1. **Family:**	Typhlopidae
2. **Scientific Name:**	*Ramphotyphlops exocoeti* (Boulenger, 1887)
3. **English Name:**	Christmas Island Blind Snake

4. **Infraspecific taxa**: None

5. **Species survival status**: Vulnerable.

6. **Former distribution**: Not known to have differed from current distribution.

7. **Current distribution**: Christmas Island, Indian Ocean, (total area 13,470 ha).

8. **Habitat**: Closed forest.

The only habitat data available relate to a specimen collected in 1975. It was found during clearance of primary rainforest on the plateau; the site is now cleared of forest.

9. **Reasons for decline**: Probably a combination of factors, including habitat clearance, disturbance by mining, soil compaction and erosion.

In the process of mining phosphate, the closed forest was clear-felled and burnt and the topsoil removed to expose the phosphate ore body; removal of the phosphate exposed bare limestone pinnacles which are slowly revegetated by low herbs and shrubs, many of them exotics. This effectively destroys the microhabitat of the worm snake.

10. **Conservation reserves on which species occurs** (including a list of other Action Plan species in each conservation reserve): Christmas Island NP; *Lepidodactylus listeri* (Vulnerable) also occurs here.

10A. **Other conservation reserves where species might be expected to occur**: None.

11. **Other public land on which species occurs**: Potentially present in areas of closed forest outside the Christmas Island National Park.

12. **Other land on which species occurs**: None known.

13. **Is knowledge about species adequate for objectives and actions to be defined accurately?**: No.

13.1: Further ground surveys need to be conducted to determine the habitat preferences of the species and the extent of its occurrence in Christmas Island NP.

13.2: Research is needed into the basic biology and ecology of the species in the field; it should include long term monitoring of changes in population size, habitat use and distribution on the island.

13.3: Research is needed to document the extent of the species' decline and to identify the major factors contributing to that decline.

14. **Recovery Plan objectives**:

14.1: To obtain sufficient information on the species' biology, ecology and distribution to determine its current conservation status and formulate appropriate management strategies.

14.2: To ensure that a secure, viable population of the species is maintained within Christmas Island NP.

15. **Management actions already initiated**:

15.1: Survey of all terrestrial reptiles of Christmas Island funded by ANPWS and conducted in 1979 (Cogger and Sadlier, 1981).

15.2: Christmas Island National Park Plan of Management in preparation.

15.3: Establishment of a nursery to provide plants for the rehabilitation of the mine fields.

15.4: Study of the introduced Wolf Snake funded by ANPWS and conducted in 1991/92 (Rumpff, 1992).

16. **Management actions required**: Given the rarity of this species, we do not believe it would be biologically sensible or cost-effective to undertake independent surveys or studies of

Ramphotyphlops exocoeti. Rather, we propose that the surveying and studying of this species be made an integral part of the recovery plan for *Lepidodactylus listeri*, especially the component which monitors the status of Wolf Snakes (*Lycodon capucinus*).

16.1: Survey known and potential habitat in reserve.

16.2: Develop community awareness of the species.

16.3: Continue rehabilitation of mined areas by wide-scale planting of forest species on the plateau.

17. Organisations responsible for conservation of species and individuals involved: Australian Nature Conservation Agency.

18. Other organisations and individuals involved: Hal Cogger and Ross Sadlier (Australian Museum), Holger Rumpff, Christmas Island National Park Advisory Committee.

19. Can recovery plan be carried out with existing resources?: No, although mining royalties have contributed considerably towards the costs of maintaining the regeneration nursery. Costs additional to those proposed for the *Lepidodactylus listeri* recovery plan:

1: Enhancement of survey methods in the *L. listeri* program to optimise capture of *Ramphotyphlops exocoeti*: $10,000. **$10K**

Total $10K

20. Remarks: Five specimens documented in museum collections; the most recent specimen was collected in 1985.

In a feeding experiment, captive Wolf Snakes did not accept *Ramphotyphlops braminus* offered to them as prey although they fed readily on live and freshly dead geckos and skinks; this suggests that *R. exocoeti* would not be preyed upon by Wolf Snakes.

References:

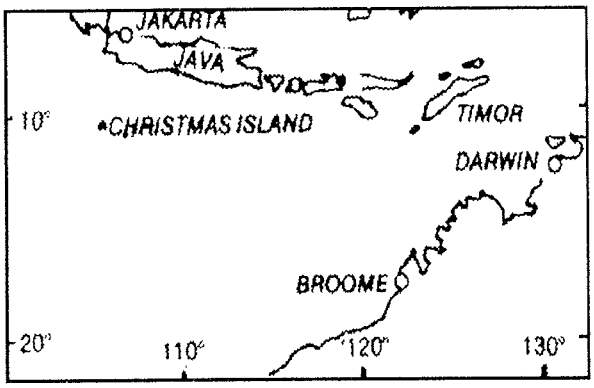
Australian National Parks and Wildlife Service. 1991. Annual Report 1990-91. Australian Government Publishing Service, Canberra.

Cogger, H.G. and Sadlier, R.A. 1981. The terrestrial reptiles of Christmas Island, Indian Ocean. Australian Museum, Sydney. 194 pp. Report to the Australian National Parks & Wildlife Service.

