

**The Range, Status and Distribution of
the Spot-tailed Quoll (*Dasyurus
maculatus*) in the Otway Ranges**

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1.0 Summary

A survey for the Spot-tailed Quoll in the Otway Ranges was conducted between February-June 1999, as part of the West Victoria Regional Forest Agreement threatened species assessment.

The survey was systematic (based on 5 minute latitude-longitude blocks to maximise coverage), tenure blind, and with six additional sites based on recent but unconfirmed reports. Trap sites were selected on the presence of suitable habitat (canopy, understorey and ground cover). A number of environmental variables were measured at each site.

Spot-tailed Quolls were recorded at three of 51 sites (5.9%), in two of the 28 blocks (7.1%) during this survey. Spot-tailed Quolls have been previously recorded from 27 blocks in the Otway Ranges (Atlas of Victorian Wildlife 1999). They were not recorded during this survey at six sites with recent (≤ 2 year old) records.

An overview analysis of the few results obtained in this study is unable to dismiss timber harvesting, habitat fragmentation and poisoning by 1080 as the key disturbance factors for Spot-tailed Quoll in the Otway Ranges. These results support the conclusions made in the Comprehensive Regional Assessment (Commonwealth of Australia 1999). Other factors could not be assessed due to the paucity of data or were not part of the study design.

2.0 Introduction

The Spot-tailed Quoll *Dasyurus maculatus*, is a forest-dependent species that appears to be largely restricted to areas where rainfall exceeds 600 mm (Mansergh 1984). It occupies large home ranges and requires extensive areas of forest to sustain and maintain populations (Belcher 1997). Little is known of the range and habitat use of the Spot-tailed Quoll in the West Region, particularly in the Otway Ranges, which had been described as the stronghold of the species in Victoria (Fleay 1940).

The basic requirements of most species are food, shelter and space. Spot-tailed Quolls require forest with suitable den sites, such as rock crevices, boulder tumbles, caves, hollow logs, burrows, tree hollows (Belcher 1997). They also require suitable cover at ground, understorey and canopy levels. Approximately 50% canopy/understorey cover appears to be the minimum cover tolerated (Belcher in preparation a). Predators require a minimum prey density to enable them to derive a net energy gain. Spot-tailed Quolls are dependent on medium-sized (0.5-5 kg) vertebrate prey (Belcher 1995;1997).

The Spot-tailed Quoll is listed under the Flora and Fauna Guarantee Act (1988), and has recently been reclassified in Victoria as 'Endangered' (NRE 1999). The species is classified as 'Vulnerable' nationally (Commonwealth endangered Species Protection Act 1995). An analysis of the Atlas of Victorian Wildlife Spot-tailed Quoll records in the Otway Ranges and in the south west of Victoria found a dramatic decline over the last 30 years (Belcher in preparation b).

2.1 Objectives

The Terms of Reference for the study were to investigate the current range, status and distribution of the Spot-tailed Quoll in the Otway Ranges. Analysis of the environmental variables measured at each site will provide information on the factors responsible for the species current distribution and enable appropriate management practices to be considered, to ensure the conservation of the Spot-tailed Quoll in the Otway Ranges.

Ecosystems Environmental Consultants were contracted by the Department of Natural Resources and Environment to undertake a Spot-tailed Quoll survey of the Otway Ranges, as part of the Regional Forest Agreement, West Region.

2.2 Aims

The aims of the study are to:

1. To conduct a targeted survey for the Spot-tailed Quoll in the Otway Ranges.
2. To measure a range of environmental variables at each trap site.

3.0 Methods

The study area was divided into 5 minute latitude-longitude blocks. The survey was designed to cover as many 5 minute latitude-longitude blocks in the Otway Ranges within the constraints of budget and time. Each block was inspected and sites were selected if they contained suitable habitat, and/or they had a number of records over time, and/or had a recent reliable record. Suitable Spot-tailed Quoll habitat was defined as sites with potential den sites and greater than 50% canopy cover with well developed understorey and ground vegetation layers.

