

**Proposal for wild harvest and export of venom, blood and body parts
from Australian native snake species submitted for
approval under the *Environment Protection and Biodiversity
Conservation Act 1999* (EPBC Act)**

1. Title and introduction

The applicant submitting this proposal is operating as Venom Supplies. Hereafter, the applicant is referred to as Venom Supplies. This proposal relates to the harvesting and breeding of snakes for the purpose of the export of snake venom, venom derivative or venom product, naturally sloughed skins, blood and other biological material.

Snake derived venom, blood and body parts have been used internationally for medical research into therapeutic compounds, production of human therapeutics and diagnostics, pure research and development of biological reagents. The current application proposes to continue this work.

Specimens covered:

Native Australian venomous snakes, except those listed under the EPBC Act as threatened (excluding the conservation dependent category), legally held by Venom Supplies (see Appendix 1 for a full species list). Specimens may have been taken from the wild or captive born. All wild snakes including parental stock must have been legally harvested under collection permits issued by the relevant state or territory government.

The snakes are held at the premises of Venom Supplies, and the venom, venom derivative or venom product, or naturally sloughed skin, from these snakes can be legally exported for research and medical purposes. Export permits are required with the exception of venom, venom derivative or venom product or a naturally sloughed skin for the following species for which an existing exemption is in place:

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|-------------------------|--|
| Common Death Adder | <i>Acanthophis antarcticus</i> |
| Northern Death Adder | <i>Acanthophis praelongus</i> |
| Desert Death Adder | <i>Acanthophis pyrrhus</i> |
| Lowlands Copperhead | <i>Austrelaps superbus</i> South Australia and Victoria) |
| Pygmy Copperhead | <i>Austrelaps labialis</i> (Kangaroo Is. only) |
| Stephens Banded Snake | <i>Hoplocephalus stephensii</i> |
| Peninsular Tiger Snake | <i>Notechis ater niger</i> (Kangaroo Island) |
| Western Tiger Snake | <i>Notechis ater occidentalis</i> |
| Eastern Tiger snake | <i>Notechis scutatus</i> |
| Inland Taipan | <i>Oxyuranus microlepidotus</i> |
| Coastal Taipan | <i>Oxyuranus scutellatus scutellatus</i> |
| King Brown Snake | <i>Pseudechis australis</i> |
| Collett's Snake | <i>Pseudechis colletti</i> |
| Spotted Black Snake | <i>Pseudechis guttatus</i> |
| Red-bellied Black Snake | <i>Pseudechis porphyriacus</i> |
| Dugite | <i>Pseudonaja affinis</i> |
| Peninsula Brown Snake | <i>Pseudonaja inframacula</i> |
| Western Brown Snake | <i>Pseudonaja nuchalis</i> |
| Common Brown Snake | <i>Pseudonaja textilis</i> |
| Rough-scaled Snake | <i>Tropidechis carinatus</i> |

Venom Supplies is initially applying for approval of the species listed in Appendix 1 of this proposal. If additional species need to be added to the list then Venom Supplies will submit a written request to Wildlife Trade Assessments requesting that the species is added to the list of approved species and await approval prior to exporting.

Species status under state legislation

All species listed are protected under the relevant state legislation. The status of the population of each species is taken into account by the respective state or territory government before approval to collect specimens is granted.

Most snakes are sourced from South Australia. The other parts of Australia where snakes have been sourced are Victoria and Queensland. Venom Supplies currently has approved collection permits for both South Australia and Queensland which are both subject to monitoring and reporting procedures. It is possible that snakes from other states may be required from time to time. It is impossible to predict this in advance.

The keeping and movement of native snake species in South Australia is regulated, monitored and enforced by the Department of Environment, Water and Natural Resources (DEWNR), SA. Permits are required for the keeping and movement of animals and regular reports are submitted to the department. The department also issues Licences for animals used in research and teaching.