Cogger, H.G., Sadlier, R.A. and Cameron, E.E. 1983. The terrestrial reptiles of Australia's island territories. Australian National Parks and Wildlife Service Special Publication 11: 1-80.

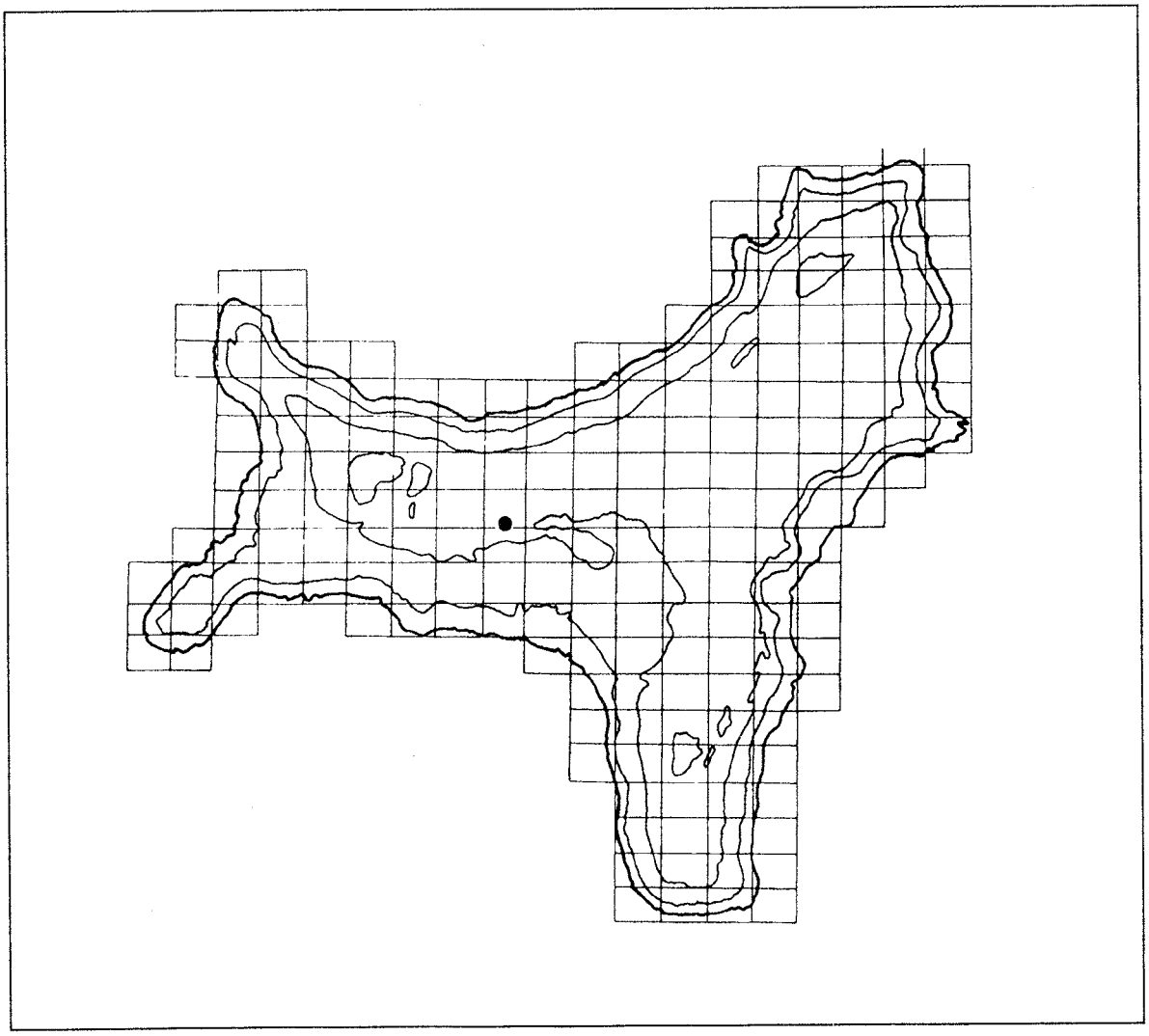
Fritts, T.H. 1993. The common wolf snake, *Lycodon aulicus capucinus*, a recent colonist of Christmas Island in the Indian Ocean. Wildlife Research 20: 261-266.

Rumpff, H. 1992. Distribution, population, structure and ecological behaviour of the introduced South-East Asian Wolf Snake *Lycodon aulicus capucinus* on Christmas Island, Indian Ocean. Report to the Australian National Parks and Wildlife Service, Canberra.



Distribution of

Ramphotyphlops exocoeti



1. Family:	Boidae
2. Scientific Name:	*Aspidites ramsayi* (Macleay, 1882) (population in south-western WA)
3. English Name:	Woma

4. Infraspecific taxa: Population under threat is apparently restricted to south-western Western Australia. "Until there are specimens from these intervening areas with heavy soils to prove the contrary the south-west population is best considered as being separated from the inland population" (Smith, 1981).

