DISTRIBUTION, HABITAT AND CONSERVATION STATUS OF THE EASTERN PYGMY-POSSUM *CERCARTETUS NANUS* IN TASMANIA

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We review literature pertaining to the distribution, habitat and conservation status of the eastern pygmy-possum *Cercartetus nanus* in Tasmania. Records from fauna surveys, museum specimens, and the Tasmanian *Natural Values Atlas* database, suggest that although *C. nanus* is widespread, it occurs in low numbers in Tasmania. From 51 fauna surveys examined, only 19 *C. nanus* were detected in a total of 47,087 Elliott trap-nights, 5,665 pitfall trap-nights, 196 scats or owl pellets, 899 spotlight hours, and 86 predator stomachs. A total of 102 Tasmanian *C. nanus* specimens was located in Australian and overseas museums. These records combined with 23 from the *Natural Values Atlas* database and 61 from an earlier published collation represent 99 of 679 grid squares (10 km x 10 km) overlaid across Tasmania (including King Island and Flinders Island). The patchy distribution of these records may be a reflection of low survey effort, low population numbers, low detectability or a combination of these and other factors. The highest number of records for a single locality was only four. Available data suggest that Tasmanian populations may be small and therefore potentially at risk from habitat loss, inappropriate fire regimes, and firewood collection. We believe there is a pressing need for further surveys to more clearly define the conservation status of *C. nanus* in Tasmania.

Key words: *Cercartetus nanus*, conservation status, distribution, eastern pygmy-possum, habitat, Tasmania

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BOTH the eastern pygmy-possum *Cercartetus nanus* and the little pygmy-possum *C. lepidus* occur in Tasmania and on mainland Australia (Green 1993; Strahan 1995). Current sub-specific designations for *C. nanus* are *C. n. unicolor* on mainland Australia and *C. n. nanus* in Tasmania and associated islands (McKay 1988). On the mainland, *C. nanus* occupies a range of habitats including heathland, woodland, sclerophyll forest and rainforest (Turner and Ward 1995). It is 'Vulnerable' in New South Wales (Bowen and Goldingay 2000; Dickman 2004) and South Australia (van Weenen and Harris 2006) and there are data that suggest that it may be threatened in Victoria (Harris and Goldingay 2005a) and in Queensland (Harris *et al.* 2007a). *Cercartetus nanus* is not listed as a threatened species under the Tasmanian *Threatened Species Protection Act 1995*, but is 'Protected' under the Tasmanian *Nature Conservation Act 2002* and also has status as 'Priority Fauna' under the Tasmanian *Regional Forest Agreement* (Commonwealth of Australia and State of Tasmania 1997).

Little research has been carried out on *C. nanus* in Tasmania and it is one of the State's least known and rarely observed marsupials (Andrews 1990). Only one ecological study pertaining to Tasmanian *C. nanus* has been published (Duncan and Taylor 2001). This contrasts with the considerable attention given to mainland populations (e.g. Turner 1986; Ward 1990; Laidlaw and Wilson 1996; Evans and Bunce 2000; Bladon *et al.* 2002; Harris and Goldingay 2005b; Harris *et al.* 2007b). In this paper we review available information on Tasmanian *C. nanus*, including distribution, habitat and conservation status. We build on the review of the distribution of Tasmanian *C. nanus* included in Munks *et al.* (2004) and provide a detailed account of records of *C. nanus* and of survey effort for the species. We also consider threats to this species and a further evaluation of its conservation status in Tasmania with particular reference to the provisions of the Tasmanian *Threatened Species Protection Act 1995*.

METHODS

Data sources

We sought distributional records of *C. nanus* from the American Museum of Natural History, New York (AMNH), Australian Museum, Sydney (AM), Natural History Museum, London (BNHM), Muséum National d'Historie Naturelle, Paris (MNHN), Museum Victoria, Melbourne (MV), Queensland Museum, Brisbane (QM), Queen Victoria Museum and Art Gallery, Launceston (QVMAG), South Australian Museum, Adelaide (SAM), and Tasmanian Museum and Art Gallery, Hobart (TMAG). Records of the fossil occurrence of *C. nanus* were extracted from Harris and Garvey (2006). Modern distributional data on *C. nanus* were also obtained from the *Natural Values Atlas* database (accessed 25 April 2006) maintained by the Tasmanian Department of Primary Industries and Water. Unfortunately, the *C. nanus* records published by Rounsevell *et al.* (1991) have either been lost or they were never added to an old database known as TASPAWS. However, we were able to deduce 10 x 10 km grid square co-ordinates for the species based on the published distribution map. Additional locality data were obtained from fauna studies, including those referenced in previous reviews by Rounsevell *et al.* (1991) and Munks *et al.* (2004). Additional searches were made for Tasmanian *C. nanus* records in specific scientific journals, i.e. *Australian Mammalogy*, *Australian Zoologist*, *Papers and Proceedings of the Royal Society of Tasmania*, *Records of the Queen Victoria Museum*, *The Tasmanian Naturalist* (Harris 2005a), *The Victorian Naturalist* (Harris 2005b) and *Wildlife Research*. The results of different surveys and detection methods in Tasmania were collated and summarised in order to compare them with detection rates compiled from other States.

RESULTS

Literature records of *C. nanus*

Approximately 80 records of *C. nanus* were found in the published literature, with 54 of these represented by a museum specimen. The holotype of the species and earliest record from Tasmania is from Maria Island (which lies 1 km off the east coast of the State) in February 1802 (Péron 1809; Harris 2006). Grant (1846) reports on a domestic cat bringing in six individuals of *Dromicia nana* (=*C. nanus*) in one night from near timber supply mills on the Tamar River. Wakefield (1963) published locality data from 36 Tasmanian specimens that were held in AM, BNHM, MV, QVMAG and TMAG. Of these, 26 were simply identified as being from "Tasmania" between 1823 and 1920. The others were from Magnet near Waratah in 1900, Hobart in 1929, an undated specimen from Cloudy Bay on Bruny Island, and from the early 1960s at Launceston, "Westbury district", and Fury Gorge near Cradle Mountain.

Also in the published literature is a record of two *C. nanus* found at 1000 m elevation on the slopes of Mount Wellington in April 1957 (Hickman and Hickman 1960). Taylor and McQuillan (1994) noted the occurrence of *C. nanus* at Mountain Park, an area that covers the east facing slopes of Mount Wellington. It is unclear whether or not this record was based on Hickman and Hickman (1960) or represents an additional record. Other published records are for areas surrounding Franklin and Cullenswood (Guiler 1960; Anon 1971), Glen Huon (Guiler 1970), Port Davey (Green 1973), Olga Camp, Lower Gordon Basin (Hocking *et al.* 1978; Hocking and Guiler 1983), Maggs Mountain (Green 1977, 1982a), Cashs Lookout (Taylor 1989), Mount Mawson (Stoddart and Challis 1991), Donaghys Hill (Mumbray 1992), Salmon River and Rebecca Creek (Slater 1992), Claytons and Melaleuca (Taylor and Comfort 1993), Mount Field (Green and Osbourne 1994), and Hastings (including a record from logging crews on Lovetts Road, near Southport) (Duncan 1995). Green *et al.* (1986) noted *C. nanus* in the preserved gut of a southern boobook owl *Ninox novaehollandiae*, although no locality was provided with the published note. Mooney (1992, 1993) noted *C. nanus* in masked owl *Tyto novaehollandiae* pellets from two undisclosed sites. Further enquiry established that these were from Ouse and Harry Walkers Tier near Broadmarsh (N. Mooney pers. comm.)