2. General Goal/Aims

The aims and goals of making biological material available are for medical research purposes. Snake blood contains natural inhibitors to snake venom components and are being researched in various parts of the world. Venom glands and livers are used to investigate venom production at a genetic level and to develop gene libraries which may eventually replace the requirement for live animal use.

Development of a product using gene libraries with the University of São Paulo in Brazil is ongoing. Venom Supplies is also involved with various projects, using snake tissue, currently being undertaken at the University of Singapore.

Below is a selected list of published work relating to these aims:

Thurn, M.J., Broady, K.W. and Mirtschin, P.J. (1993). Neutralisation of tiger snake (*Notechis scutatus*) venom by serum from other Australian elapids. *Toxicon* 31(7): 909-912.

Flachsenberger, W., Leigh, C.M., Mirtschin, P.J. (1995). Sphero-echinocytosis of the human red blood cells caused by snake, red-back spider, bee and blue-ringed octopus venoms and its inhibition by snake sera. *Toxicon* 33(6): 791-797.

Butler, T.L., Jacobsen, P.F., Mirtschin, P.J., Kakulas, B.A. (1998). An In Vitro study of the effects of venom of Australian elapids on murine skeletal muscle and the protective effect of homologous plasma. *J. Venom. Anim. Toxins*. 4(1): 36-50.

- Smith, A., Marshall, L.R., Mirtschin, P.J., Jelinek, G.A. (2000). Neutralisation of the clotting activity of Australian snake venoms by snake plasma. *Toxicon* 38 1855-1858.
- Shifali Tiwari Chatrath, Alex Chapeaurouge, Qingsong Lin, Teck Kwang Lim, Nathan Dunstan, Peter Mirtschin, Prakash P. Kumar, and R. Manjunatha Kini. (2011) Identification of Novel Proteins from the Venom of a Cryptic Snake *Drysdalia coronoides* by a Combined Transcriptomics and Proteomics Approach, *Journal of Proteome Research* 02/2011; 10(2):739-50
- Timothy N. W. Jackson, Kartik Sunagar, Eivind A. B. Undheim, Ivan Koludarov, Angelo H. C. Chan, Kate Sanders, Syed A. Ali, Iwan Hendrikx, Nathan Dunstan and Bryan G. Fry (2013) Venom Down Under: Dynamic Evolution of Australian Elapid Snake Toxins, *Toxins* 2013, 5, 2621-2655

3.1 Wild Harvest Details

Description of what is being harvested

Live snakes are collected opportunistically in small numbers, generally by licenced wildlife professionals attending to nuisance snake requests from the public. Whilst Venom Supplies has permits in South Australia and Queensland to collect snakes used for venom extraction, the number of wild harvested snakes rarely exceeds 20 individual snakes from across the list of approved species. This permit provides for potential venom requirements and maintenance of genetic vigour of the captive colony. A few individuals are euthanased and used for blood extraction and harvest of body parts. Sloughed skins from various species are also required from time to time.

The snakes will be/have been opportunistically collected under state legislation controls which regulate the collecting of native species. Whilst the details of collecting requirements in each state vary slightly, they all generally require a permit to collect and an additional permit to export the snakes from the source state and a permit to import the snakes into South Australia. Details of these permits are usually available on the respective state website. All the requirements and methods used have to be approved by the respective state authority. In each case it is simply a matter of catching the snakes when opportunities arise. Collection is by hand and in most cases the snakes are collected when they are interacting with the public and are removed to reduce the risk of snake bite to the public.