5. Species survival status: Endangered.

6. Former distribution: Prior to 1960 recorded from a broad strip of south-western Western Australia, extending south-east from Yuna (near Geraldton) to Boddington (south-east of Mandurah) and inland to Menzies in the north and the western edge of the Nullarbor Plain in the south. This region now largely coincides with the north-eastern wheatbelt of Western Australia.

7. Current distribution: Only eight specimens have been added to the Western Australian Museum's collections since 1960 (only one since 1975) and they have come from the north-western and south-eastern edges (Burracoppin and Narembeen) of the species' former range. Smith (1981) remarked "there seems little doubt that the south-western population is close to extinction".

8. Habitat: Open heath, tall shrubland.

Preferred habitat appears to be myrtaceous heath on sandplains (Laurie Smith, *in litt.*) which are bordered on the north and east by heavy soils dominated by mulga (*Acacia aneura*).

9. Reasons for decline: Probably a combination of factors, including clearance of habitat for agriculture and grazing, and crop production.

"... most [of the preferred habitat has] been cleared in the last 40 years" (Laurie Smith, *in litt.*). Wilson and Knowles (1988) also suggested that predation on young snakes by feral animals may have contributed to the decline.

10. Conservation reserves on which species occurs: None known.

10A. Other conservation reserves where species might be expected to occur: Badjaling NR, Bendering NR, Billyacatting Hill NR, Bindoo Hill NR, Buntine NR, Durokoppin NR, East Nugadong NR, East Yorkrakine NR, East Yuna NR, Kodj Kodj NR, Marchagee NR, North Bungulla NR, Nugadong NR, Nugadong Forest NR, South Badjaling NR, Wilroy NR, Yorkrakine NR, Yoting Water NR. These nature reserves within the known distribution range of *Aspidites ramsayi* were surveyed for vertebrates between 1971 and 1976 (Chapman and Dell, 1985) but the species was not found.

11. Other public land on which species occurs: None known.

12. Other land on which species occurs: Only specimen in Western Australian Museum registered since 1980, came from 12 km north of Marchagee, Western Australia. Known from private land near Watheroo and potentially present in areas of remnant native vegetation on private properties throughout the species' range in southern Western Australia.

13. Is knowledge about species adequate for objectives and actions to be defined accurately?: No.

13.1: Ground surveys need to be conducted to determine the full geographic range of this population, its habitat preferences, and the extent of its occurrence in existing reserves.

13.2: Research is needed into the basic biology and ecology of the population in the field; it should include long term monitoring of changes in population size, habitat use and geographic range.

13.3: Research is needed to document the extent of the population's decline and to identify the major factors

contributing to that decline.

14. Recovery Plan objectives:

14.1: To obtain sufficient information on the population's biology, ecology and distribution to determine its current conservation status and formulate appropriate management strategies.

14.2: To ensure that secure, viable populations are maintained within a reserve system.

14.3: To implement land management practices which promote the maintenance of secure, viable populations outside reserves.

15. Management actions already initiated:

15.1: Listed as requiring "special protection" on the 1990 Schedule of the *WA Wildlife Conservation Act 1950*. [The eastern population of this species is listed as "vulnerable and rare" on the 1992 Revised (Interim) Schedule 12 of the *NSW Endangered Fauna (Interim Protection) Act 1991*].

15.2: Twenty-four nature reserves in the WA wheatbelt were surveyed for vertebrates by the Western Australian Museum biological survey unit between 1971 and 1976 (Chapman and Dell, 1985).

16. Management actions required:

16.1: Survey known and potential habitat in reserves within the population's known range.

16.2: Survey known habitat outside reserves within the population's known range.

16.3: Develop and promote guidelines and provide incentives for landowners and users to reduce the impact of current land use practices on the population outside reserves.

16.4: Establish appropriate reserves.

16.5: Develop community awareness within the population's known range.

16.6: Implement control program for feral animals if these are demonstrated to have an adverse effect on the population.

16.7: In view of the success of many python captive breeding programs overseas, encourage captive breeding program for re-introduction of the species into reserves within its known range.

17. Organisations responsible for conservation of species and individuals involved: Western Australian Department of Conservation and Land Management (Andrew Burbidge).

18. Other organisations and individuals involved: Laurie Smith (Western Australian Museum).

19. Can recovery plan be carried out with existing resources?: No.

1: Survey of geographic range, habitat preferences and occurrence in reserves: 2 workers for 4 months each year for 2 years - $53,333 salary; $26,667 expenses. **$80K**

2: Research into basic biology and ecology, including assessment of threatening processes: 1 worker for 3 months each year for 3 years - $30,000 salary; $15,000 expenses. **$45K**

3: Preparation of management strategies: 1 worker for 3 months - $10,000 salary; $2,000 expenses. **$12K**

4: Develop captive breeding program: 1 worker for 2 months each year for 2 years: $13,333 salary; $2,667 expenses. **$16K**

