

Ecological Fire Management Strategy

Department of Environment and Natural Resources

Kangaroo Island Dunnart (*Sminthopsis aitkeni*)

Purpose

This strategy focuses on fire management for the Kangaroo Island Dunnart, identifying a number of issues that should be considered before, during and after fire. Potentially conflicting activities should be discussed with the Regional Ecologist. Very little is known about the ecology of the Kangaroo Island Dunnart due to the difficulties in detecting the species. This strategy is based on the best available information.

Species Information

Rating	ENDANGERED – <i>NPW Act 1972</i> ENDANGERED – <i>EPBC Act 1999</i>
Identification	This mouse-sized animal has sooty grey upperparts which contrast with lighter grey belly fur. Its head is usually faintly patterned and it has a distinctive, slender pointed muzzle. The thin tail is always longer than the body.
Distribution	Endemic to Kangaroo Island (KI). All records for the past 30 years are on western KI, with large potential habitat areas occurring within Flinders Chase NP and Ravine des Casoars WPA. Although a handful of earlier records were on eastern KI, subsequent habitat clearance and degradation would indicate reduced likelihood of dunnarts still being present in those areas.
Habitat	Shelters in various habitat elements including leaf litter, logs and dense shrubs. Dunnarts have been recorded in the following vegetation associations: open low mallee (<i>Eucalyptus remota</i> ; <i>E. baxteri</i> ; and <i>E. cosmophylla</i>) and low woodland (<i>E. baxteri</i> ; <i>E. cosmophylla</i> ; <i>E. remota</i> and <i>E. obliqua</i>) with a variety of shrub species and density. The dunnart shows preference for sparse and variable understorey vegetation.
Populations	Dunnart presence confirmed at six sites but likely to extend beyond this in large inaccessible habitat areas in western KI reserves. Based on existing knowledge it is likely that the population is fewer than 500.
Home Range	Estimates of home range vary from 0.34ha to 2.32ha, (small sample size).
Reproduction	Females are likely to give birth to two sets of young per year. Mating is thought to occur in mid-September to early October and again in November to December. Dunnart young are likely to mature rapidly, require minimal parental care and have high mortality.
Dispersal	The dunnart has been recorded moving up to 200-300m per foraging period, however, seasonal patterns of home-range use and differences between sexes in use of habitat and space is not clear. The capture of dunnarts over a period of 11 years at one site suggests that some areas provide core habitat, and dunnarts continually occupy such areas for relatively long periods of time.



Photo: (left) T. Moonev; (right) T. Robinson

Longevity	Females may survive to breed in a second year, whereas males are less likely to survive beyond one breeding season.
Predators	Predators of this nocturnal species include Black Tiger Snake (<i>Notechis ater</i>), Southern Boobook (<i>Ninox novaeseelandiae</i>), and feral cats (<i>Felis catus</i>).
Diet	Opportunistic forager, feeding on terrestrial insects. Spiders, ants, beetles, scorpions and grasshoppers comprise the bulk of the diet.

Fire and Dunnarts

Fire and risk to Dunnarts

Fires can directly kill Kangaroo Island Dunnarts through radiant heat, smoke and flame. Indirect impacts stemming from the loss of habitat including food, shelter, nesting sites and movement corridors are likely to have severe long-term implications for populations. Dunnarts may become highly susceptible to predation and extremes in weather since the density and structural diversity of healthy understorey vegetation is reduced. Furthermore, individuals that are forced to disperse into unfamiliar habitat or unsuitable areas are probably at an increased risk of predation.

The greatest threat to the dunnart populations is the magnitude of fires compared to the amount of remaining native vegetation. As a consequence when a bushfire does occur it has a far greater probability of burning a much higher percentage of the remnant vegetation. An extensive bushfire burning entire habitat patches is likely to cause localised extinctions of dunnart populations. However, recolonisation of habitat is likely if there is sufficient habitat connecting the patch to a nearby population.

Habitat quality may decline with decreases in habitat structure and plant diversity. This may occur if habitat is frequently burnt. Declines in structural complexity and plant diversity may also occur at some long-unburnt sites. Such sites may improve in quality following fire. However high frequency fire may inhibit key habitat features developing, and thus affect habitat suitability.



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Kangaroo Island Dunnart Fire Response

In general, fire is significant in determining habitat suitability for dunnarts, with species known to peak in abundance in the years following fire, and then show rapid declines to pre-fire levels. Life history characteristics, such as double breeding and rapid development of precocious young, allow dunnarts to take advantage of the resources available following fires.