The sites were surveyed between February and June 1999, by

- (i) trapping with large wire cage traps (600 x 30 x 30 mm) baited with chicken pieces, for 10 nights and
- (ii) placing hair funnels baited with a mixture of sardines flour and tuna oil along a transect at 50 metre intervals or
- (iii) undertaking scat searches.

A number of factors may influence Spot-tailed Quoll survey results. The time of year of the survey will have a direct bearing on the results. Peak activity occurs during the breeding season (May-August), when males are moving between a number of female territories (Belcher in preparation c). The next highest level of activity occurs after weaning (December), until the start of the breeding season. The lowest level of activity occurs between September and December, when females leave their young in a maternal den. The young are first left, at approximately 6-7 weeks of age, before they can thermo-

regulate (Settle 1978). As a consequence, the females are restricted in the distance and length of time they can forage away from the maternal den, hence they are much harder to record. Male activity also decreases substantially during this period.

To investigate factors responsible for the species current distribution, some environmental measurements were collected at each site. These included: presence of potential dens -hollow logs, burrows, tree hollows; logging; 1080 baiting within 10 km and habitat complexity. Habitat complexity, following the methods of Newsome and Catling (1979) and Catling and Burt (1995) was calculated at each site. Habitat complexity was based on five features: (1) percentage canopy cover; (2) shrub cover; (3) ground vegetation cover; (4) the amount of litter, fallen logs and rocks; (5) a moisture rating. Each feature was rated on a scale of 0-3 and the scores of the five features totalled to give an overall score out of 15. A score of 4-5 denotes forest with poor structure with few understorey shrubs and sparse ground cover, whereas a score of 9-10 denotes forest with a thick understorey and thick ground and litter cover. Ecological Vegetation Classes (EVCs), Old Growth Forest and stand age information was not available at the time of the study.

The results of a study of Spot-tailed Quoll habitat utilisation, using habitat complexity scores (Belcher in preparation a), found that quolls used habitat with scores ≥ 9 , with most utilised habitat ≥ 10 . Spot-tailed Quolls were regularly recorded moving over distances up to 10 km (Belcher 1995b; in preparation b) and occasionally over much greater distances (Belcher 1998b).

3.1 Survey sites

Details for each survey site are presented in Table 1 and their locations are shown in figure 1.

Table 1. Sites surveyed during this survey. CT = cage traps, HF = hair funnel

Site	Map No.	AMG	No. Trap nights	Trap type
1.Morris Trk	7520	063 175	200	CT
2.Wyelangta SW Water Catchment off Egans Trk	7520			
i) East Weir	7520	128 203	50	CT
ii) West weir	7520	125 203	50	CT
iii) First Ck	7520	122 203	50	CT
iv) N. of gate	7520	121 192	50	CT
v) S of gate	7520	122 190	50	CT
3.Aire River Crossing	7620			
i) Aire xing Trk	7620	151 145	50	CT
ii) Aire xing Trk	7620	155 135	50	CT
iii) Aire River Xing	7620	153 131	100	CT
4.Youngs Creek Rd	7620			
i) Cianci Ck	7620	156 145	40	CT
ii) Young Ck	7620	162 155	40	CT
iii) Young Ck	7620	162 166	40	CT
iv) Triplet Falls walking trk	7620	168 169	100	CT
5. Harveys Rd/Beech Forest Rd	7620			
i) Harveys Rd- freehold	7620	260 213	50	CT
ii)Beech Forest Rd- freehold	7620	257 211	100	CT
6. Charleys Ck Rd- N of Tucker Orchard Rd	7620			
i) Charleys Ck	7620	203 262	100	CT
ii) freehold above Ck	7620	198 255	100	CT
7.Turtons Trk	7620			
i) Coutts Trk	7620	310 197	50	CT
ii) Turtons Trk E Barham R headwaters	7620	311 195	50	HF
iii) Turtons Trk N side 400 m E of Coutts Trk	7620	316 197	50	CT
iv) Turtons Trk Olangolah Ck	7620	325 191	100	CT
v) Turtons Trk W of Wild Dog Trk	7620	329 192	100	CT
8. West Barwon Dam	7620			
i) behind caretakers house	7620	366 319	100	CT
ii) SW of dam wall	7620	367 313	100	CT
9. Mt McKenzie Rd	7520			
i)Trib. Chapple Ck N branch	7520	104 183	50	CT
ii) saddle	7520	100 189	50	CT
iii) Sandy Ck Trib.	7520	097 191	50	CT
10. Calder River	7620			
i) Cannans Trk N side of river	7620	191 079	100	HF
ii) S side of Calder R.	7620	193 078	100	HF
11. Otway Lighthouse Rd	7620			