Total $153K

20. Remarks: 52 specimens documented in Australian museum collections.

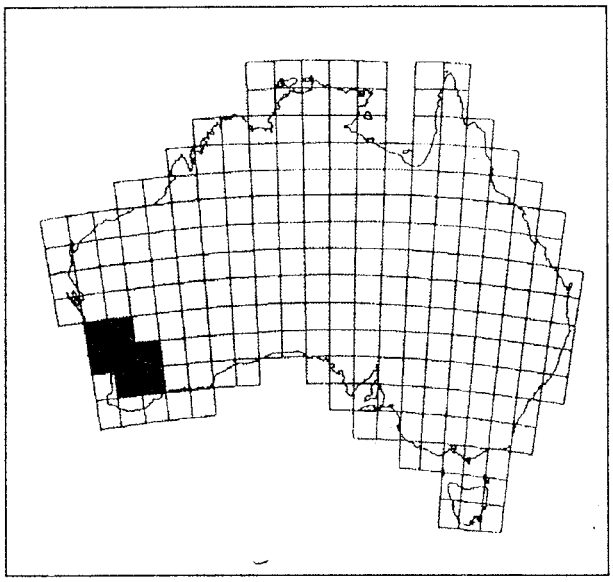
References:

Chapman, A. and Dell, J. 1985. Biology and zoogeography of the amphibians and reptiles of the Western Australian wheatbelt. Records of the Western Australian Museum 12(1): 1-46.

Smith, L.A. 1981. A revision of the python genera *Aspidites* and *Python* (Serpentes: Boidae) in Western Australia. Records of the Western Australian Museum 9: 211-226.

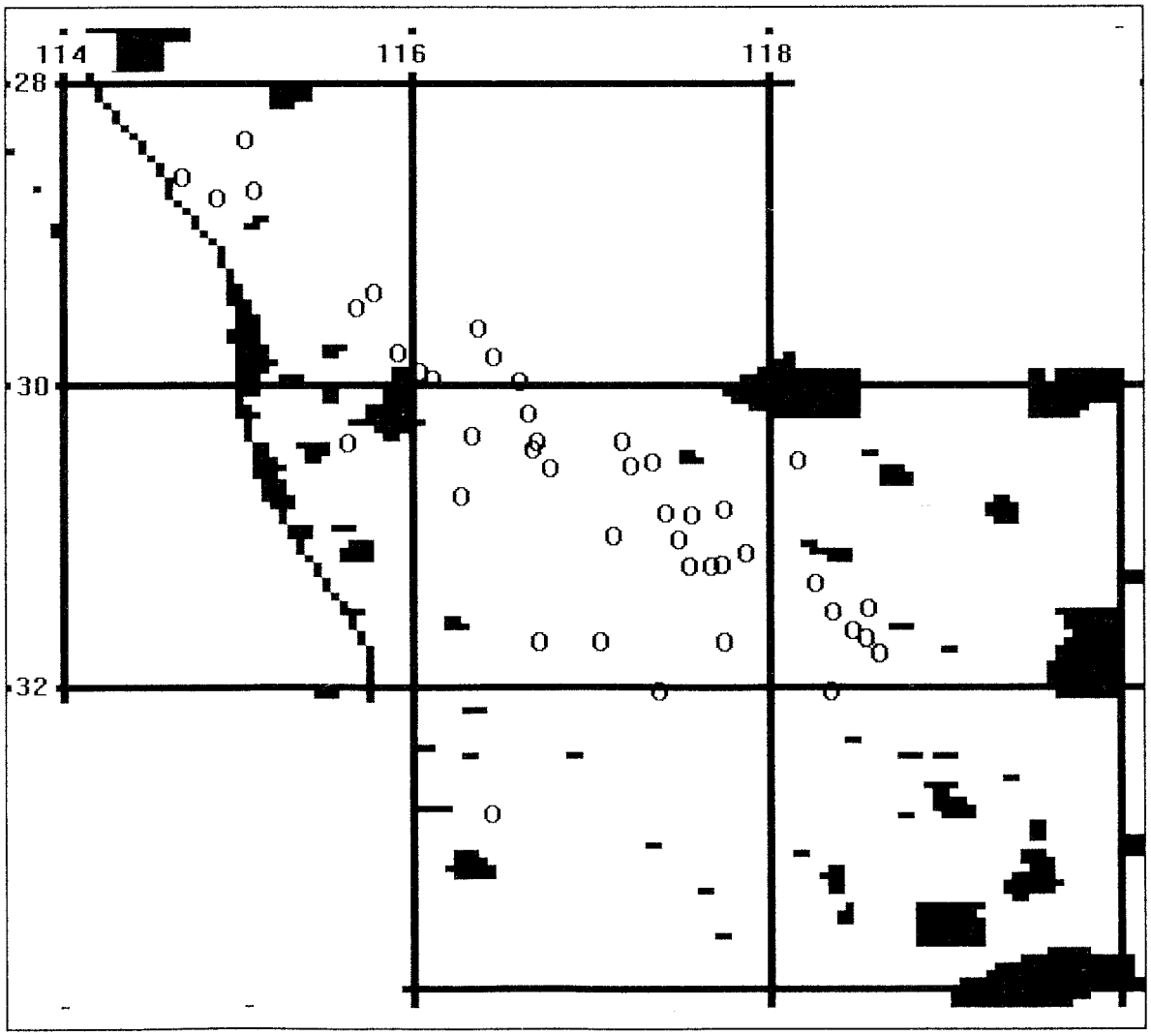
Storr, G.M., Smith, L.A. and Johnstone, R.E. 1986. Snakes of Western Australia. Western Australian Museum, Perth. 187 pp.