Munks *et al.* (2004) list records for the following islands: Maria, Flinders, King, Bruny, Schouten and Flat Witch. The most recent Maria Island record is from April 1969, when two animals were found near Darlington in a dead tree being cut for firewood (Animals and Plants Protection Board 1969). Green (1969) reported the discovery of an adult female in a torpid condition in a Launceston woolstore on 6 May 1965 "inside a bag of wool which had just been received into the store" from Flinders Island. This animal is now in the QVMAG (reg. no. 1966/1/20) (Appendix 1). Green (1969) also noted that David Rhodes had "found them on several occasions [on Flinders Island], usually in a cavity in the decaying stump of a grass tree". Hope (1973) reported that MV has a female and four young collected on Flinders Island (at Lady Barron) by Mr J. Whinray in February 1969 (see also Appendix 1). Whinray (1971) did not mention these MV specimens, but he did report that a Flinders Island *C. nanus* was caught in August 1971 and sent to QVMAG. On King Island, *C. nanus* was reportedly "occasionally found" at Egg Lagoon and in December 1967 one was found there drowned in a drum of water (Green and McGarvie 1971). The skull was later lodged with QVMAG (reg. no. 1968/1/33). An adult male found near Camp Creek, King Island on 15 October 1967 was subsequently preserved with QVMAG (no. 1968/1/38) (Green and McGarvie 1971). There are two *C. nanus* from Bruny Island in TMAG

(Wakefield 1963; Green 1979c; Appendix 1). Recent island surveys by TMAG and DPIWE discovered *C. nanus* on Flat Witch Island and Schouten Island (Gales and Pemberton 2002).

Museum records of *C. nanus*

We found 102 Tasmanian *C. nanus* specimens in museums in Australia and overseas: seven in AM, five in AMNH, 16 in BNHM, 17 in MV, one in MNHN, one in QM, 40 in QVMAG, three in SAM, and 12 in TMAG (Appendix 1). Most museum records (77%) were prior to 1980, with 32 records dated before 1900, and 16 from 1900-1949 (Table 1). There are five museum records since 1990, compared to seven during the period 1980-89. Of the 102 specimens, we have listed two as "probably" from Tasmania because their origins are uncertain (see Appendix 1). This includes the syntype for *Phalangista gliriformis* (=*C. nanus*) held by BNHM (see also Harris 2006). There are another 31 specimens for which the only locality information is "Tasmania". Sixty-nine specimens have reasonably specific locality data and these are from throughout Tasmania. The dates recorded with the museum specimens extend over a period of more than 200 years (February 1802 to March 2003).

		Type of record		
Period	***n***	**M**	**L**	**A**
<1900	32	32	6	-
1900-1949	16	16	-	-
1950-1959	6	2	4	-
1960-1969	15	9	3	3
1970-1979	27	20	2	5
1980-1989	13	7	1	5
1990-1999	19	3	8	8
2000-2007	6	2	2	2
Undated	78	11	6	61*
Total	**218**	**102**	**32**	**84**

Table 1. Chronology of modern *C. nanus* records from Tasmania. *n* = number of *C. nanus* records within the given time periods. Type of record: M = Specimen in a museum; L= literature record (includes trapping records but excludes museum specimens so as to prevent double-counting); A = other records (including Atlas records that are not mentioned in the literature or represented in a museum as well as pers. comm. records); - = no records of this type. * these are records from Rounsevell *et al.* (1991) and are dated from 1967 to 1989 – unfortunately these TASPAWS data now appear to be lost.

Compilation of locality records from all sources

The map of the distribution of *C. nanus* in Tasmania provided by Rounsevell *et al.* (1991) incorporated 61 records from 1967 to 1989, covered 46 grid squares (10 x 10 km), and represented 7% of all grid squares covering Tasmania. Munks *et al.* (2004) updated this map by a further 35 records covering another 25 grid squares, bringing the total grid squares occupied to 71 (records between 1964 and 2002). These datasets were based on locality records from reliable observers, from museum specimens held in Tasmanian institutions, and from the *Natural Values Atlas*. We have updated the distribution map of Munks *et al.* (2004) by 28 grid squares (i.e. 99 grid squares) based on museum specimens held outside Tasmania, six fauna surveys not considered previously, and additional historical records (Fig. 1). Most *C. nanus* records with known capture dates occurred outside the winter months (Fig. 2), though this might reflect a bias in the time collecting or surveys occurred.

Survey types

In 51 fauna surveys examined, including 36 conducted after 1980 (Appendix 2), *C. nanus* was found in only 12 (24%). These surveys produced 19 records of the species, including 14 since 1980. Table 2 summaries the capture success for *C. nanus* during these surveys. For example, just four *C. nanus* captures resulted from a total of 47,087 Elliott trap-nights (0.01 captures per 100 trap-nights). Only 1625 Elliott-trap nights (3% of total) were conducted in trees but none produced *C. nanus* captures. Four captures resulted from 5665 pitfall trap-nights (0.07 per 100 trap-nights), four detections from analysis of 196 predator remains (2.04 per 100 scats or pellets analysed), one observation during 899 spotlight hours (0.001 per hour) and one detection from content analysis of 86 predator stomachs (1.16 per 100). Three records also resulted from opportunistic captures. No *C. nanus* were recorded during 61,147 'other' trap-nights i.e. using Cage, Mascot, Sherman, or snap traps or from deployment of 54 hair-sampling tubes

Habitat association descriptions from the literature

Green (1973) stated that *C. nanus* "occurs predominately in areas of rainforest, but it has been found in other habitats", although he did not detail what these other habitats are. Subsequent reports have indicated *C. nanus* also inhabits wet sclerophyll forests, dry sclerophyll forests, scrublands, woodlands and moorlands (Table 3), and includes stands of *Eucalyptus obliqua* (Slater 1987, 1992; Statham 1987) and *Melaleuca*-fringing rainforest (Flannery 1994). Driessen *et al.* (2002) notes *C. nanus* from buttongrass moorlands, but these were rare instances and were adjacent to more typical habitat. On Tasmania's offshore islands, the presence of "*Eucalyptus* forest" (Rounsevell *et al.* 1991) appears to be important to support *C. nanus* populations. The species appears to be absent from treeless alpine habitats (Kirkpatrick *et al.* 1993) and some doubt has been expressed as to whether *C. nanus* uses coastal heath in the drier regions of the State (Taylor 1991).