Site	Map No.	AMG	No. Trap nights	Trap type
i) W side 750 m S of GOR	7620	200 034	100	CT
ii) trib of Parker R	7620	199 027	100	CT
iii) W side trib of Duck Ck	7620	198 009	50	CT
iv) 500m N of Blanket Bay Rd	7620	197 978	100	CT
v) Blanket Bay Rd 500 m W of Red Hill Trk	7620	204 972	100	CT
12. Maits Rest	7620	219 072	50	HF
13. Elliott River, Elliott Rd	7620	271 039	120	CT
14. Riley's Ridge Rd	7620	272 149	100	HF
15. Gellibrand River	7620			
i) Bridge Trk	7620	282 291	100	HF
ii) Sayers Trk	7620	283 288	100	HF
iii) Lardners Trk 200m SW of Bridge Trk	7620	275 292	100	HF
iv) Lardners Trk	7620	272 302	50	HF
v) Lardners Trk	7620	269 307	50	HF
16. Wild Dog Rd opp piggery	7620	343 164	100	HF
17. Binns/Robertsons Rd	7620	248 138	100	HF
18. Seaview Ridge Rd saddle 500m S of HP Trk	7620	295 165	60	HF
19. Sunnyside Rd, saddle near State Forest S boundary	7620	295 162	100	HF
20. Henrys Rd edge of logging	7620	417 182	50	HF
21. Grey River Rd head of Kennett R	7620	405 216	100	HF
22. Wye River Falls	7620	456 214	200	HF
23 Bogalley Ck 1 km N of GOR	7620	532 218	100	HF
24. Parker River gorge	7620	224 048		Scat search
25. Porcupine Ck, Pipeline Trk	7521	301 345	200	CT

4.0 Results

Reports were received from staff of NRE, South West Water and the Threatened Species Network, of the following sites where Spot-tailed Quolls had been observed in the last two years:

1. Wyelangta - South West Water Catchment. Adults + female with young;
2. Charleys Creek – adult;
3. Beech Forest/Harveys Track – female with young;
4. Rileys Ridge Trk - 2 records;
5. Sunnyside Road- southern boundary of Otway State Forest - crossing on saddle;
6. Henrys Track;
7. Cumberland River Falls, near T and W Rd. Adult plus scats.

All records have been checked, the observer interviewed and the records evaluated as reliable. Six of the sites were included in the current field trapping survey.

In 4050 trap nights, comprising 2220 cage trap nights and 1830 hair funnel nights, Spot-tailed Quolls were recorded at three of the 51 sites surveyed (5.9%), in two of the 28 blocks surveyed (7%). Trap success rate was 0.0005%. One record was from a fresh scat and two were from hair funnels. Two of the records were from the Otway National Park, and one from the Otway State Forest. They were not recorded from six sites surveyed with recent records (≤ 2 years) (Table 2).

Spot-tailed Quolls were recorded at the following sites during this survey (Figure 2.):

1. Parker River gorge (scat)
2. Turtons Track, near Coutts Track (hair funnel)
3. Maits Rest (hair funnel)

These three results have been entered on the Atlas of Victorian Wildlife.