Wilson, S.K. and Knowles, D.G. 1988. Australia's Reptiles; a photographic reference to the terrestrial reptiles of Australia. Collins Publishers, Australia. 447 pp.



Distribution of *Aspidites ramsayi*

(south-western WA)



1. Family:	Boidae
2. Scientific Name:	*Morelia spilota imbricata* (Smith, 1981) [also appears in the literature as *Python spilotus imbricatus*]
3. English Name:	Western Australian Carpet Python

4. Infraspecific taxa: *M. spilota imbricata* (south-western Western Australia, and St Francis Island, South Australia *vide* Schwaner *et al.*, 1988), *M. spilota spilota* (coastal New South Wales), *M. spilota variegata* (remainder of continental Australia except for southern Victoria and arid central and western Australia). Laurie Smith (*in litt.*) reports that coastal and plateau populations of *M. spilota imbricata* can be differentiated on colour pattern and meristics.

5. Subspecies survival status: Vulnerable.

6. Former distribution: South-west of Western Australia, from Geraldton in the north to Kalgoorlie, Norseman and Mount Le Grand in the east.

7. Current distribution: "An analysis of *Python spilotus imbricatus* accessions [in the Western Australian Museum] suggests a decline in the numbers of this subspecies (at least on the mainland) similar to *Aspidites ramsayi* in south-western Western Australia" (Smith, 1981).

No longer present on North Wallabi Island although it is still found on a number of offshore islands including East and West Wallabi Islands in the Houtman Abrolhos, Garden Island off Kwinana, and North Twin Peak and Mondrain Islands in the Archipelago of the Recherche; also on St Francis Island off Ceduna, South Australia.

8. Habitat: Woodland, low woodland.

Observed in dry sclerophyll wandoo woodland (Nichols & Nichols, 1984), in "sandy heath ... with *Banksia attenuata* the predominant banksia", in a "grove of well established trees, predominantly *Banksia littoralis* and *Agonis flexuosa*" and in a "... predominantly *Banksia quercifolia* heath, with some *Banksia attenuata*" all in Torndirrup National Park (Smith, 1990).

9. Reasons for decline: Probably a combination of factors, including overgrazing by stock, clearance of habitat for agriculture and grazing, pasture improvement and crop production.

10. Conservation reserves on which subspecies occurs: Cape Naturaliste NP, Fitzgerald River NP, Peak Charles NP, Stirling Ranges NP, Stokes NP, Torndirrup NP, West Bendering NR.

10A. Other conservation reserves where subspecies might be expected to occur: Badjaling NR, Bendering NR, South Badjaling NR, West Bendering NR, Yoting Water NR, Yornaning NR. These wheatbelt nature reserves within the range of *Morelia spilota imbricata* were surveyed for vertebrates between 1971 and 1976 (Chapman and Dell, 1985) but the subspecies was not found.

11. Other public land on which subspecies occurs: Bold Park (Perth), Mount Saddleback SF and Dryandra SF; probably present in all the major State Forests in the south west of the state (Andrew Burbidge, *in litt.*).

12. Other land on which subspecies occurs: Potentially present in areas of remnant native vegetation on private properties throughout the subspecies' range in southern Western Australia.

13. Is knowledge about subspecies adequate for objectives and actions to be defined accurately?: No.

13.1: Ground surveys need to be conducted to determine the full geographic range of the subspecies, its habitat preferences, and the extent of its occurrence in existing reserves.

13.2: Research is needed into the basic biology and ecology of the subspecies in the field; it should include long term monitoring of changes in population

size, habitat use and geographic range.

13.3: Research is needed to document the extent of the subspecies' decline and to identify the major factors contributing to that decline.

13.4: Genetic study needed to determine the taxonomic status of this subspecies.

14. Recovery Plan objectives:

14.1: To obtain sufficient information on the subspecies' biology, ecology and distribution to determine its current conservation status and formulate appropriate management strategies.

14.2: To ensure that secure, viable populations of the subspecies are maintained within a reserve system.

14.3: To implement land management practices which promote the maintenance of secure, viable populations of the subspecies outside reserves.

15. Management actions already initiated:

15.1: Listed as requiring "special protection" on the 1990 Schedule of the *WA Wildlife Conservation Act 1950.*

15.2: Twenty-four nature reserves in the WA wheatbelt were surveyed for vertebrates by the Western Australian Museum biological survey unit between 1971 and 1976 (Chapman and Dell, 1985).

15.3: Fox control program has been operational in Dryandra SF for the past eight years.

16. Management actions required:

16.1: Survey known and potential habitat in reserves within the subspecies' known range.

16.2: Survey known habitat outside reserves within the subspecies' known range.

16.3: Develop and promote guidelines and provide incentives for landowners and users to reduce the impact of current land use practices on the subspecies outside reserves.