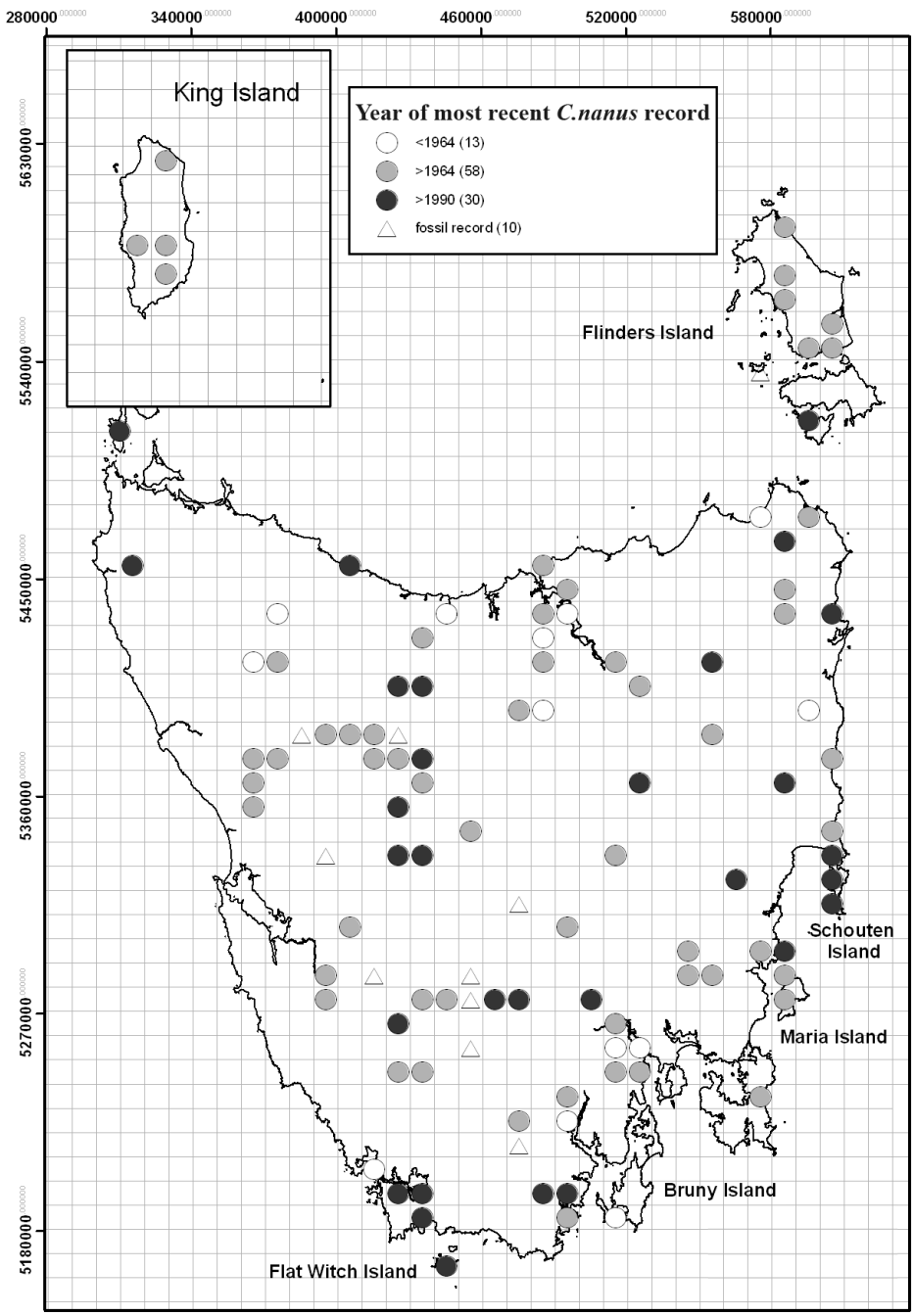

Fig. 1. Distribution of *C. nanus* records in Tasmania. Scale: 1 grid square = 10 km.

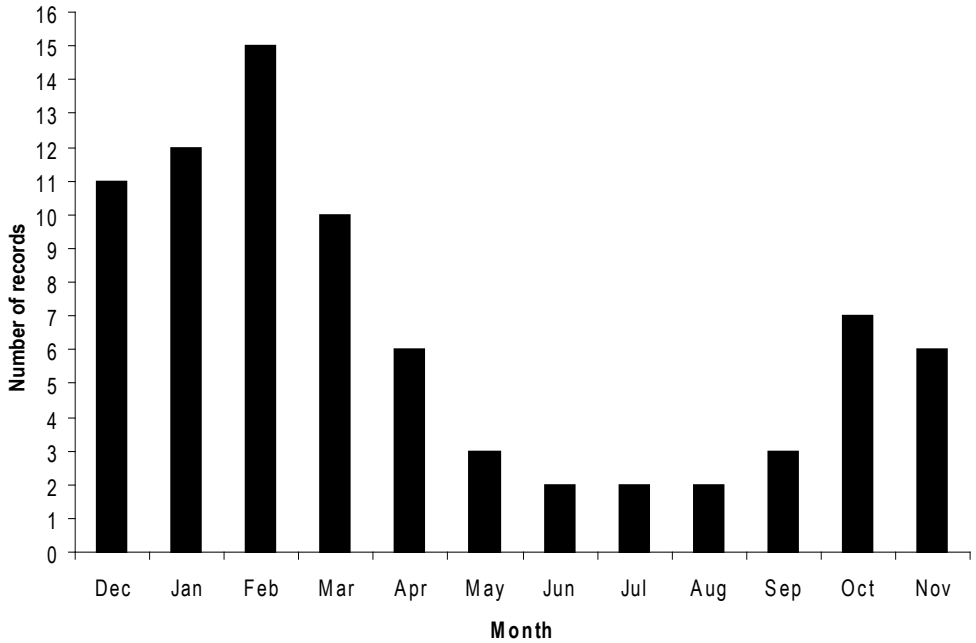

Fig. 2: Tasmanian *Cercartetus nanus* records with known dates of capture or collection compiled from museum specimens, literature records and the Natural Values Atlas database.

Data on habitat use by *C. nanus* were generated at Hastings, southern Tasmania, by Duncan (1995). Two *C. nanus* were captured in 20-year old regrowth wet forest, and two in 80 year old regrowth wet forest, but none in four year old regrowth. One *C. nanus* (an adult male) was radio-tracked in the 80-year regrowth, and subsequently three nests 25–133 m apart were located in burnt stumps. Two were in an area with a dense *Melaleuca squarrosa* and *Leptospermum scoparium* overstorey, and the third was in area that had been burnt four years prior, and had *Pomaderris apetala* and *Acacia verticillata* understorey.

DISCUSSION

Detectability

Rates of detection of *C. nanus* are consistently low throughout its geographic range (Table 2). Trapping rates compiled from surveys in New South Wales averaged 0.04 (Elliott traps) and 0.06 (pitfall traps) captures per 100 trap-nights (Table 2). In Victoria, average rates were somewhat higher (0.14 for Elliott traps and 0.29 for pitfall traps). In Queensland, no *C. nanus* were detected from 30,300 Elliott trap-nights. Results from surveys in Tasmania are also very low (0.01 for Elliott traps and 0.07 for pitfall traps). Low detection rates may result from either low population sizes or low detectability or both. Bowen and Goldingay (2000) argued that standard survey methods do have the potential to detect the species if survey effort is high. Yet in many areas where this occurred in NSW few if any were detected, indicating that the species is probably patchy in distribution. In Victoria, survey effort using appropriate methods has been very extensive. Harris and Goldingay (2005a) argued that the low rates of *C. nanus* detection do reflect small populations. In general the species can be difficult to detect, and some methods such as spotlighting are not really appropriate. However, trapping is reasonably appropriate and we expected more Tasmanian *C. nanus* records from the 47,087 Elliott trap-nights and 43,277 trap-nights using Sherman, snap and mascot traps undertaken. Further research needs to be undertaken on the detectability and population sizes of *C. nanus* in Tasmania to clarify whether populations are indeed small which seems likely based on available data.