Location of harvest

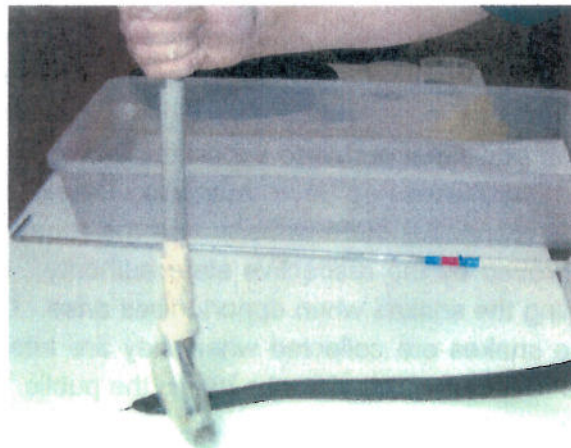
These species are harvested in small numbers from private lands in South Australia and Queensland (other states may be included in the future) within their normal ranges in accordance with restrictions listed in the approvals from the respective state authorities. The ranges of each species can be obtained from the books Cogger, H.G. (2014), *Reptiles and Amphibians of Australia* VII edition CSIRO PUBLISHING, Melbourne and Wilson, S. and Swan, G. (2013) *A complete guide to Reptiles of Australia* IV Edition. Reed New Holland, Sydney.

Areas collected: Snakes are collected within their normal range in accordance with state controls. In all cases these areas are outside national and conservation parks. The respective ranges can be found in Cogger, H.G. (2014), *Reptiles and Amphibians of Australia* VII edition CSIRO PUBLISHING, Melbourne and Wilson, S. and Swan, G. (2013) *A complete guide to Reptiles of Australia* IV Edition. Reed New Holland, Sydney.

Land Ownership: Snakes are collected from privately owned land across South Australia and Queensland (and other states if required). Approval from the land owner is gained prior to collection as per State approval requirements.

Quantities harvested: In each case the number of snakes harvested is low and in accordance with state permit numbers. Snakes are collected on an opportunistic basis and in most cases when interacting with the public to remove snake hazard. Our South Australian permit allows the wild harvest of 10 individuals per species per year, except for *Pseudonaja textilis* and *Notechis scutatus*, where generally no more than 20 individuals of each species are taken each year. In most cases these limits are not reached and in fact in many instances none are collected. Again, these snakes are collected for venom extraction, and some are used for blood extraction and body parts.

Harvest Methods: Snakes are caught by hand using a snake jigger, a soft padded device attached to a handle used to safely pin the snake without harming it (see picture).



Jigger is used to gently restrain snakes

Harvest Time: Snakes are generally harvested during their active period which is mostly from September to April each year.

3.2 General Operations (including breeding)

General husbandry:

Venom Supplies currently has 4 buildings and a number of secure outside enclosures (appendix 2) to maintain its collection of snakes and rodents (used as a food source). The facilities have 24 hour monitored security and fire systems. Venom Supplies is a recognised Department of Agriculture Quarantine Approved Facility and is subject to regular inspections from the Department of Agriculture to maintain this status.

The majority of snakes at Venom Supplies are housed individually with the exception of snakes together for breeding purposes or those housed in the outdoor enclosures. Snakes (other than those in the outdoor enclosures) are housed in either a plastic 'tub' style enclosure or a fixed, wooden enclosure. All snakes are given a unique ID code and husbandry records are collected and recorded for all individuals during their lifetime. Breeding of snakes is performed on an as needed basis, generally in response to a direct service related requirement but also to maintain overall collection vigor and reduce the necessity of wild harvesting.

4. Impact of Wild Harvest on Ecosystems

The impact of collecting on the ecosystem is immeasurably low and the likely impact of the collecting on species abundance is negligible. In general terms the relative impact of collecting animals for any purpose compared with other environmental impacts such as habitat loss and feral animals can be realised by reading an assessment by Professor Hal Cogger regarding land clearing in Queensland (Cogger et al, 2003). The report stated that an estimated 89 million reptiles are being killed annually in Queensland by land clearing. Earlier, hugely conservative, estimates in Ehmann and Cogger (1985), Australia's endangered herpetofauna: a review of criteria and policies, reflect the true perspective of collecting compared with other classes of mortality:

| | | |
|--------------------------------|---------------|---------|
| <u>Natural mortality</u> | 3,840 million | 99.77% |
| <u>Human induced mortality</u> | | |
| Road kills | 5.48 million | 0.14% |
| Land clearing | 3.26 million | 0.08% |
| Research collecting | 0.02 million | 0.0005% |
| Skins and amateur collecting | <0.02 million | 0.0005% |