Table 2. Environmental variables measured at each trap site. Dens are scored 0-5, 0 = no potential dens, 1 = some potential dens, 5 = abundant potential dens. Logging indicates the site or the area adjacent to the site has been recently logged (within the last 10 years). Baiting indicates that herbivore baiting has occurred within 10 km of the site. Predator baiting was included, if known. * denotes Spot-tailed Quoll recorded this survey, # denotes a recent reliable record.

Site	Dens	Logging	Baiting	% Canopy cover	% Shrub cover	% Ground cover	% Litter, log, rock cover	Moisture	Score
1. Morris Trk	1	N	Y	2	2	2	2	2	10
2. Wyelangta SW Water									#
i) East Weir	2	N	Y	2	2	2	3	2	11
ii) West Weir	2	N	Y	2	2	2	3	2	11
iii) First Ck	2	N	Y	2	2	2	2	2	10
iv) N of gate	1	Y	Y	1	1	2	1	1	6
v) S of gate	1	Y	Y	1	1	2	1	1	6
3. Aire River Crossing									
i) Aire Xing Trk	2	Y	Y	2	3	2	2	2	11
ii) Aire Xing Trk	2	N	Y	3	3	2	2	2	12
iii) Aire River Xing	2	N	Y	3	3	2	2	2	12
4. Youngs Ck Rd									
i) Cianci Ck	2	N	Y	3	3	2	2	2	12
ii) Youngs Ck	2	N	Y	3	3	2	2	2	12
iii) Youngs Ck	2	N	Y	3	3	2	2	2	12
iv) Triplet Falls walking Trk	2	N	Y	3	3	2	2	2	12
5. Harveys Rd/ Beech Forest Rd									#
i) Harveys Rd	2	Y	Y	3	3	1	1	2	10
ii) Beech Forest Rd	2	Y	Y	3	3	1	1	2	10
6. Charleys Ck Rd									#
i) Charleys Ck	2	N	Y	3	3	2	1	2	11
ii) freehold above Ck	2	N	Y	2	2	3	3	1	11
7. Turtons Trk									
i) Coutts Trk	2	N	Y	2	3	2	2	2	11
ii) E Barham R	1	N	Y	3	3	2	2	1	11*
iii) 400 m E of Coutts Trk	1	N	Y	2	2	2	2	2	10
iv) Olangolah Ck	1	N	Y	3	2	2	1	2	10
v) W of Wild Dog Trk	2	N	Y	3	3	2	2	1	11
8. West Barwon Dam									
i) Near caretakers house	1	N	Y	2	2	2	2	1	9
ii) SW of dam wall	2	N	Y	2	2	2	2	1	9
9. Mt McKenzie Rd									
i) trib. Chapple Ck N	2	N	Y	2	2	2	2	1	9
ii) Saddle	2	Y	Y	2	2	2	2	1	9
iii) Sandy Ck trib	2	N	Y	3	2	2	2	2	11
10. Calder River									
i) N side of river	2	N	Y	3	3	2	2	2	12
ii) S side of river	2	N	Y	3	3	2	2	2	12
11. Otway Lighthouse Rd									
i) W side 750 m S of GOR	2	N	N	3	3	2	2	2	12
ii) trib of Parker R	2	N	N	3	2	2	2	2	11
iii) W side of duck Ck	2	N	N	3	2	2	2	2	11
iv) 500m N of Blanket Bay Rd	1	N	N	2	2	2	1	1	8
v) Blanket Bay Rd	1	N	N	2	2	2	1	1	8
12. Maits Rest	2	N	N	3	3	2	2	2	12*
13. Elliott River	2	N	N	3	3	2	2	2	12
14. Rileys Ridge Rd	2	Y	Y	1	1	2	2	1	7 #
15. Gellibrand River									
i) Bridge Trk	2	N	Y	2	3	2	2	2	11
ii) Sayers Trk	1	Y	Y	2	2	2	1	2	9
iii) Lardners Trk	1	Y	Y	2	1	2	2	2	9
iv) Lardners Trk	1	Y	Y	2	2	2	1	2	9
v) Lardners Trk	1	Y	Y	2	2	2	2	2	10
16. Wild Dog Rd	2	N	Y	3	3	2	2	2	12
17. Binns/Roberstons Rd	2	N	Y	3	2	1	1	2	9
18. Seaview Rd saddle	2	Y	Y	2	2	2	2	1	9
19. Sunnyside Rd	1	Y	Y	2	1	2	1	1	7 #
20. Henrys Rd	2	Y	Y	3	2	2	2	1	10 #
21. Grey River Rd	2	N	Y	3	3	2	2	2	12
22. Wye River Falls	2	N	Y	3	3	2	2	2	12
23. Bogalley Ck	2	N	Y	2	2	2	2	2	10
24. Parker River Gorge	2	N	N	3	3	2	2	2	12*
25. Porcupine Ck Pipeline Trk	1	Y	Y	2	2	3	2	2	11