There are many potential biases in the above data, but in comparison to mainland states, Elliott traps and other trapping methods (i.e. excluding pitfall trapping) in Tasmania has not been very successful for *C. nanus*. Elliott-traps in trees has been under-utilised, as has hair-tubes but detection rates for *C. nanus* from the latter method are generally very low (see Harris and Goldingay 2005a). Nest-boxes and pitfall traps have proven highly effective for detecting *C. nanus* in many mainland studies (e.g. Ward 1990; Bladon *et al.* 2002;

	TASMANIA			NEW SOUTH WALES			VICTORIA			SOUTH AUSTRALIA			QUEENSLAND		
Method	Effort	*n*	Rate	Effort	*n*	Rate	Effort	*n*	Rate	Effort	*n*	Rate	Effort	*n*	Rate
Elliott-trapping	47,087	4	0.01	314,561	123	0.04	84,081	120	0.14	7917	3	0.04	30,300	0	0
Pitfall-trapping	5665	4	0.07	56,977	32	0.06	49,582	145	0.29	3654	18	0.49	100+	0	0
Cage, Mascot, Sherman, snap traps	61,147	0	0	-	-	-	221595	63	0.03	-	-	-	-	-	-
Predator remains	161	4	2.04	na	19	na	18,331	76	0.41	-	-	-	15+	0	0
Predator stomachs	86	1	1.16	-	-	-	33	0	0	-	-	-	na	1	na
Spotlighting	899	1	0.001	na	16	na	4424	13	0.003	na	2	na	100+	2	0.02
Hair-tubing	54	0	0	59,300	24	0.04	7346	3	0.041	-	-	-	15+	0	0
Stagwatching	-	-	-	-	-	-	1005	2	0.002	-	-	-	-	-	-
Nest-boxes	-	-	-	1157	105	9.08	5878	1	0.017	-	-	-	66	0	0
Opportunistic captures	na	3	na	na	7	na	na	10	na	na	4	na	na	10	na

Table 2. Comparison of average detection rates for fauna studies conducted across the range of *C. nanus*. ***n*** = number of *C. nanus* detected; na = data not available; - = data not collected **Effort:** Predator remains include analysis of both scats and owl pellets. Values for spotlighting are in hours. **Rates:** For Elliott and pitfall trapping, rates are captures per 100 trap-nights. Rates for predator remains and stomachs are number of detections per 100 samples analysed. Spotlighting rates are number seen per hour. Hair-tubing rates are number of detections per 100 sampling devices deployed. Rates for stagwatching are number seen per tree. Rates for nest-boxes are number of captures per 100 box checks. Data sourced from Bowen and Goldingay 2000, Harris and Goldingay 2005a, van Weenen and Harris 2006; Harris *et al.* 2007a.

Harris and Goldingay 2005b; Tulloch and Dickman 2006), but were not employed (nest-boxes) or under-employed (pitfall traps) in the Tasmanian fauna studies we reviewed. If one was to plan a widespread survey in Tasmania for *C. nanus*, we would argue that a range of methods should be used concurrently, with a particular emphasis on installation and monitoring of nest-boxes, pitfall traps, and Elliott traps in trees. With the latter method, the use of honey sprays could also assist to enhance capture success (Harris and Goldingay 2005a; Harris *et al.* 2007b). Using additional methods such as predator scat analysis and hair-tubes may maximise the likelihood of detecting *C. nanus*. Most *C. nanus* detected in Tasmania have been found outside the winter months (Fig. 2) but this could partly reflect survey effort during the year. Of relevance here is the ability of the species to enter torpor (Geiser 1993; Green 1993). It is possible that the colder climate of Tasmania requires a greater use of torpor, particularly during winter. Accordingly, we suggest that surveys should be mainly conducted outside winter. However, it may still be important to conduct some winter trapping to coincide with the flowering of particular plants, such as *Banksia marginata*.

Distribution

Cercartetus nanus is distributed widely in Tasmania as it is in some other states but this distribution is patchy. However, many areas of the State have not been systematically surveyed with fewer than 25% of a total of 679, 10 x 10 km grid squares across Tasmania subjected to any mammal trapping (Hocking and Driessen 2000). In particular, large areas of western Tasmania are largely unsurveyed because they are inaccessible. Hence, *C. nanus* distribution in this region may be significantly underestimated. Nevertheless, available data suggest that compared with other possum and glider species in Tasmania, *C. nanus* is probably much more sparsely distributed (99 grid squares). For instance, its congener *C. lepidus* is recorded in 127 grid squares. The other three species of possum (see Munks *et al.* 2004) have even more extensive ranges: sugar glider *Petaurus breviceps* (191 grid squares), common ringtail possum *Pseudocheirus peregrinus* (440 grid squares), and common brushtail possum *Trichosurus vulpecula* (554 grid squares). We have not allowed for the difficulties in detecting *C. nanus* compared with the larger possums, but it is apparently more restricted in distribution compared with *C. lepidus* as these congeners may have a similar detectability.

Cercartetus nanus is recorded from six of Tasmania's satellite islands. Additionally, it possibly occurs on Three Hummock Island and Cape Barren Island, as there are records for *Cercartetus* (species unidentified) in Le Souef (1929), Whinray (1971), Hope (1973)

Location	*n*	Sources	Description of the vegetation community
Magnet and Fury Gorge	2	Wakefield 1963	Wet sclerophyll forests of Beech (*Nothofagus*).
Bruny Is. and Maria Is.	2	Wakefield 1963	Presumably from dry sclerophyll forest.
Maggs Mountain	1	Green 1982b	Mixed sclerophyll forest with some small patches of Myrtle.
Mount Mawson	2	Stoddart and Challis 1991	Alpine type vegetation with rocky outcrops; *Eucalyptus coccifera* was the only tree species present; shrubs included *Orites revoluta*, *Olearia ledifolia*, *Richea scoparia*, *Leptospermum rupestre* and *Pimelea sericea*.
-	1	Driessen *et al.* 2002	Moorland, adjacent to more typical habitat.
Salmon River	1	Slater 1992	Rainforest.
Olga Camp (Lower Gordon)	1	Hocking and Guiler 1983	Open Forest (trees 10-30m, tallest stratum covering 30-70%).
Olga Camp (Lower Gordon)	1	Hocking and Guiler 1983	Low Woodland (5-10m, tallest stratum covering 10-30%).
Southern Tasmania	-	Taylor 1990	Favours trees with thick stringy bark (e.g. *Eucalyptus obliqua*). Abundant in areas with leatherwood, Myrtaceae (e.g. tea tree, eucalypts), Proteaceae (e.g. *Banksia*) and Epacridaceae (e.g. *Richea*, *Cyathodes*).
Western Tasmania	1	Flannery 1994	*Melaleuca*-fringing rainforest.
Hastings	2	Duncan 1995	80 year old regeneration tall *E. obliqua* (30-40 m) forest over a tall understorey (6-10 m) of *Acacia melanoxylon*, *Pomaderris apetala*, *Pittosporum bicolor*, *Phebalium squameum*, *Melaleuca squarrosa* and *Cyathodes glauca* and a shrub layer of *Trochocarpa cunninghamii*, *Coprosma nitida*, *A. verticillata*, *P. apetala*, *Gahnia grandis* and *Dicksonia antarctica*. The ground layer was ferns (*Blechnum wattsii*), *Pimelea drupacea*, *C. nitida* and *Drymophila cyanocarpa*. Where the understorey had been burnt four years earlier, there was a dense shrub layer (1-5 m) of *P. apetala*, *A. verticillata* and ferns (*B. wattsii* and *Histiopteris incisa*) with *G. grandis* over deep litter. In part of the area the soil was waterlogged. Here there were fewer eucalypts over dense *M. squarrosa* and *C. glauca* (6-10 m) with *B. wattsii*, water-logged moss and *G. grandis*.
Hastings	2	Duncan 1995	Dense 20 year old regeneration of *E. obliqua* (10-12 m) forest with *P. apetala*, *A. melanoxylon* and *A. verticillata* forming a tall understorey (6-8 m). The ground layer was quite open, consisting of litter, ferns (*Pteridium esculentum*) and occasional shrubs such as *C. nitida*, *Leptospermum scoparium*, *P. bicolor*, *Pimelea drupacea* and vines (*Billardiera longifolia*, *Clematis aristata*). In gaps and along tracks there were dense thickets of *P. esculentum* and regeneration of *L. scoparium* and *P. apetala*.
Hastings (rt obs.)	1	Duncan 1995	Flat, poorly drained area with dense overstorey of *Melaleuca squarrosa* and *Leptospermum scoparium* (8-12 m) and occasional *Pomaderris apetala*, *Atherosperma moschatum* and *A. melanoxylon*. Occasional dead eucalypt stags and stumps as well as live emergent *E. obliqua* scattered throughout. Ground layer of dense ferns with clumps of *Gahnia grandis*.
Hastings (rt obs.)	1	Duncan 1995	Similar to above but ground layer dominated by *Gahnia grandis* and *Bauera rubioides*.
Hastings (rt obs.)	1	Duncan 1995	Pole stand of *E. obliqua* (dbh 60-80 cm, height 20-25 m) with understorey which was burnt four years earlier, consisting of *Pomaderris apetala* and *Acacia verticillata*. Ground layer of *Gahnia grandis* and *Pteridium esculentum* and many fallen stems from both the understorey and eucalypts.
Lovetts Road (Hastings)	1	Duncan 1995	27 year old *E. obliqua* forest regrowth.