16.4: Establish appropriate reserves if the existing reserve system is found to be inadequate to secure the survival of the subspecies.

16.5: Develop community awareness within the subspecies' known range.

16.6: In view of the success of many python captive breeding programs overseas, encourage captive breeding program for re-introduction of the species into reserves within its known range.

17. Organisations responsible for conservation of subspecies and individuals involved: Western Australian Department of Conservation and Land Management (Andrew Burbidge).

18. Other organisations and individuals involved: Laurie Smith (Western Australian Museum).

19. Can recovery plan be carried out with existing resources?: No.

1:	Survey of geographic range, habitat preferences and occurrence in reserves: 2 workers for 3 months each year for 2 years - $40,000 salary; $20,000 expenses.	**$60K**
2:	Research into basic biology, taxonomy and ecology, including assessment of threatening processes: 1 worker for 4 months each year for 3 years: $40,000 salary; $20,000 expenses.	**$60K**
3:	Preparation of management strategies: 1 worker for 3 months - $10,000 salary; $2,000 expenses.	**$12K**
4:	Establishment of captive breeding program: 1 worker for 2 months each year for 2 years - $13,333 salary; $2,667 expenses.	**$16K**
		Total $148K

20. Remarks: 139 specimens documented in Australian museum collections. Although this species probably occurs in more conservation reserves than do most species included in the Reptile Action Plan, its decline is unequivocal.

References:

Bush, B. 1985. Some reptiles and frogs recorded in Stokes National Park. Western Australian Naturalist 16(2/3): 52.

Chapman, A. and Dell, J. 1977. Reptiles and frogs of Bendering and West Bendering Nature Reserves. Records of the Western Australian Museum Supplement 5: 47-55.

Chapman, A. and Dell, J. 1985. Biology and zoogeography of the amphibians and reptiles of the Western Australian wheatbelt. Records of the Western Australian Museum 12(1): 1-46.

How, R.A and Dell, J. 1990. Vertebrate fauna of Bold Park, Perth. Western Australian Naturalist 18(4/5): 122-131.

How, R.A., Dell, J. and Muir, B.G. 1988. The biological survey of the Eastern Goldfields of Western Australia. Park 4. Lake Johnston-Hyden Study Area. IV. Vertebrate fauna. Records of the Western Australian Museum Supplement 30: 44-83.

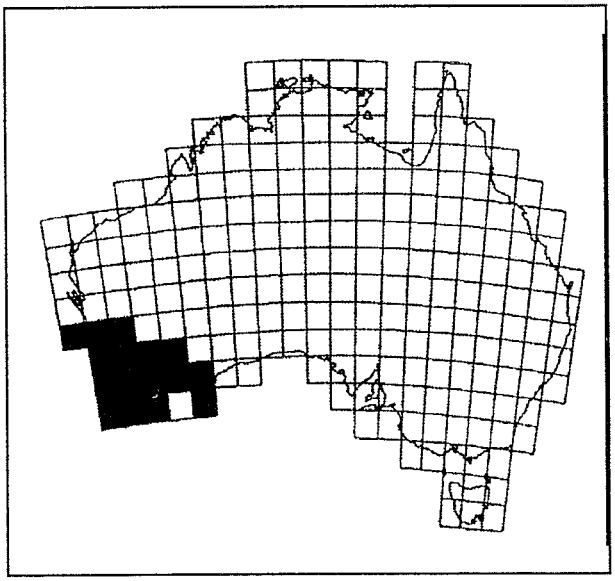
Nichols, O.G. and Nichols, F.M. 1984. The reptilian, avian and mammalian fauna of the Mount Saddleback State Forest, Western Australia. Western Australian Naturalist 15(8): 179-189.

Schwaner, T., Francis, M. and Harvey, C. 1988. Identification and conservation of carpet pythons (*Morelia spilota imbricata*) on St. Francis Island, South Australia. Herpetofauna 18(2): 13-20.

Smith, L.A. 1981. A revision of the python genera *Aspidites* and *Python* (Serpentes: Boidae) in Western Australia. Records of the Western Australian Museum 9: 211-226.

