket rehabilitation, the threatened and significant plant species to determine any special requirements for their continued survival, and into the impact of fire on sensitive communities and species.
• Establish a program to monitor the condition of vine thickets.

Native animals

Background information

Apart from some investigations dealing with bats and arthropods in the cave environment, systematic and effective documentation of native animals including invertebrates in the parks has been limited. Consequently there is the potential problem that native animal management will suffer due to lack of information concerning distribution, populations, ecology and conservation requirements of the individual species.

presentation to the public, consistent with current levels of understanding of scientific and park values.
• Investigate with operators of the Undara Lava Lodge the possibility of half-day tours to experience Barkers Cave and budget tours to concentrate on Arch Complex.
• Seek expert assistance to:
  - assess the potential impact on park aquifers of sewerage disposal system of the Undara Lava Lodge; and
  - assess the impact of water extraction on park water table levels particularly in the vicinity of Road and Bayliss Caves.

Public contact

Background Information

Public contact involves providing opportunities for park interpretation, environmental education, publishing information, education sheets and brochures, and enforcing park regulations. Opportunities for park interpretation and education in Undara Volcanic National Park and Forty Mile Scrub National Park are not fully realised. In a limited context the Savanna Guides operating from the adjacent resort are performing this role.

There is no interpretive material readily available for the parks. The Lodge provides the primary contact between visitors and Undara Volcanic National Park through the Savanna Guides in the course of their cave-guiding duties. QPWS staff have a management presence but effectively have little public contact.

Visitors to the parks predominantly visit a few lava caves on a guided basis for a relatively short period and experience very little of volcanic vents or a range of other natural features and landscapes. Their knowledge and understanding of the values of these parks is consequently likely to be very limited.

Desired outcomes

• A high standard of information and interpretive opportunities to enable park visitors to more fully understand, enjoy and respect for the area is developed.

• Visitors are aware of potential impacts created by their visit and support the implementation of expressed management actions.

Proposed guidelines and actions

• Use the proposed Kalkani day-use area as the primary focus for information on Undara Volcanic National Park and the proposed Forty Mile Scrub National Park day-use area as the primary focus for information on that park.
• Promote employment and training of local Aboriginal people in planning area management. This could also involve developing skills in natural and cultural heritage interpretation and presentation.
• Ensure cultural heritage information is appropriate for interpretation and presentation.
• On Undara Volcanic National Park liaise with commercial operators to ensure:
  - promotion of the area is accurate and appropriate;
  - approval is obtained 'or appropriate placement of any proposed interpretive panels;
  - dissemination of relevant information about the park to visitors; and
  - presentation of high quality audio/visual material relates park values to visitors.
• Develop and implement an interpretive plan for the parks. Until then the following will guide priorities:
  - interpretive panels at Kalkani day-use area illustrating geological cross section through Kalkani and Silent Hill Volcanoes; regional geology of McBride Province showing vents and flows, highlighting Undara Volcano, its flows and lines of lava tubes; and walking tracks and special features;
  - plan at Wind Tunnel Cave showing relationship of walking tracks to the volcanic features and longitudinal profile of Wind Tunnel Cave;
  - plan at Arch Complex showing relationship of Picnic collapse and lava pond to this complex including walking trails and parking areas and longitudinal profiles through Stephensons and Left Arch Caves;
  - plan at Road Cave showing walking track, parking area and road access relative to the cave entrance.
and collapse exit and longitudinal and cross sections of the cave, showing the granite basement and spring.

- plan of the area at Barkers Cave showing relationship of this cave to Barkers collapse and granite outcrops and include location of facilities; and
- possible panels at Undara Lava Lodge depicting major volcanic provinces in north Queensland and regional geology of McBride Province, highlighting Undara Volcano, its flows and lines of lava tubes; and lava tube development and associated features (including collapse depressions from older lava ponds) possibly incorporating block diagrams to enhance understanding by showing basement topography/geology.

- At Forty Mile Scrub National Park day-use area and near the Duns Bore vine thicket develop a self-guided walk and associated interpretive material about the evolution and special characteristics of the vine thicket and floristic relationships to rainforest.

Visitor safety

Background information

Safety issues of QPWS concern include fire from wildfire and prescribed burning operations; venomous snakes; histoplasmosis from dusty environments in caves; rock falls in caves, pits and crevices; and exposure and dehydration as parts of the park are remote and have no surface water and a difficult landscape in which to navigate.

Suitable public information through direct contact or appropriate signs is required to reduce or eliminate the risks associated with these areas or activities. Guides conducting underground cave tours are trained in cave rescue and general safety matters to a level acceptable to Regional Director, Northern Region, QPWS.

Desired outcome

- Visitors and park staff have adequate safety awareness and a reduced exposure to perceived risks.