Table 3. Descriptions of vegetation communities where *Cercartetus nanus* has been found in Tasmania. These are the only references found that mention habitat type. ***n*** = number of *C. nanus* detected; rt obs = radio-tracking observation.

and Munks *et al.* (2004). Mammal surveys are needed on these and other islands (e.g. Robbins, Deal, Dover, Great Dog, Babel, and De Witt) to ascertain the extent of the insular occurrence of *C. nanus*. Islands potentially provide important insights into the biogeography of the species, for instance, the population on Maria Island has probably been isolated from mainland Tasmania for 3000 years (Rounsevell 1989). Such information can be used to supplement prehistoric distributional data available from the fossil record (Harris and Garvey 2006). Another aspect of its ecology (and genetics) that island populations can shed light on is its ability to persist in low numbers (see also Main 1961; Mills *et al.* 2004; Sale *et al.* 2006). Further research on island ecology might also tell us something about the susceptibility of *C. nanus* to predation, particularly by cats. The species appears to be absent from numerous offshore islands that have been trap-surveyed including Erith, Outer Sister, Prime Seal, and Clarke Islands in the Furneaux Group, and Maatsuker Island and others in south-west Tasmania (White 1981; see also Munks *et al.* 2004).

Habitat

In Tasmania, *C. nanus* occurs in a variety of habitats (Table 3), but rainforest and wet sclerophyll forests are reported as the primary habitat type (e.g. Green 1974; Taylor 1990; Rounsevell *et al.* 1991; Hocking and Driessen 1996). As there are numerous records from non-rainforest areas (Table 3), we suggest that the importance of rainforest (and probably also wet forest) may have been overstated. The term "rainforest" has traditionally been used very broadly, and until recently the standard distribution maps of rainforest in Tasmania were significant over-estimations (see Hickey *et al.* 1993). Harris and Goldingay (2005a) emphasised that the presence of *C. nanus* may be explained by certain floristic or structural components of the vegetation, such as nectar and pollen availability and a tall or dense interlocking shrub layer rather than a specific vegetation community. Overall, *C. nanus* has been recorded from a wide spectrum of habitats, but rainforest does not emerge as the primary habitat type.

Areas that lack understorey vegetation, nectar sources and nest sites do not appear to support *C. nanus* populations (Statham 1984; Taylor 1991). Taylor (1990) commented that *C. nanus* is likely to be most abundant in Tasmania in areas that are rich in flowering plants such as leatherwood (*Eucryphia lucida*), the Myrtaceae (e.g. teatrees, paperbarks, eucalypts), Proteaceae (e.g. *Banksia*) and Epacridaceae (e.g. *Richea*, *Cyathodes*). On the mainland, the species has a preference for habitat that includes banksias, but the number of *Banksia* species in Tasmania today is relatively low compared to similar habitats in other parts of Australia (Hill *et al.* 1993). Although *Banksia* diversity is low, *B. marginata* is one of the most widespread tall shrubs occurring in Tasmania, and can be found in numerous vegetation types including heathlands, copses in moorland, coastal scrub (where it can be dominant) and also as a component in a variety of forest types. Based on the preference of the species for *Banksia*-dominated communities on the mainland, a field study that targets *C. nanus* in habitat containing or dominated by *B. marginata* in Tasmania must be a high priority to better inform its conservation and management.

Past opinions of relative abundance

Gould's (1845) account of *Dromicia gliriformis* (=*C. nanus*) stated that the species was "abundant…in Van Dieman's Land [=Tasmania], particularly the northern parts of the island". This was an opinion that he most probably gleaned from locals during his visits to Tasmania because there were only four *C. nanus* specimens in the BNHM in 1845. Lord and Scott (1924) came to the same general conclusion (i.e. *C. nanus* was more common in northern Tasmania). Wakefield (1963) considered *C. nanus* to be "rare" throughout Tasmania because of the impact of fires and land clearing, and the paucity of recent museum and literature records at that time. However, Guiler's (1967) opinion was that *C. nanus* was actually "more common than was formerly recognised", although no justification was given for this conclusion. Green (1973) expressed the view that "nowhere" in Tasmania is this species known to be "common", having earlier published on its occurrence at Icena Estate, Gladstone (Green 1967a), where he considered *C. nanus* to be "uncommon". Similarly, at Maggs Mountain, Green (1977, 1982a) reported it to be "rare", having collected only one specimen and cited the opinion of "hunters". In the Lower Gordon Basin, Hocking *et al.* (1978) suggested that *C. nanus* was "relatively common" based on two records. More recently, Griggs (2001) suggested that *C. nanus* is "rare" in a number of forest types in the Lower Gordon, presumably based on the absence of recent records. In south-west Tasmania, White (1985) regarded *C. nanus* as "not particularly common". Slater (1992) reported that *C. nanus* is "plentiful" in certain areas of Rebecca Creek based on opinion from logging contractors, and Green and Osborne (1994) considered the species to be "common" at Mount Field but no data were presented. On King Island, *C. nanus* was considered "rare" based on two museum records (Green and McGarvie 1971).

There is a majority view expressed by the authors of the above studies that *C. nanus* is uncommon or rare, but all of the opinions are essentially based on few if any objective data. In Victoria and New South Wales there are locations where *C. nanus* is locally common but they are few (see Bowen and Goldingay 2000; Harris and Goldingay 2005a). This situation may apply in Tasmania also.

A modern perspective on the status of *C. nanus* in Tasmania

Under section 15 of the Tasmanian *Threatened Species Protection Act 1995*, native flora or fauna may be listed as 'endangered', 'vulnerable' or 'rare'. A set of guidelines provides criteria used to inform the listing process (DPIWE 2001). The criteria are based on those published by the International Union for the Conservation of Nature and Natural Resources (IUCN). Rare is not an IUCN category but is defined for Tasmania as those species that "have very small or localised populations where ever they occur" and are "at risk". Available data on *C. nanus* in Tasmania are currently inadequate to resolve the appropriate status of this species because it is unclear how representative the survey data are and whether the decline in the number of museum specimens collected in recent decades reflects trends in collecting or in the abundance of the species. It appears it is not a common species. Accordingly, we call for a program of targeted surveys for *C. nanus* throughout Tasmania and detailed study of its population ecology. There also needs to be greater knowledge about how threatening processes (e.g. habitat clearing and fragmentation, inappropriate fire regimes, loss of nest sites due to intensive forestry and firewood collection; and predation by introduced species) potentially impact on the species in the Tasmanian context. This species deserves its recognition as 'Priority Fauna' under the Tasmanian *Regional Forest Agreement* and should remain a priority in land use planning.

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APPENDIX 1.

Tasmanian *Cercartetus nanus* specimens held in Australian and overseas museums.