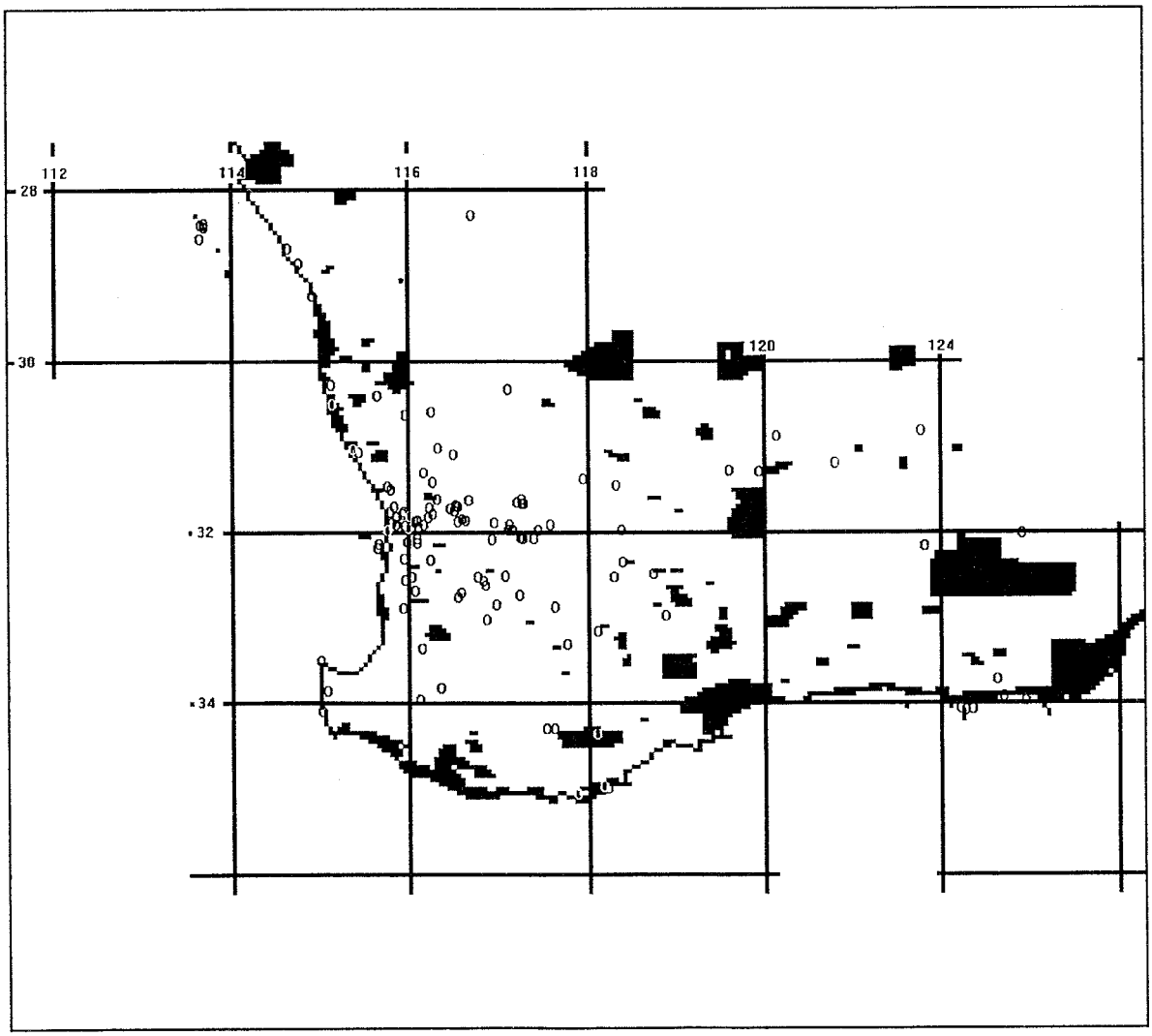
Smith, V.W. 1990. The terrestrial vertebrate fauna of the Torndirrup National Park. Western Australian Naturalist 18(3): 82-92.

Storr, G.M., Smith, L.A. and Johnstone, R.E. 1986. Snakes of Western Australia. Western Australian Museum, Perth. 187 pp.



Distribution of

Morelia spilota imbricata



1. Family:	Elapidae
2. Scientific Name:	*Austrelaps labialis* (Jan, 1859) (population around Adelaide, SA)
3. English Name:	Pygmy Copperhead

4. Infraspecific taxa: Only the Adelaide population is considered under threat; the geographically-isolated Kangaroo Island population is probably secure (Hutchinson, 1992).

5. Species survival status: Vulnerable.

6. Former distribution: Not known to have differed from current distribution.

7. Current distribution: Occurs on Kangaroo Island and in the Mount Lofty Ranges, South Australia, but only the latter population, concentrated in an area of about 150 km^2 in the Adelaide Hills, is of immediate conservation concern.

8. Habitat: Open forest, woodland.

In the Mount Lofty Ranges, largely restricted to high altitude stringybark forest with dominant species *Eucalyptus obliqua* and *E. baxteri* and an understorey of *Lomandra* species, *Hakea rostrata*, mixed species heath or introduced species. Two sites were in Bluegum (*Eucalyptus leucoxylon*) and Pinkgum (*E. fasciculosa*) woodland. These areas have a high average annual rainfall between 800 and 1000 mm. Most localities that could be accurately determined were near the tops of hills and were characterised by a near closed canopy and dense heath or bracken understorey. Resting copperheads were usually found under rocks or iron (Read and Bedford, 1991).

9. Reasons for decline: Probably a combination of factors, including clearance of habitat for agriculture and grazing, crop production, urban development and predation by cats and brown snakes.

Has been recorded as prey of domestic cats in the Adelaide Hills and this threat may be quite significant as the domestic and feral cat population in the Mount Lofty Ranges appears to be quite large. Predation by brown snakes which have encroached on the copperheads' range due to land clearance may also be a problem. Clearance of sclerophyll scrub in the Mount Lofty Ranges for agriculture and housing appears to result in the displacement of copperheads (Read and Bedford, 1991). The species has become less common in the Adelaide Hills as a result of urbanisation of the Stirling-Heathfield-Aldgate area (John Read and Mark Hutchinson, *in litt.*).