5.0 Discussion

The lack of trap success indicates that Spot-tailed Quoll densities are extremely low in the Otway Ranges. The survey period (February and June), covered part of the moderate and peak activity periods. The timing of the survey does not explain the paucity of records. The selection of survey sites was based on recent Spot-tailed Quoll records, and/or a number of previous records and/or the presence of suitable Spot-tailed Quoll habitat. The habitat complexity scores for most sites were high and nearly all sites had potential den sites and suitable vegetation structure (Table 2).

Studies conducted elsewhere in Victoria and New South Wales have implicated clearfell timber harvesting, habitat fragmentation and poisoning by 1080 baiting as major threats to Spot-tailed Quoll (Belcher, C.A. 1997, 1998a,b). An overview analysis of the few results obtained in this study is unable to dismiss these as the key disturbance factors for quolls in the Otway Ranges. These results are compatible with the conclusions made in the Comprehensive Regional Assessment (Commonwealth of Australia 1999).

Other factors, such as forest stand age and presence or proximity to old growth forest were not assessed, as the data were not available. Prey presence and densities were not assessed during this survey as they were beyond the scope of this study, but may be an important factor in the current distribution of Spot-tailed Quolls in the Otway Ranges.

5.1 Timber Harvesting

Clear-fell logging removes habitat and the prey resource for a substantial period of time. This is likely to have a much more significant impact on female Spot-tailed Quolls due to the smaller size of their territories and their dependence on an adequate prey resource to successfully rear their young (Belcher in preparation c). If logging renders a female Spot-tailed Quoll territory unsuitable, it will also affect male quoll distribution. Male Spot-tailed Quoll distribution is directly affected by the presence of adult breeding females (Belcher in preparation c).

Clearfelling came into practice post second world war with the advent of chainsaws and bulldozers. As a consequence logging intensity increased (Mansergh 1984). The impact of clear-fell logging may be cumulative if the harvesting cycle is shorter than the period required for the forest to develop the habitat characteristics required by Spot-tailed Quolls. Similarly, post-harvest slash burns may render habitat unsuitable by removing the understorey, which may be important as a foraging strata and/or for cover.

Special Protection Zones and adjacent Special Management Zones have been established to support Spot-tailed Quolls in other forest areas of the State, such in the Proposed Forest Plan for North East (NRE 1999). The Special Protection Zones exclude timber harvesting and the Special Management Zones will aim to allow timber harvesting and maintain at least 500 ha of quality habitat for quolls and their prey species.