Date	Museum	Rego. No.	Locality details	Other details	Latitude	Longitude
17 Sep 1896	AM	M1125	Launceston	Collected by Launceston Museum	41° 27' S	147° 10' E
17 Sep 1896	AM	M1126	Launceston	Collected by Launceston Museum	41° 27' S	147° 10' E
17 Sep 1896	AM	M1127	Launceston	Collected by Launceston Museum	41° 27' S	147° 10' E
01 Dec 1903	AM	M1745	Launceston	Collected by Launceston Museum	41° 27' S	147° 10' E
20 Oct 1915	AM	M2588	West coast Tasmania	Collected by "Council Zool Soc"	-	-
21 Apr 1917	AM	M2686	Tasmania	Collected by A.S Le Souef	-	-
28 Jan 1920	AM	M2800	Tasmania	Collected by "Trustees of Taronga Park"	-	-
17 Dec 1922	AMNH	65347	Arthur River Mill, n-w Tas.	Collected by H.C. Raven	41° 13' S	145° 29' E
16 Dec 1922	AMNH	65348	Arthur River Mill, n-w Tas.	Collected by H.C. Raven	41° 13' S	145° 29' E
19 Dec 1922	AMNH	65349	Arthur River Mill, n-w Tas.	Collected by H.C. Raven	41° 13' S	145° 29' E
19 Dec 1922	AMNH	65350	Arthur River Mill, n-w Tas.	Collected by H.C. Raven	41° 13' S	145° 29' E
01 Jan 2001	AMNH	2148	Tasmania	Collected by H.F Belamy	-	-
<1841	BNHM	1841.1250	Tasmania	Donated J. Gould	-	-
<1841	BNHM	1841.1249	Tasmania	Donated J. Gould	-	-
<1841	BNHM	1841.1253	Tasmania	Donated J. Gould	-	-
<1829	BNHM	1979.2190	Probably Tas.; Syntype of *Phalangista gliriformis*	Collected J. Morgan; Donated T. Bell	-	-
<1852	BNHM	1852.1.15.10	Tasmania	Collected R. Gunn	-	-
<1852	BNHM	1852.1.15.12	Tasmania	Collected R. Gunn	-	-
<1852	BNHM	1852.1.15.13	Tasmania	Collected R. Gunn	-	-
<1854	BNHM	1854.11.4.2	Tasmania	Donated J. Abrahams	-	-
<1860	BNHM	1860.11.29.34	Tasmania	Donated Milligan	-	-
<1853	BNHM	1853.12.2.3	Tasmania	Donated J.E. Gray	-	-
<1846	BNHM	1846.9.11.12	Tasmania	Collected J.B. Jukes Φ	-	-
<1852	BNHM	1852.11.30.3	Tasmania	Donated A. Smith	-	-
<1853	BNHM	1853.12.2.2	Tasmania	Donated J.E. Gray	-	-
<1858	BNHM	1858.5.4.588	Probably Tasmania	Donated Zoological Society of London	-	-
<1884	BNHM	1884.11.4.1	Tasmania	Collected W. Abrahams	-	-
1924	BNHM	1929.8.1.3	Hobart	Collected F. Wood Jones	42° 53' S	147° 18' E
17-28 Feb 1802	MNHN	1990-413	Maria Island	Holotype, collected by F. Peron	42º 39' S	148º 04' E
20 Sep 1872 [D]	MV	C.4459=R13004	Tasmania	Purchased from L.A. Peers	-	-
20 Sep 1872 [D]	MV	C.4460=R13003	Tasmania	Purchased from L.A. Peers	-	-
20 Sep 1872 [D]	MV	C.4461	Tasmania	Young of C. 4460 As above	-	-
20 Sep 1872 [D]	MV	C.4462	Tasmania	Young of C. 4460 As above	-	-
20 Sep 1872 [D]	MV	C.4463	Tasmania	Young of C. 4460 As above	-	-
20 Sep 1872 [D]	MV	C.4464	Tasmania	Young of C. 4460 As above	-	-

APPENDIX 1. Continued

Date	Museum	Rego. No.	Locality details	Other details	Latitude	Longitude
20 Sep 1872 [D]	MV	C.4467=R13012	Tasmania	Purchased from L.A. Peers	-	-
20 Sep 1872 [D]	MV	C.4468	Tasmania	Young of C. 4467 As above	-	-
20 Sep 1872 [D]	MV	C.4469	Tasmania	Young of C. 4467 As above	-	-
20 Sep 1872 [D]	MV	C.4470	Tasmania	Young of C. 4467 As above	-	-
20 Sep 1872 [D]	MV	C.4471	Tasmania	Young of C. 4467 As above	-	-
20 Sep 1872 [D]	MV	C.4472=R13013	Tasmania	Purchased from L.A. Peers	-	-
10 Dec 1923 [D]	MV	C.4456=R12737	Tasmania	Donated Mr D. Le Souef	-	-
25 Nov 1968	MV	C.9571	Lady Barron, Flinders Is.	Coll. & Don. John Whinray	40° 13’ S	148° 15’ E
01 Feb 1969	MV	C.9182	Lady Barron, Flinders Is.	Pouch young of C.9571	40° 13’ S	148° 15’ E
27 Mar 1970	MV	C.10302	North Pats River, Flinders Is.	From “Blue Gum Forest”	40° 01’ S	148° 02’ E
31 Oct 1975	MV	C.16639	North Pats River, Flinders Is.	Collected by J.S Whinray	40° 01’ S	148° 02’ E
16-23 Jul 1998	QM	JM14850	Mt William National Park	Caught in malaise trap in heath	40° 32’ S	148° 07’ E
3 May 1940	QVMAG	1940/1/199	Glengarry	J. Newman; orig. identified as *C. lepidus*	41° 20’ S	146° 52’ E
-	QVMAG	1945/1/35	Boobyalla	A. Garcia	40° 53’ S	147° 53’ E
-	QVMAG	1953/1/11	Devonport	Barrie Hall	41° 11’ S	146° 21’ E
-	QVMAG	1959/1/26	Richmond Hill, East Tamar	Old reg no 1943.95.	41° 12’ S	146° 54’ E
1961	QVMAG	1962/1/40	near Launceston	Kept as a pet until 15.10.1962.	41° 27’ S	147° 10’ E
-	QVMAG	1963/1/14	near Westbury	M. Turner	41° 33’ S	146° 50’ E
28 Apr 1963	QVMAG	1963/1/95	Fury Gorge, Cradle Mountain	E. Vogelpoel	41° 39’ S	145° 57’ E
-	QVMAG	1963/1/267	Icena Estate, Gladstone	Lance Woolcox	40° 58’ S	148° 01’ E
6 May 1965	QVMAG	1966/1/20	Roberts & Stewarts Woolstore, Flinders Island	Chris Barratt	40° 00’ S	148° 00’ E
1967	QVMAG	1968/1/33	Egg Lagoon, King Island	Max McGowie	39° 40’ S	143° 59’ E
15 Oct 1967	QVMAG	1968/1/38	Camp Creek, King Island	-	39° 56’ S	143° 52’ E
01 Aug 1971	QVMAG	1971/1/6	L. Hollaways Range, Flinders Is.	G.D.F. Smith	40° 00’ S	148° 00’ E
24 Oct 1971	QVMAG	1971/1/9	Flinders Island	G.D.F. Smith	40° 00’ S	148° 00’ E
12 Feb 1972	QVMAG	1972/1/4	Picton River, Geeveston	Roy Bugg	43° 07’ S	146° 43’ E
Dec 1971	QVMAG	1972/1/5	Icena Estate, Gladstone	R. Vogelpoel	40° 58’ S	148° 01’ E
Jan 1973	QVMAG	1973/1/4	Flinders Island	D. Smith	40° 00’ S	148° 00’ E
Jan 1973	QVMAG	1973/1/5	Flinders Island	D. Smith	40° 00’ S	148° 00’ E
09 Dec 1973	QVMAG	1973/1/30	Flinders Island	D.M. Rhodes	40° 00’ S	148° 00’ E
1967	QVMAG	1973/1/31	King Island	R.H. Green	40° 00’ S	144° 00’ E
-	QVMAG	1976/1/19	Flinders Island	Derek Smith	40° 00’ S	148° 00’ E
11 Mar 1976	QVMAG	1976/1/22	Flinders Island	G.D.F. Smith	40° 00’ S	148° 00’ E
1976	QVMAG	1976/1/144	Flinders Island	F. Rhodes	40° 00’ S	148° 00’ E
14 Feb 1977	QVMAG	1977/1/8	Maggs Mountain plateau	R.H. Green	41° 45’ S	146° 12’ E
Jan 1978	QVMAG	1978/1/80	Launceston	Found on floor of possum cage; R.H. Green	41° 27’ S	147° 10’ E
1973	QVMAG	1978/1/300	King Island	Kept in captivity until death on 28.5.1978.	40° 00’ S	144° 00’ E
12 Oct 1979	QVMAG	1979/1/82	Flinders Island	F. Rhodes	40° 00’ S	148° 00’ E