Proposed guidelines and actions

- Provide information in recreation areas (specifically Undara Lava Lodge, Fifteen Mile Spring, Kalkani, and Forty Mile Scrub National Park day-use areas) advising of potential hazards in the parks. This information should also be incorporated in visitor information brochures for the parks.
- Ensure all facilities are sited, designed and maintained to a safe standard.
- Ranger staff will be trained in workplace health and safety and first aid to a minimum level.
- A search and rescue/disaster plan will be developed for park operations and Ranger staff are trained in search and rescue operations, including cave rescue and miscellaneous emergency procedures which could involve counter disaster plans.
- Establish a registration system for all visitors using remote parts of Undara Volcanic National Park.
- Assist the Senior Mines Inspector in monitoring public access caves for roof and wall instability and atmospheres that fail to meet stated criteria, on a basis to be specified by the Senior Mines Inspector. If a potential hazard is detected immediate closure will be considered until appropriate to re-open.
- Determine if radon exposure is a potential risk to visitors and staff exposed regularly to cave atmosphere.
- Install warning signs on all walking tracks relating to water availability and requirements.
- Provide adequate warning signs about features. Place warning signs at identified hazardous features such as caves with elevated carbon dioxide levels, high dust levels or instability.
- Because of its relative accessibility and potentially lethal atmosphere, Boyiss Cave will be considered for closure by gates which do not impede bats.
- Develop procedures for park closure and if necessary evacuation in the event of wildfires or prescribed burning operations.
- Park staff will become familiar and participate in reviews of local counter disaster plans.

- Align tracks and vehicle parking areas to avoid the lava tubes and cave entrances where practical and avoid siting any structures or roads on key landform features particularly tubes and volcanic vents.
- Create opportunities via walking tracks, particularly near Kalkani Volcano and Arch Complex for visitors to experience collapsed lava tube and lava pond features. Align walking tracks marginal to these features with some opportunity provided via spur tracks to enable closer inspection of these geological features.
- Investigate options for monitoring the biota in caves subject to visitor impacts and, where practical, establish monitoring projects as soon as possible.
- Allow only permitted scientific access to Undara Volcano. This strategy is necessary because of the sensitivity of vegetation in the crater and its relative remoteness from other park features and facilities which offer comparable visitor experiences.
- Investigate options to provide protection to the entire Undara Volcano, for example, through a voluntary and co-operative agreement with the adjoining landholder.
- Rehabilitate the abandoned quarry site on Kalkani Volcano following assessment of the geology of the exposure.
- Rehabilitate the abandoned quarry south of the Gulf Developmental Road in the Undara Volcanic National Park.
- Assess the visual intrusion of all proposed developments, and minimise any such impact by appropriate siting.
- Allow the area clear for cultivation on the Yaramulla Section of Undara Volcanic National Park to revegetate naturally.
- Extract no resources from volcanic vents or other topographically prominent positions.
- When undertaking land rehabilitation, or other land management practices, the resulting impact on cultural heritage will be assessed and managed appropriately.

Catchment protection

Background information

Much of the park consists of relatively flat terrain developed on various basaltic surfaces. The main relief is provided by outcrops of granite basement rock and volcanic vents. On the gently undulating basaltic plains, well drained, strongly structured clays and loams have developed. In places these soils reach a depth of about 1.5 metres, but in substantial areas they are very stony (Grundy and Bryde 1989). These soils appear stable in this weathering regime and no widespread erosion has been observed. However, there are numerous tracks in the parks where erosion is occurring due to the development of ruts and destruction of grass cover.

In the southern portion of Mount Rosey Section, dark, deep, moderately drained clay soils attain thicknesses of about 1.5 metres and appear relatively stable in terms of erosion. Granitic areas have weathered to produce well drained, shallow, sandy loams with coarser sands around the outcrop margins. These soils tend to be prone to gully and sheet erosion where exposed, especially along vehicle tracks. This situation is clearly evident along the track section just south of Fifteen Mile Spring.

The perennial spring environments and associated watercourses remain largely undisturbed on the Mount Rosey Section except for cattle grazing, bore establishment and fencing. Existing tracks tend to avoid these features.

Desired outcomes

- Hydrologic and catchment values of the national parks are protected.
- Perennial spring environments are identified, monitored and protected.

Proposed guidelines and actions

- Carefully plan track construction, maintenance and drainage to minimise erosion especially in granite-derived soils.
- Identify and rehabilitate sections of existing tracks with significant erosion problems.
- Carefully site resource extraction areas for track material to avoid erosion and impact on catchment values.
3 Management strategies

3.1 Natural resource management

Geological and landform features

Background information

Three lava tubes relating to the Undara Volcano have been defined. Sixty-eight caves have been documented associated with these lava tubes. Sixty of these are in the parks. These tube systems, associated caves, depressions related to tube collapse and other depressions considered to represent lava ponds have remained essentially undisturbed by human influence since formation. Caves habitats are special, diverse and spatially restricted. They are susceptible to environmental modification through artificial air movement, ground water changes, human-induced alteration to light, temperature, atmospheric composition, humidity and biological changes. They support rare, restricted and highly selective invertebrates and provide essential shelter for bats. Some support the most restricted invertebrate taxa known. Public visits have the potential to adversely affect cave wildlife.