It is suggested the Kangaroo Island Dunnart are habitat generalists, since all known records occur in a wide range of eucalyptus woodland and mallee vegetation habitats. Habitat structure is a key habitat component since the dunnart has been known to shelter in a variety of habitat elements including: under fronds of Yacca's (*Xanthorrhoea* spp.); in leaf litter of *Banksia* species; and inside hollow logs and dead Yacca trunks.



Habitat of an occupied dunnart site (T. Mooney)

The dunnart colonises an area when it meets their habitat requirements and as vegetation structure changes over time, the suitability of habitat changes. It is suggested that the Kangaroo Island Dunnart has preference for vegetation in early to mid-seral stages, with records occurring within vegetation burnt greater than 6 years post fire. It is not known if there is an optimal successional stage following fire for the dunnarts. In the absence of a clear fire response for the dunnart, managing for variable fire intervals, within the domain required for maintenance of flora, is therefore a plausible management approach. It is predicted in most instances that this approach will produce suitable habitat structure. This should be reassessed as more information becomes available.

Fire Management Objectives for Dunnarts

- To reduce the likelihood of contiguous remnants of significant dunnart habitat burning in their entirety during a single fire event.
- Reduce the likelihood of fire management activities including prescribed burning and fire suppression, impacting upon the long-term viability of dunnart populations.
- To ensure that sufficient dunnart habitat is maintained by implementing appropriate fire regimes across known habitat areas.
- To improve knowledge of how dunnart populations respond to fire, by filling gaps in knowledge and contributing new information and concepts.

Strategies for Fire Management in Dunnart Areas

- Ensure bushfire risk mitigation and suppression activities consider prevention of population or habitat loss due to fire.
- Reducing fuel at strategic locations to minimise the extent of a bushfire burning an entire patch of suitable habitat.
- Ensure occupied habitat is not deliberately burnt without appropriate dunnart-specific management considerations.
- Promoting a habitat mosaic consisting of a range of post-fire age-classes.
- Monitor the fire response of dunnarts to changes in seral stages of habitat.

Risk Management - Prescribed Burning

Fire Management Planning

Preliminary Planning

- Clearly define and map the known dunnart population sites and use to assist in fire management planning.
- Include reference to this information in all relevant DENR Response Plans.
- Assign high quality dunnart habitat to Conservation-zones (C-zones).

Risk Assessment

- Prioritise fire management activities to protect key populations and those identified as being at greatest risk from bushfire.

Planning Prescribed Burns

- Only undertake prescribed burning of occupied habitat for strategic conservation purposes, and do not undertake such burning without dunnart-specific management advice.
- Allow for provision of unburnt refuge and breeding habitat areas (minimum 2ha), and maintenance of connectivity.
- Occupied habitat should not be burnt during breeding season (Sep-Dec).
- In C-zones, burns should be conducted under conditions that maximise patchiness.
- In C-zones, burns should not be conducted in severe drought conditions.
- In A and B zones, known dunnart populations are to be protected during these burns.

Size of burn

Based on known Kangaroo Island Dunnart home range sizes:

- Burns over 3ha are likely to have an impact on a population; therefore, a low intensity, patchy burn is required within the proposed burn area.
- Incorporate key linkage habitat areas and areas that may benefit from prescribed burning.

Location & frequency of burn

- Burns in dunnart habitat in C-zones should not be located adjacent to habitat that has burnt in the last 7 years.
- Where possible, dunnart habitat in A- and B-zones should not be burnt if the adjacent habitat has burnt in the last 7 years.
- Dunnart habitat in C-zones should be burnt according to the ecological fire management guidelines.
- The proximity of unburnt remnants, even narrow strips, is a key factor in the survival of dunnart populations.

Actions for Risk Management - Bushfire

During Bushfires

Incident Management

- Technical advisors to be appointed to Incident Management Teams to advise planning bushfire suppression activities in or near dunnart habitat.

Protect core local population sites

Bushfire suppression strategy and efforts should aim to protect dunnart populations and habitat by:

- Minimising area of known dunnart management sites from burning.
- Minimising entire habitat patches from burning in a single fire event.
- Ensuring dunnart sites are considered prior to back-burning operations.

After Bushfires

Bushfire risk management

- If a large proportion of habitat is burnt, remaining populations should be protected.
- If a bushfire burns the entirety of one or more habitat patches, risk management measures, such as predator control should be increased to protect remaining nearby populations and prescribed burning should be avoided.