APPENDIX 1. Continued

Date	Museum	Rego. No.	Locality details	Other details	Latitude	Longitude
Sep 1979	QVMAG	1979/1/92	Badger Corner, Flinders Island	J. Parish	40° 16' S	148° 10' E
23 Dec 1980	QVMAG	1980/1/510	Reekara, King Is. 3 km SSW Mt. Council	Ken Small	39° 57' S	143° 55' E
28 Jun 1981	QVMAG	1981/1/144	Lady Barron, Flinders Island	C. Patterson	40° 13' S	148° 14' E
23 Mar 1982	QVMAG	1982/1/29	Cradle Mountain	B. Hamilton; map sheet 8014, 157708 'Sophia'	41° 39' S	145° 57' E
09 Feb 1904	QVMAG	1982/1/148 §	Magnet	O.L. Adams; Old Reg No 2170.	41° 26' S	145° 26' E
01 Mar 1988	QVMAG	1988/1/26	Cradle Mt. NP camp ground	M. Garner	41° 38' S	145° 46' E
23 Dec 1980	QVMAG	1989/1/141	Reekara, King Is. 3 km SSW Mt. Council	Ken Small; One of a litter of 2.	39° 57' S	143° 55' E
23 Dec 1980	QVMAG	1989/1/142	Reekara, King Is. 3 km SSW Mt. Council	Ken Small; One of a litter of 2.	39° 57' S	143° 55' E
-	QVMAG	1989/1/181	Icena Estate, Gladstone	Lance Woolcox; One of a litter of four.	40° 58' S	148° 01' E
-	QVMAG	1989/1/182	Icena Estate, Gladstone	Lance Woolcox; One of a litter of four.	40° 58' S	148° 01' E
-	QVMAG	1989/1/183	Icena Estate, Gladstone	Lance Woolcox; One of a litter of four.	40° 58' S	148° 01' E
-	QVMAG	1989/1/184	Icena Estate, Gladstone	Lance Woolcox; One of a litter of four.	40° 58' S	148° 01' E
09 Feb 1904	QVMAG	1993/1/74	Magnet	O.L. Adams; acquired 9/2/1904.	41° 26' S	145° 26' E
Nov 1906	QVMAG	1993/1/75	Magnet	O.L. Adams; after 18 months in captivity	41° 26' S	145° 26' E
19 Jan 1970	SAM	m07924	Zion	-	42° 00' S	146° 30' E
19 Jan 1970	SAM	m07925	Zion	-	42° 00' S	146° 30' E
27 Jan 1971	SAM	m08261	Launceston	D. Sim	41° 27' S	147° 10' E
01 Jan 1858	TMAG	A6a	Lake St Clair	Mont Turner	42° 07' S	146° 10' E
25 Oct 1937	TMAG	A57	Cloudy Bay, Bruny Island	F.H. Long	43° 28' S	147° 13' E
18 Mar 1963	TMAG	A63	Cloudy Bay, Bruny Island	L. Long	43° 28' S	147° 13' E
24 Nov 1910	TMAG	A640	"Cullensward", near St Marys	W.V Legge	41° 34' S	148° 11' E
03 Jan 1950	TMAG	A641	Tasmania	-	-	-
-	TMAG	A649	Lake Fenton	W. Belcher	42° 40' S	146° 37' E
1970	TMAG	A878	Rosebery	Mr Haig	41° 46' S	145° 32' E
14 Nov 1988	TMAG	A1564	Melaleuca	D. King	43° 27' S	146° 09' E
1991	TMAG	A1581	Melaleuca	R.J. Taylor and M.D. Comfort	43° 27' S	146° 09' E
24 Jan 1993	TMAG	A1589	Tooms	(see Duncan and Tayor 2001)	42° 14' S	147° 50' E
Mar 2003	TMAG	A1765	Private Forest Res. Ferndale Rd near Bicheno	D. Obendorf	41° 52' S	147° 18' E
14 Apr 1958	MVZ	127329	Port Davey	Harold C. Reynolds; died 18 Sep 1958	43° 19' S	145° 55' E

Records are listed alphabetically by institution abbreviation name and then chronologically. **Date** = specimen collection date; or donation date (indicated by [D]). **Museum**: American Museum of Natural History (AMNH), Australian Museum (AM), British Natural History Museum (BNHM), Muséum National d'Historie Naturelle (MNHN), Museum Victoria (MV), Museum of Vertebrate Zoology, UCLA, Berkeley (MVZ); Queen Victoria Museum and Art Gallery (QVMAG), Queensland Museum (QM), South Australian Museum (SAM), Tasmanian Museum and Art Gallery (TMAG). § The skull of this specimen is figured in Green and Rainbird (1983). Φ This specimen may be the same individual mentioned in Meredith (1881) – if it is then J.B. Jukes donated the specimen to BNHM and L.A. Meredith was the collector. Some details of collectors for BNHM specimens are also in Thomas (1888).

APPENDIX 2.

Survey details for published and unpublished fauna surveys undertaken in Tasmania.

Area	*n*	Season	Habitat	A	Survey method, effort & number *C. nanus* detected						Source
					ET	CT	OT	APR	SP	O	
NORTH-WEST											
Smithton	-	E	H, O	-	-	2240	-	-	-	-	Heinsohn 1968
Granville Harbour	-	E	-	-	-	5133	-	-	-	-	Guiler 1978
Sumac FR and Dempster Plains	-	A	WS, H, TS, R	200	-	30	2040	-	3.0	-	Green 1979a
Round Hill	-	Sp	H	-	-	50	2150	-	-	-	Green 1979b
Sumac FR, Maggs Mt	-	E	-	-	4080	980	-	-	153km	-	Statham 1983
Ordnance Point	-	A	-	-	-	416	3000	-	2.0	-	Green 1984
Maggs Mountain	1	E	WSF	880	-	450	1320	-	45.0 (1)	-	Green 1977; 1982a
Upper Henty River	-	S	R, WSC[B], EC, SE, AV	200-1000	2355	-	-	-	12.0	27[HT]	Taylor *et al.* 1985
Upper Henty River	-	Sp-S	R, WSC, EC, SE, AV	-	-	+	-	43	-	3 [PSCA]	Taylor 1986
Norfolk Range	-	S	BM, WSF, R, DSF	-	65Σ	-	579	-	-	91[PF^]	Slater 1992
NORTH-EAST											
Icena Estate, Gladstone	-	-	DSF[B], H	-	-	-	-	-	-	82 [PSCA]	Green 1967a
Pateena	-	S	EC	-	-	-	-	35	-	-	Green 1982b
Mayfield and Rostrevor	1	E	-	-	-	-	-	90	-	(1)[PSCA]	Green *et al.* 1986
Goulds Country SF	-	E	DSF, BG, H, SE	700	6920	-	-	-	-	-	Norton 1987a,b,c
Mt Ossa	-	A	AV, H	1617	200	-	-	-	-	-	Broome 1990, 1998
Mt William NP	-	E	H, SL, OF	-	-	-	2132Ŷ	-	-	-	Pye 1991
Cataract Gorge	-	W	OSC, DSF	-	50	18	-	15	2.0	-	Taylor *et al.* 1997
Mount Barrow	1	E	WSF	-	16, 058 (1)	-	-	-	-	-	C. Reid pers. comm.
SOUTH-EAST											
Hobart	-	E	-	-	-	497	-	-	-	-	Guiler 1958
Glen Huon	1	A-W	W[B], SF	-	-	2829	-	-(1)	-	-	Guiler 1970
Buckland	-	E	O, S, SE	-	-	-	7660Ω	-	9.0	-	Gowland 1977
Geeveston and Woodsdale	-	A	DSF, WSF	-	800	-	80	-	1.0	132[PF]	Pattemore 1977
Lower Gordon Basin	2	S-A	O, OSC, LW	-	-	-	2400§	-	-	(2)[OP]	Hocking *et al.* 1978; Hocking & Guiler 1983