In recent years some of the caves (restricted to the north-west tube line) have provided an attractive focus for public visitation on a commercially guided basis. Apart from some minor works to facilitate access in one cave, no infrastructure or hardening of surfaces has been implemented to accommodate this visitor influx. Access to the caves used by park visitors has been on unformed dirt tracks using 20-seater buses with parking areas immediately adjacent to caves.

The current level of visitor use in the public access caves is contributing to a degradation of these environments. This degradation includes wear on primary lava flow floor surfaces, disturbance to vegetation and animals, dust from silty floors deposited on cave walls, floor compaction, siltation and erosion.

About 44 vents are scattered throughout the park, although most occur in the Yarramulla and Mount Rosey sections of Undara Volcanic National Park. Kalkani Volcano is the only defined vent which has incurred significant human disturbance in the form of quarrying and water tanks. Fences encroach on some vents but, apart from Kalkani Volcano, no access tracks disturb these features. Undara Volcano straddles the park boundary with a significant portion of this important feature located in adjacent Scoria Holding.

Desired outcomes

- Geothermal, biological, scenic and cultural values of the lava tube system are protected.
- The lava tube system and associated caves are managed to prevent or minimise disturbance and degradation from visitor activities.
- Visitors are able to gain access to selected vents and gain an appreciation of the volcanic landscape.
- Vents damaged by human impact are rehabilitated.

Proposed guidelines and actions

- Allow public access to certain caves only on a guided basis. The Service will review access to other caves in the Undara Volcanic National Park for the purpose of free and independent visits. This opportunity will be considered if there is a clearly established need for this kind of experience.
- Caves available for public access are Arch and Wind Tunnel Complexes, Barkers and Road Caves, and Picnic Cave (surface only).
- Build structures in all public access caves to minimise adverse impact.
- Restrict lighting (if used) to Arch Complex with appropriate placement of generators if required to remove visual impact and noise. Where practical, use solar panels in preference to generators for power generation. Conduct environmental monitoring where lighting is used to ensure any adverse effects are mitigated or prevented should they occur.

3.6 Park management

Other agencies and utilities

Background information

Many factors controlled by outside agencies have an influence on the parks' values. These require liaison between QPWS as land managers and agencies involved in local planning and facilities management. Key elements include Queensland Transport, Department of Mines and Energy, Far North Queensland Electricity Board, Queensland Corrective Services Commission, Etheridge, Dalrymple, Mareeba and Herberton Shire Councils, management of the commercial facilities on the special business lease, Aboriginal people, Oasis Rural Fire Brigade, and local pastoral interests.

Maintenance of utilities, particularly main roads and electricity transmission lines involving clearance of native vegetation, is of concern.

Desired outcome

- Relevant agencies, individuals and groups are given timely and relevant information about management of the parks.

Proposed guidelines and actions

- Play a leading role in co-ordination and co-operation between agencies which have an interest or have the potential to impact on the parks. Liaise with local governments for effective rubbish removal along sections of major roads through the parks. Liaise with local governments to ensure no actions are taken about undeveloped gazetted roads crossing the parks which might adversely impact on park values.
- Determine if existing public utilities in the parks require permits under section 34 of the Nature Conservation Act 1992. Permit conditions can specify QPWS requirements including protection of native vegetation with limits on clearing, access to the facility and maintenance requirements, removal of construction and maintenance materials, notification before undertaking maintenance, use of herbicides, site rehabilitation, new structures, and other conditions deemed necessary by QPWS.
- Assess proposed services for their potential impact and allow them only where no significant impacts are identified and no alternative sites exist outside the parks. Where practical, new and upgraded services are to be in existing use corridors.

Staffing and infrastructure

Background information

The Ranger-in-charge and a support ranger are based at the Yarramulla Ranger Base.

Housing at this Base is not to Service standard for current levels of staff.

Lotus Glen Prison has entered into agreements related to a co-operative work program with QPWS whereby Lotus Glen provides supervisory staff for prisoner work parties. Facilities were established in early 1995 to accommodate this workforce.

Desired outcome

- An appropriate number of staff and resources are allocated to implement this plan.
- Staff accommodation is adequate and meets all Service standards as soon as practically possible.

Proposed guidelines and actions

- QPWS intends to upgrade housing at this Base to Service standards for a minimum of two staff.
- Seek opportunities for Aboriginal employment and explore external funding arrangements.
- Review allocation of resources and staff annually and plan to rectify any deficiencies to enable effective parks' management.
• Encourage the use of Lotus Glen Prison-supervised work parties to assist in weed control and construction programs and ensure the Lotus Glen accommodation facilities are maintained to environmentally acceptable standards, compatible with standards set for existing facilities in the park.
• Establish a new workshop and move all appropriate gear acquired for parks’ management on site as soon as practicable.
• Develop a remote facility, strategically located on the Mount Rosey Section of Undara Volcanic National Park, suitable for overnight park staff accommodation and equipment storage.
• Train and develop Ranger staff in a range of skills, appropriate for implementing this plan.