5.2 Habitat Fragmentation

The clearing of freehold land for pine and blue gum plantations has resulted in the loss and fragmentation of habitat. Anecdotal support of this was provided by Judy Spafford at Lower Gellibrand. She recorded Spot-tailed Quolls and an active latrine in a gully adjoining her property. The adjoining area was subsequently cleared and planted with pines. Spot-tailed Quolls, bandicoots and potoroos disappeared (circa 1970s), and have not been sighted again (Judy Spafford, personal communication).

5.3 1080 poison baiting

Baiting for foxes and wild dogs with FOXOFF and meat baits may result in the primary and secondary poisoning of resident Spot-tailed Quolls. The bulk of 1080 baiting currently conducted in the Otway Ranges is carried out on private land, with some conducted in State Forest and land managed by Parks Victoria. The Management Guideline for use of 1080 poison in State Forest, developed in the Proposed Forest Plan for North East (NRE 1999), states that where 1080 baiting is employed it should be done under the direction of a documented & auditable control program, that baits should have at least 10 cms soil cover and the bait stations should be at least one kilometre apart (to avoid caching by

foxes). Adherence to this guideline on both private and public land would minimise primary poisoning.

The use of 1080 poison to control rabbits throughout the Otway Ranges could be a threat to the Spot-tailed Quoll through secondary poisoning. McIllroy and Gifford (1992) found that the average 1080 poison residue levels in rabbits after baiting was over 7.5 mg. This level is high enough to kill all adult quolls which consumed poisoned rabbits. Home ranges of Spot-tailed Quoll are known to range from 600 to 3500 ha (Belcher 1995b, 1997) which translates to average movements of approximately 10 km. Plotting the areas baited for rabbits in the past 12 months (for which records exist), and taking a 10 km radius around each site illustrates the potential area affected by baiting (Figure 3). 1080 poison has been used in the Otway Ranges since the late 1960s for control of herbivores when planting pine plantations and more recently blue gum plantations. The decline in records of the Spot-tailed Quoll in the Otway Ranges may correspond to the introduction and widespread use of 1080 poison (Belcher in preparation b).

The impact of primary and secondary 1080 poison on predators is both difficult to measure, as few if any carcasses are found after baiting due to the delay between ingestion and death and they may mask the importance of other habitat variables in determining Spot-tailed Quoll distribution.

6.0 Conclusions

The current survey supports previous assessments that the size of the Otway Ranges population of Spot-tailed Quoll appears to be small and animals occur at low densities. The Statewide decline in the number of quoll records since the 1960s seems to be reflected in the Otways Ranges. The paucity of recent records suggests that the conservation status of the Spot-tailed Quoll in the Otway Ranges should be classified as 'Critically Endangered'.

To refine the current distribution of the Spot-tailed Quoll in the Otway Ranges, a more intensive, finer scale survey would be required.

7.0 Issues for Consideration

1. The use of 1080 poison for herbivore control in the Otway Ranges should be reviewed. Alternative methods for herbivore control should be explored.
2. The Management Guideline for use of 1080 poison in State Forest, developed in the Proposed Forest Plan for North East (NRE 1999), should be adopted throughout the Otways Ranges.
3. Logging should continue to be planned at the landscape level to ensure that suitable, contiguous habitat is maintained across the Otway Ranges.
4. Spot-tailed Quoll habitat utilisation should be investigated further in the Otway Ranges. This would involve trapping and radiotracking to determine habitat use, territory size, den requirements and scat collection to investigate diet and prey requirements.
5. The status of the Spot-tailed Quoll in the Otway Ranges appears to be Critically Endangered. An urgent review of the conservation management strategy for this species would seem warranted.

8.0 Large Forest Owl Records

During the Spot-tailed Quoll survey, large forest owl sightings were recorded. The following records were obtained from residents and verified, using tapes of owl calls.

1. Powerful Owl, Lower Gellibrand
2. Barking Owl, Lower Gellibrand
3. Barking Owl, Charleys Creek
4. Powerful Owl, Chapple Vale- Mt McKenzie
5. Barking Owl, Curdies River/Timboon Railway reserve above the limeworks.

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