10. Conservation reserves on which species occurs: In the Mount Lofty Ranges: Cox's Scrub CP (prior to 1983 at least), Cleland CP.

On Kangaroo Island present in Dudley CP, Pelican Lagoon CP and Flinders Chase NP.

10A. Other conservation reserves where species might be expected to occur on the mainland: Probably none; between January 1988 and March 1989, Read and Bedford (1991) searched many National, Conservation and Recreation Parks in the Mount Lofty Ranges, including Deep Creek, Newland Head, Scott, Horsnell Gully, Belair and low reaches of Cleland, without finding *Austrelaps labialis*.

11. Other public land on which species occurs: None known.

12. Other land on which species occurs: Potentially present in suitable habitat on private properties throughout the population's range.

13. Is knowledge about species adequate for objectives and actions to be defined accurately?: No.

13.1: Further ground surveys need to be conducted to determine the full geographic range of the population, its habitat preferences, and the extent of its occurrence in existing reserves.

13.2: Research is needed into the basic biology and ecology of this population in the field; it should include long term monitoring of changes in population size, habitat use and geographic range.

13.3: Research is needed to document the extent of the population's decline and to identify the major factors contributing to that decline.

14. Recovery Plan objectives:

14.1: To obtain sufficient information on the biology, ecology and distribution of the geographically-isolated Mount Lofty population to determine its current conservation status and formulate appropriate management strategies.

14.2: To ensure that secure, viable populations are maintained within a reserve system.

14.3: To implement land management practices which promote the maintenance of secure, viable populations outside reserves.

15. Management actions already initiated: None known.

16. Management actions required:

16.1: Survey known and potential habitat in reserves within the population's known range.

16.2: Survey known habitat outside reserves within the population's known range.

16.3: Establish appropriate reserves if the existing reserve system is found to be inadequate to secure the survival of the population.

16.4: Develop and promote guidelines and provide incentives for landowners and users to reduce the impact of current land use practices on the population outside reserves.

16.5: Develop community awareness within the population's known range.

16.6: Implement control program for feral cats if they are demonstrated to have an adverse effect on the population.

17. Organisations responsible for conservation of species and individuals involved: South Australian Department of Environment and Land Management.

18. Other organisations and individuals involved: John Read (Olympic Dam Operations).

19. Can recovery plan be carried out with existing resources?: No.

1:	Survey of geographic range, habitat preferences and occurrence in reserves: 2 workers for 2 months each year for 2 years - $26,667 salary; $13,333 expenses.	**$40K**
2:	Research into basic biology and ecology, including assessment of threatening processes: 1 worker for 3 months each year for 2 years - $20,000 salary; $10,000 expenses.	**$30K**
3:	Preparation of management strategies: 1 worker for 3 months - $10,000 salary; $2,000 expenses.	**$12K**
		Total $82K

20. Remarks: 53 specimens from the Adelaide Hills documented in Australian museum collections.

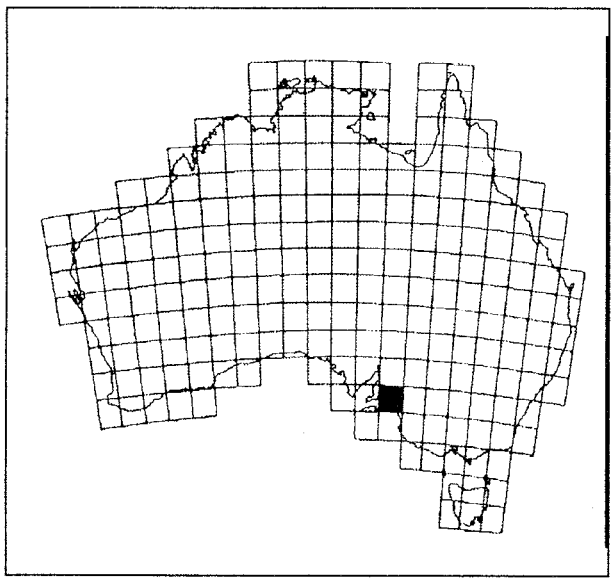
References:

Hutchinson, M.N. 1992. Threatened reptiles in South Australia. Section 7 *in* S.P. Tay (ed.) Threatened species and habitats in South Australia: a catalyst for community action. South Australian Advisory Committee on Threatened Species, Adelaide.

Rawlinson, P.A. 1991. Taxonomy and distribution of the Australian tiger snakes (*Notechis*) and copperheads (*Austrelaps*) (Serpentes, Elapidae). Proceedings of the Royal Society of Victoria 103(2): 125-135.

Read, J.L. and Bedford, G. 1991. The distribution and ecology of the Pygmy Copperhead Snake (*Austrelaps labialis*). Herpetofauna 21(2): 1-6.

Shine, R. 1987. Ecological ramifications of prey size: food habits and reproductive biology of Australian copperhead snakes (*Austrelaps*, Elapidae). Journal of Herpetology 21: 71-74.



Distribution of *Austrelaps labialis*

(Adelaide population)