3.7 Research and monitoring

Background Information
Some research has been carried out on Cainozoic geological aspects, cave biology and vine thickets. There is a need to increase knowledge of the parks’ values to improve the basis for management, interpretation and presentation. Most current research involves bat dynamics in relation to the publicly accessed caves, biology of Byflis Cave and vine thickets. Basic documentation of cave locations and morphology is incomplete. Previous studies on native plant and animal characteristics and distributions remain largely undocumented or in a form not readily available to managers.

At present there is little effective monitoring of activities or situations in the parks to enable detection of deleterious changes.

Desired outcomes
• Adequate monitoring of management activities and relevant environmental variables are undertaken.
• Research with particular emphasis on current management issues is encouraged and supported.

Proposed guidelines and actions
• Collate past research, particularly about native vegetation and animals and determine relevance to management.
• Give priority to research studies which generate baseline information on park values. Highly relevant studies include:
  - cave ecology; bat dynamics and entomology in publicly accessed caves;
  - vine thicket rehabilitation in Forty Mile Scrub National Park;
  - fire management in relation to threatened species and habitats;
  - management and eradication techniques for rubber vine;
  - Cainozoic geology with emphasis on Undara volcanic environment;
  - regional native plants and animals with emphasis on rare or threatened species;
  - cave invertebrate palaeontology;
  - Aboriginal cultural heritage and knowledge;
  - non-Aboriginal cultural heritage and history of exploration and settlement;
  - radon accumulation in publicly accessed caves; and
  - promote collaborative research with various groups.

Priority areas for monitoring are given in Table 6.

Educational and scientific values
There is considerable scope for undertaking a range of interpretive and educational programs related particularly to geological values of the park (aspects of Cainozoic volcanism, exposures of granite basement and of the lava flows afforded by the caves, combined with good preservation of the various volcanic vents). Potentially useful research opportunities include geological, archaeological, anthropological, biological, palaeontological and fire ecology.
Vegetation

Vine thickets are near the driest extent of their range and are associated with some craters and lava tube collapses. They are distributed in patches throughout the parks, particularly in stony, fire-exclusive zones, with the peak development in the Forty Mile Scrub National Park. These vine thickets remain as 'islands' in a landscape largely dominated by extensive savannah woodlands of ironbark and woodland species and provide important animal refuges. Of all the vine thickets in the region, Forty Mile Scrub vine thickets are believed to contain the greatest number of plant species. Vine thickets in Undara's crater contains the only known occurrence of a small-leaved myrtle shrub Backhousia sp. yet to be fully described. The rare, white-flowered onion vine Ipomea ointamnemis also occurs in vine thickets in the parks.

Springs are outstanding natural features in this usually dry volcanic/granitic terrain and consequently provide important habitats for a range of wildlife. Associated with these springs are swamps and dense thickets of black tea-tree Melaleuca brocata interspersed with a range of tree species including figs and eucalypts.

Native animals

Specialised habitats in Undara Volcanic National Park and Forty Mile Scrub National Park support a range of native animals including:

**Bats** - Barlers Cave is a major nursery site for the common bent-winged bat Miniopterus schreibersii, the eastern cave bat.Persistence troglodyti and the eastern horseshoe-bat Philodice megalophyllus. The total colony is estimated to comprise about 40,000 bats during the maternity period.

**Arthropods** - insects, shrimp and spiders: Bayliss Cave is one of the world's most important, biologically diverse caves, supporting 24 species of specialised troglobitic cave animals. This phenomenon is attributed to part of the uniquely high carbon dioxide levels (up to 6 per cent), stagnant air and high relative humidity, creating a highly specialised habitat (Howarth 1998).

**Macropods** - Forty Mile Scrub appears to be the dry western extent of the range of the rainforest dwelling red-legged pademelon Thylogale stigmatica. Another vine thickener, the black-striped wallaby Macropus dorsalis has the northern edge of the geological Province as its northern frontier. The antilope kangaroo Macropus antilopinus, a grassy woodland inhabitant, reaches its southern limit in this area and is particularly common in the Fifteen Mile Spring area of the Undara Volcanic National Park.

Cultural values

The Aboriginal cultural heritage of the two parks remains largely undocumented. A preliminary survey at Undara Volcanic National Park was carried out in 1993 on areas most frequently visited. Several sites have been located in the parks and consist primarily of artefact scatters and scarred trees. The lava tubes themselves and the areas comprising the perennial springs have not been surveyed and as such, the assessment of these potentially significant places is yet to be determined. The traditional and historical associations of Aboriginal people with the park is yet to be investigated.

The non-Aboriginal cultural heritage of the area is yet to be assessed. There is evidence of pastoral use of the area such as fence lines and yards, as well as the old Mt Surprise road, telegraph lines and several blazed trees.