APPENDIX 2. Continued

Area	*n*	Season	Habitat	A	Survey method, effort & number *C. nanus* detected						Source
					ET	CT	OT	APR	SP	O	
Kempton	-	E	DSF, WSF, REF	-	-	1440	-	-	-	-	Fitzgerald 1984
Triabunna	-	-	-	-	-	-	-	94	-	-	Green & Rainbird 1985
Arve Loop to Mt Connection	2	-	R, MF, DSF[B], WSF, AV	50-1240	2000	-	-	-	-	-	Stoddart & Challis 1991, 1993
Donaghys Hill	1	S-W	-	-	-	-	-	8 (1)	-	-	Mumbray 1992
Hastings and Tooms	4	E	MT[B], REF, WSF	-	2154@	-	-	-	-	5432(4)[PF]	Duncan 1995; Duncan & Taylor 2001
Mt Nelson	-	Sp	CWF	-	575	232	-	-	-	-	Hird 1995
Wellington Park	-	A	WSF	550-650	240	120	-	-	1.5	-	Hird & Hammer 1995
Mt Dromedary	-	S-A	O	580	-	85	-	-	120.0	-	Klettenheimer & Salamon 1997
Launceston	-	E	-	-	-	2826	-	-	-	-	Statham & Statham 1997
Mount Wellington	-	Sp-A	WSF, SHW[B]	600-960	1504	-	-	-	-	-	Driessen 1998b
Huon Valley	-	E	O, W	-	-	-	8880	-	-	-	Mallick *et al.*1998, 2000
Silver Plains	-	E	DSF	870	1560 Σ	-	-	-	-	-	Klettenheimer-Salamon 2000
Dennes Hill, North Bruny Island	-	W	OW	-	160	76	-	-	-	-	Hird 2000
Kingston Beach/ Browns River	-	S	O[B]	-	-	60	-	-	-	-	Driessen 2003
SOUTH-WEST											
Lake Pedder	-	S	-	-	-	-	~300	-	15.0	-	Andrews 1967
Huon River	-	E	DSF	300	500	+	-	64	10.0	-	Blackhall 1980
Anthony Study Area	-	Sp	R, WSC, EC, SE, AV	-	2000	288	-	16	12.0	27[HT]	Anon 1984
McPartlan Pass	-	A	SE	-	308	-	-	-	-	-	Driessen & Comfort 1991
Melaleuca and Claytons	2	S-A	MXF, SW, TS, SE	-	631(1)	-	78	-	5.3	(1)[OP]	Taylor & Comfort 1993
South-west NP – FLGWRNP	-	E	BM	320-800	4665	-	-	-	-	-	Arkell 1995
Pelion Plains	-	S	HS, GSF	850	442	-	-	-	-	-	Driessen 1998a
Lake St Clair	-	-	BM	730	-	-	6958Ω	-	-	-	Driessen 1999
Tyndall Range	-	-	BM	500	730	100	-	-	-	-	Driessen *et al.* 2002

APPENDIX 2. Continued

Area	*n*	Season	Habitat	A	Survey method, effort & number *C. nanus* detected ET	CT	OT	APR	SP	O	Source
MULTIPLE REGIONS											
Greens Beach, Cradle Mountain	-	-	H, W, R	-	-	-	5700	-	-	-	Green 1967b, 1968, 1972
Eddystone Pt -Tasman Peninsula	-	A-W	H, W[B]	-	610	-	-	-	-	-	Hocking 1980
northern, central & south-east	-	S	-	-	-	-	-	-	661.0	-	Driessen & Hocking 1992
Devonport - Hobart	2	-	SF, WS	-	-	-	-	15 (2) Φ		-	Mooney 1992, 1993
Flat Witch and Schouten Islands	2	Sp-S	-	-	40 (2)	-	-	-	-	-	Pemberton unpubl. data
Total	19	-	-	-	47,087 (4)	17,870 (-)	43,277 (-)	196 (4)	899 h (1) 151 km	PF= 5655 (4); HT = 54 (-); OP =(3); PSCA = 86 (1)	

Area: FR = Forest Reserve, Mt = Mount/Mountain, NP = National Park, Pt = Point, SF = State Forest; FLGWRNP = Franklin Lower Gordon Wild Rivers National Park. ***n*** = number of *C. nanus* detected. **Season** = season of the study (S = Summer, A = Autumn, W = Winter, Sp = Spring, E = extended over all seasons). **Habitat:** alpine vegetation (AV), buttongrass (BG), buttongrass moorland (BM); dry sclerophyll forest (DSF), eucalypt scrub (EC), grassy subalpine forest (GSF), heath (H), highland sedge (HS), low woodland (LW), montane forest (MF), mature forest (MT), open forest (O), open scrub (OSC), open woodland (OW), rainforest (R), regenerating forest (REF), shrubland (S), sedgeland (SE), sclerophyll forest (SF), shrubby woodland (SHW), shrubland (SL), sclerophyll woodland (SW), tea-tree scrub (TS), woodland (W), wet sedgeland (WS), wet scrub (WSC), wet sclerophyll forest (WSF), mixed forest (MXF), *Banksia* spp. ([B]), **A** = altitude (metres above sea level). **Survey Method**: **ET** = Elliot Traps = Values are trap-nights, and number of *C. nanus* captured in parentheses; **CT** = Cage Traps = wire cage traps of various sizes; **OT** = Other Traps; these were either Sherman, snap (i.e. breakback), or mascot traps (25x25x26cm), unless otherwise indicated. § = this survey used three sizes of trap: Elliotts, small wire-mesh traps and large steel-mesh traps. Ŷ = these were Elliotts and Longworth traps. Ω = these were Elliott and mascot traps. @ = this included Elliott traps and other traps specially designed for pygmy-possums. Σ = all or some of these Elliott trap-nights were positioned in trees above ground. ^ = these included 79 hanging pitfalls and 12 ground pitfalls. Φ = total number of pellets analysed is unknown, but they were collected from 15 widely disperse sites. **APR** = analysis of predator remains (i.e. examination of mammalian scats and/or owl pellets) (Values are number of scats or pellets analysed, and number of *C. nanus* detected in parentheses). **SP** = spotlighting (Values are number of spotlighting hours unless otherwise indicated, and number of *C. nanus* seen in parentheses), **O** = Other methods (PSCA= Predator Stomach Contents Analysis, N= Nestboxes = number of nestbox checks, OP=opportunistic capture, sighting, or detection), HT= hair-tubes, PF = pitfall trapping; note that some pitfalling studies did use drift-fences but others did not), (-) indicates data not known or not applicable.