Recreation and tourism

The lava caves, diversity of landforms and habitats combine to make the parks an important and worthwhile venue for a range of nature-based activities including bush camping, bushwalking and cave visitation. Commercial tourism is playing an increasingly important role in the economy of this region. Because of their favourable location, the parks have the potential to contribute significantly to regional growth.

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<th>Table 6. Summary of key monitoring activities.</th>
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<td><strong>Tourist operations</strong></td>
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4 Bibliography


Permits and agreements

A number of activities within the parks and the adjoining special business lease are subject to permits or agreements which have considerable relevance in planning and management. These are:

- Deeds of agreement with Undavall Pty Ltd and Duttana Pty Ltd relating to commercial activities within the special business lease and the Undara Volcanic National Park. These agreements establish the broad framework for concessional rights and conditions negotiated by QPWS with Duttana Pty Ltd and Undavall Pty Ltd. Duttana Pty Ltd also has a commercial permit to operate in Undara Volcanic National Park.
- Deed of agreement with Undavall Pty Ltd relating to access on the special business lease by QPWS employees and their agents.
- Memorandum of understanding between QPWS and the Queensland Correction Services Commission to establish a prisoner work camp in the Undara Volcanic National Park.

2.5 Values of Undara Volcanic and Forty Mile Scrub National Parks

Geology and landscape

A variety of volcanic vents ranging from shield volcanoes (Raincoast Knoi) to pyroclastic cones (Kalkani) and lava vents (Undara) are present in the Undara Volcanic National Park (Stephenson, Griffin, Sutherland 1980). The Undara Volcano which straddles the eastern boundary contains an impressive steep sided crater: 340m across and 48m deep, now heavily vegetated with vine thickets which is a rare and threatened plant community (Stephenson, Griffin, Sutherland 1980).

Long lines of partially preserved lava tubes are associated with the northern and north-western flows from the Undara Volcano (White 1962). In the north-western flow the lava tube system possibly extends more than 110km although the most evident section of tube (north-west tube section) extends about 35km from Undara Volcano. Barker's Cave, at 32km along the flow from Undara Volcano is the last known remnant cave along the tube line. This lava tube system is Australia's longest tube system and one of the longest tube systems in the world. It is also unusual if not unique in that it developed on a granitic basement.

The surviving segments of the tube form caves and arches, generally oval to circular in cross section with impressive dimensions up to 14m high, 20m wide and more than 1km long. More than 60 caves and arches have been discovered in the systems. Most caves are less than 200m long, but the north-west tube section contains Australia's longest lava cave, Bayliss Cave, which is about 1350m long (Atkinson 1993).

The Undara Volcano and associated volcanic features (lava tubes and flows) are highly significant geological phenomena in international and national contexts. The lava tubes in particular are remarkable and superlative examples of these natural phenomena. The extruded lavas and pyroclastic deposits form extensive plains derived from the numerous vents scattered across the landscape and provide the dominant relief throughout most of the parks.

Three catchment systems are represented in the parks. Water eventually drains into the Lynd, Ensalegh and Herbert Rivers. The western portion of Undara Volcanic National Park is drained by several prominent creeks, comprising Fifteen Mile, Twelve Mile, Nine Mile, Six Mile and Spring Lamb Creeks, which form part of the Ensalegh River catchment. The upper reaches of these creek catchments are fed by perennial springs, derived probably entirely from the basaltic aquifer. These springs are extraordinary because of the high discharge volumes and continuity of flows even in dry times.

Much of Undara Volcanic National Park, particularly in its southern portion, may be considered to have moderate-high wilderness value (AHC National Wilderness Inventory 1994).
2.4 Management obligations

Decisions concerning planning and management must consider relevant legislation, the needs of other government agencies with statutory duties, permits and agreements, and the influence of surrounding land use.

Legislation

Relevant legislation includes:
There are no formal native title claims over Undara Volcanic and Forty Mile Scrub National Parks at the time of writing this plan, however it is possible that native title may exist.

The Native Title Act 1993 provides for the recognition and protection of native title. The plan does not intend to affect, diminish or extinguish any native title rights. Work programs and management activities will consider the requirements of native title legislation to ensure native title rights are not compromised.

Nature Conservation Act 1992
Section 17 defines the management principles for national parks. The cardinal principle is to provide, to the greatest extent, for the permanent preservation of the area’s natural condition and the protection of the area’s cultural resources and values. The other principles are to present the area’s cultural and natural resources and their values, and to ensure that the only use of the area is nature-based and ecologically sustainable.

Land Act 1994
This Act regulates the gazetted and de-gazetted of public roads, provides for the administration of leasehold and reserved land and controls changes in land tenure. The Special Business Lease granted to Undeal Pty Ltd and Dusanta Pty Ltd is administered under this Act.

Rural Lands Protection Act 1985
Relevant provisions of this Act primarily relate to the control of weeds and feral animals throughout Queensland. Section 73 devotes control of declared plants and animals on public land to the government department which manages the land.

Integrated Planning Act 1997
This Act provides for planning for orderly development and environmental protection. The parks and surrounding land are included in the Town and Strategic Plans of the Etheridge, Mareeba, Herberton and Dalrymple Shires.

Fire Service Act 1992
This Act provides fire management across Queensland. Conservation officers have powers under the Act to control fires on and lands adjoining protected areas. The Rural Fire Division of the Queensland Fire and Rescue Authority remains responsible for controlling fire management on lands other than national park and administers rural fire brigades across Queensland.

Cultural Records (Landscapes Queensland and Queensland Estate) Act 1987
This Act, administered by the Environmental Protection Agency (EPA) Cultural Heritage Branch, protects cultural heritage places in Queensland including sites of cultural significance to Aboriginal people.

Queensland Heritage Act 1992
This Act, administered by EPA, provides protection for cultural places such as historic buildings, places, ruins or other features listed under the Act.


Fensham, R.J., Cannell, R.J., Fairfax, R.J. (1993) The invasion of Lantana camara in Forty Mile Scrub National Park, North Queensland (Unpub.)


desirable as they share many similar management issues and will be managed in a co-ordinated and complementary manner:

Undara Volcanic National Park has been gazetted in four stages — Undara Crater of 600ha in June 1989, Yarramulla Holding portion of 17 000ha in August 1992, Mount Rossey Holding portion of 37 100ha in July 1993, and One Hundred Mile Swamp former special lease area portion of 6780ha in August 1994. The current area of Undara Volcanic National Park is about 61 500ha.

Forty Mile Scrub National Park has been gazetted in a number of stages — St Ronans Holding and Minnamoolka Holdings, tctal portions of 4619ha in June 1970 (in July 1988 with the introduction of digitised mapping, the park area was reduced to 4500ha); Mount Laing North Holding portion of 1680ha in December 1989; St Ronans portion of 100ha in November 1995; Minnamoolka Holdings portion of 50ha in November 1997. Forty Mile Scrub National Park currently has an area of about 6330ha.

A special business lease of 841ha lies adjacent to Undara Volcanic National Park. This area is a prime focus for visitor management to the park and consequently is discussed in this plan.

The southern portion of the former Mount Rossey Holding has become a resources reserve under the Nature Conservation Act 1992. The Department of Mines and Energy (DME) holds an interest in the land for the purposes of sapphire extraction. The chief executives of DME and QPWS are joint trustees of this reserve. A separate management plan is being compiled for this area. Consequently, consideration of the area will mostly be excluded from this plan.

2.3 Planning process

The purpose of management plans is to set clear directions for management of national parks. To do this, detailed management actions are proposed where necessary.

All comments, suggestions and submissions about management plans are considered when final plans are written.

Once approved, final plans are given effect under the Nature Conservation Act 1992. Under section 125, plans must be reviewed within 10 years.

The planning process started in November 1992 with the inaugural meeting of an Interim Management Advisory Committee at Mt Surprise. The committee's input and discussion largely provided the basis for the plan. Community and government members of the committee include: Aboriginal representative (initially M. Thomas, replaced by B. Bing) Conservation Group representative (Queensland Conservation Council, initially R. Crisp, replaced by M. Thurgate) Department of Primary Industries, Fisheries and Forestry (J. Dickenson) Etheridge Shire Council (L. Lethbridge) Queensland Tourist and Travel Corporation (J. Smith) Landholders adjoining the parks (N. Condon, Rosella Plains) Specialist Consultant Geologist (A. Adkinson) James Cook University, Geology Department (Professor J. Stephenson) Queensland Fire and Rescue Authority (B. Clifuentes) Chillagoe Caving Club (L. Pearson) Undara Lava Lodge Resort (G. Collins) Queensland Parks and Wildlife Service (Regional Director, Chairperson)

In accord with section 113 of the Nature Conservation Act 1992, advertisements giving notice of the preparation of a draft plan were published in newspapers in the Cairns and Atherton Tablelands regions.
2 Basis for management

2.1 Regional context

Undara Volcanic National Park and Forty Mile Scrub National Park are part of the extensive Einaidhoo Uplands biogeographic region (Stanton and Morgan 1977) and also lie in the north-western portion of an area known as the geological terms as the McBride Province, about 150km south-west of Atherton (map 1). Undara Volcanic National Park contains outstanding examples of well preserved volcanic features, developed in the Cainozoic era. These superb natural phenomena include lava tubes, craters, lava ponds and flows which are associated with unique fauna and vine thickets at the western extent of their natural range. Impressive perennial springs are also an integral part of the dominantly volcanically derived landscape.

The Undara Volcano produced lava fields covering an area of about 1550sq km, derived from several flows; the longest (160km) flowed down precursors of Junction Creek and the Einaidhoo River to the north-west. This flow also contains the best lava tube development, now evident as preserved lava caves and a line of depressions caused by roof collapse, and drainage of former lava ponds adjacent to and in alignment with the flow.

In Undara Volcanic National Park and Forty Mile Scrub National Park vegetation comprises open savannah woodland and grass plains with vine thickets generally restricted to rocky, fire-resistant areas such as craters and depressions. The largest expanse of vine thickets occurs in Forty Mile Scrub National Park. Tea-tree Melaleuca breutlerata forms dense thickets in the vicinity of perennial springs on Undara Volcanic National Park and provides important areas of habitat for native animals. Much of these woodlands remain uncleared, altered only since European settlement through stock grazing activities, invasion of feral animals and weeds, and a changed fire regime.

The region has been used predominantly for cattle grazing since the early 1860s when European people moved into the area. Currently, cattle grazing is being phased out of Undara Volcanic National Park.

Surface water is relatively scarce except in the vicinity of perennial springs, and in swamps, following monsoonal rains.

Historically, the lava tubes were features of interest and received intermittent, unmanaged visitation. They were well recognised in the area by 1891 as indicated and described by Maitland (1891). The spectacular lava tubes, other volcanic features, the savannah landscape and improved access have become an important focus for regional tourism. Development of a resort-style lodge on a special lease, business (tourist facility) purposes (subsequently referred to as the special business lease) adjacent to Undara Volcanic National Park and operated on a concessionaire basis (Undawal Pty Ltd and Dutana Pty Ltd) has catered for this need. Undara Lava Lodge is currently in its tenth season of operation although guided tours started in 1989. Annual public visitation to approved lava caves increased to about 32,000 during 1998-99. Current trends suggest further increases in visitor numbers.

Access to the parks is predominantly by vehicle-based visitors travelling on the sealed Kennedy Developmental Road and the Gulf Developmental Road. The growing demands made on the lava tube environment, particularly those used for tourism in the vicinity of Undara Lava Lodge, have the potential to degrade these features and threaten associated ecosystems.

There are no other national park areas of easy access within a 100km radius.

2.2 Planning area

The planning area consists of two national parks — Undara Volcanic National Park and Forty Mile Scrub National Park. The linking of these parks as a single management unit in this management plan is


Queensland Department of Environment and Heritage (1990) Site Planning Manual; A practical guide to the developments of facilities on National Parks (unpub.).


Queensland Department of Environment and Heritage (1992) National Parks Good Neighbour Policy.


Visitors to Forty Mile Scrub National Park will have an opportunity to appreciate examples of rainforest vegetation of a type previously more widespread in north Queensland. This will be achieved through day-use facilities as it is not intended that camping facilities will be developed in this national park.

**Purpose**

The major purpose of management will be to ensure that:

**Conservation**

- The volcanic features of Undara Volcanic National Park, particularly the lava tubes, caves and their associated biological systems, are given special protection.
- Sensitive habitats and threatened species, for example, vine thickets of Forty Mile Scrub National Park, are monitored and management programs take into account their known requirements.
- Sites of special significance, for example, perennial springs, designated caves and the Undara Crater, are managed to minimise human interference.
- Burning for ecological purposes will be used to protect plant and animal communities from the potentially adverse effects of wildfires.
- Springs and aquifers which contain precious water supplies do not suffer impacts associated with proposed visitor facilities and increasing visitor numbers.
- Pest plant and animal control action plans are developed in conjunction with park neighbours.
- Programs to rehabilitate degraded sites, for example, fire and lantana affected areas, are undertaken.
- The uninterrupted vistas associated with the savannah landscape are retained.
- Actions are taken to declare small areas of adjoining lands currently under negotiation as national park.

**Recreation and tourism**

- Opportunities for a range of ecologically sustainable nature-based recreation and tourist activities focusing on examples of volcanic events and the savannah landscape are developed and managed to a high standard.
- Undara Volcanic National Park’s geological processes/landforms as part of a set of attractions in the Cairns hinterland are promoted.
- Vehicle and walk-in camping opportunities are developed in Undara Volcanic National Park.
- Day-use facilities providing interpretation of the vegetation of Forty Mile Scrub National Park are developed.
- Visitor enjoyment of the parks is enhanced through improved interpretation and education of the key features.
- Sites which pose a potential risk to visitor safety are identified and access carefully controlled.
- Develop strategies for the management of cultural heritage values/places.

**Community involvement**

- Neighbours are aware of matters in which they have an interest, for example, fire management and weed control programs.
- Opportunities are provided for Aboriginal people and other local residents particularly concerned with the parks to be consulted and involved in planning and management.
Introduction

This document is a management plan for both Undara Volcanic National Park and Forty Mile Scrub National Park. Much of the land in the parks has been used only for grazing and minor timber extraction. This allows long-term planning for the areas without significant constraints imposed by past activities.

Undara Volcanic National Park contains a range of superb and well preserved features associated with Queensland's Cainozoic volcanic history and includes a variety of volcanic vents and long lines of lava tubes. These lava tubes are the finest examples in Australia and also significant on an international basis. They occur in lava flows from the Undara Volcano which was active about 190,000 years ago. These lava tubes contain specialised ecosystems which are significant in a national and international context. Bayliss Cave is rated as one of the world's most important biologically diverse caves.

The focus of management will be to protect the park's geological values and to provide improved visitor services and facilities for day use and camping at designated camp sites. Tourism is based currently on selected cave visits staged from the Undara Lava Lodge, located adjacent to the park. The management plan incorporates a range of strategies for managing such activities.

While not contiguous with Undara Volcanic National Park, Forty Mile Scrub National Park is located in close proximity and contains substantial and excellent examples of vine thickets vegetation rich in species diversity and is important for a range of fauna species. The two national parks are managed in a complementary and co-ordinated manner. It is anticipated that Undara Volcanic National Park will continue to be the major focus of visitors and management.

The plan proposes detailed strategies to protect natural and cultural values while allowing the public to continue enjoying the range of recreational activities that are available in the parks. Areas that are relatively undisturbed by human activity have been recognised in the parks and will be managed to ensure that they continue to be available for people seeking solitude and isolation in the context of nature-based recreation. Feral animal and weed control programs and the removal of stock from the parks will also help to protect the area's ecosystems.

This plan has been prepared by the Queensland Parks and Wildlife Service (QPWS) in close consultation with the Undara Interim Management Advisory Committee and following consideration of public submissions on issues affecting the area.

1 Management directions and purpose

Directions

Undara Volcanic National Park and Forty Mile Scrub National Park will be managed as largely undeveloped national parks renowned for their contributions to representative samples of Queensland's Cainozoic volcanic history and vegetation respectively.

Visitors to Undara Volcanic National Park will enjoy the park's impressive geological landforms and examples of volcanic vents in north Queensland. High quality visitor experiences will be provided through the adjacent commercial operation and through a variety of facilities to be established on the park. The main visitor activities will be camping, bushwalking, nature study, photography and birdwatching. The distinctive savannah landscapes will continue to be preserved with no loss of scenic amenity.

Low-key visitor facilities which are sensitively sited and managed will be located primarily in the park's north-eastern section while the southern sections will remain largely remote and natural and be managed accordingly. Opportunities and facilities for groups to visit designated lava tubes and caves will be provided in appropriate areas close to the adjacent Undara Lava Lodge.

Appendix 1

Significance and values of Undara Crater and Lava Tubes as recorded on the Register of the National Estate

<table>
<thead>
<tr>
<th>Register criteria</th>
<th>Significance and values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1 Importance in the evolution of Australian flora, fauna, landscapes or climate.</td>
<td>High. The Undara Crater and Lava Tubes provide much information about past volcanic events in North Queensland. The physical characteristics of the flow indicate a gentle outpouring of lava (palaeohoe lava) that unlike many of the other flows in the region were able to form lava tubes. Old lava levels and the sequence of formation of the tubes can be determined clearly. Palaeodrainage of ancient rivers and creeks are indicated by the flow (Adkinson, 1990, 1992; Atkinson, Griffin and Stephenson 1972). The surface of the lava flows and the cave entrances support a semi-evergreen vine thicket that contains distinctive and ancient plant species that have strong affinities with Gondwana species (Kahn and Lawrie, 1987).</td>
</tr>
<tr>
<td>A.2 Importance in maintaining existing processes or natural systems at the regional or national scale.</td>
<td>High. The Undara Lava Tubes and Lava Craters are an important breeding area for cave-dwelling bats. Maternity colonies of the common bent-wing bat (Miniopterus schreibersii), little bent-wing bat (M. australis), little brown bat (Eptesicus pumilus) and eastern horseshoe bat (Rhinolophus megaphyllus) are found in a number of the lava tubes (Matthews 1985). Speciation and evolution of troglobiotic animals from their terrestrial counterparts is also in evidence within the lava tube ecosystems (Howarth 1988).</td>
</tr>
<tr>
<td>A.3 Importance in exhibiting unusual richness or diversity of flora, fauna, landscapes or cultural features.</td>
<td>High. Bayliss Cave contains at least 52 resident species of animals within the lava tube system, and also supports the most diverse assemblage of arthropods recorded for any cave in North Queensland (Howarth 1980).</td>
</tr>
<tr>
<td>C.1 Importance for information contributing to a wider understanding of Australian natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark.</td>
<td>High. The Undara Crater and Lava Tubes have been an important research site for the study of the formation of lava tubes; the study of volcanism in the McBride Province; and the study of cave-dwelling fauna and their ecology. A number of major expeditions to the Undara Lava Tubes have been conducted over the last few decades in order to explore and map the caves and to collect specimens (Atkinson 1992, Grimes 1977). The Wall is a highly significant feature because it has been found to be analogous with volcanic features on the Moon, and has thus assisted in the interpretation of lunar features (Atkinson 1990, 1992; Atkinson, Griffin and Stephenson 1975).</td>
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