5. Monitoring & Assessment (in relation to the wild harvest)

The environmental impact of the proposed activity of collecting snakes is believed to be miniscule. Monitoring is applied at both state and federal levels by state wildlife agencies through returns submitted by us, and Wildlife Trade are informed through Specimen Export Record form lodgement. No population studies have been carried out on these species in the areas from which they are likely to come, nor is any analysis possible.

5.1 Resource assessment (in relation to the wild harvest)

No population studies have been conducted for these species in areas from which they are likely to be taken. See above. Ecological studies of reptiles tend to be

conducted in reserves. These specimens will all come/have come from private property.

6. Effective Management Strategies (in relation to wild harvest)

Population changes are hardly detectable when working with such small numbers over brief periods and would be indistinguishable from the effects of season and meteorological conditions on observable abundance.

The effectiveness of our management in the laboratory of the snakes we collect and hold is reflected in returns submitted to state wildlife authorities and AEC. Our standards are maintained at a superior level. Monitoring and feedback may result following review by these bodies of submitted returns.

7. Compliance

As noted under Section 1 Species status under state legislation, the species are protected under state legislation. The keeping and movement of native snakes in South Australia is regulated by DEWNR. Venom Supplies provides reports to DEWNR.

Compliance with permit conditions for the collection of snakes from the wild is monitored by state government agencies, particularly DEWNR in South Australia. This is to ensure that only legally obtained specimens are used in commercial trade.

8. Reports

Wildlife Trade is informed about exports through the lodgement of Specimen Export Record forms, which are provided for every consignment exported. Venom Supplies will further provide the information already being supplied to the South Australian and other state authorities if required by Wildlife Trade.

9. Background information

Biological and ecological information on most Australian snake species is poorly known.

Professor Rick Shine from the University of Sydney is the best known in this area and an overview of biology and ecology of the Australian species involved can be found in Shine (1991), *Australian Snakes: A Natural History*.

Allen Greer authored a work which summarises a vast body of knowledge of the biology of Australian snakes in Greer, A.E. 1997. *The Biology and Evolution of Australian Snakes* Surrey Beatty and Sons, Chipping Norton.

For taxonomic summaries see Cogger, H.G. (2014), *Reptiles and Amphibians of Australia* VII edition CSIRO PUBLISHING, Melbourne and Wilson, S. and Swan, G. (2013) *A Complete Guide to Reptiles of Australia* IV Edition. Reed New Holland, Sydney.

References

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- Cogger, H.G., Ford, H., Johnson, C., Holman, J. and Butler, D. (2003). *Impact of Land Clearing on Australian Wildlife in Queensland*. WWF Australia Report.
- Ehmann, H. and Cogger, H. (1985) Australia's endangered herpetofauna: a review of criteria and policies. *Biology of Australasian Frogs and Reptiles* (eds G. Grigg, R. Shine & H. Ehmann), pp. 435-447. Royal Zoological Society of New South Wales, Sydney, Australia.
- Greer, A.E. 1997. *The Biology and evolution of Australian Snakes*, Surrey Beatty and Sons, Chipping Norton.
- Shine, R. (1991). *Australian Snakes: A Natural History*, Reed Books, Sydney.
- Wilson, S. and Swan, G. (2013) *A Complete Guide to Reptiles of Australia* IV Edition. Reed New Holland, Sydney.

Appendix 1

| Common Name | Scientific Name |
|------------------------------|------------------------------------|
| Common Death Adder | <i>Acanthophis antarcticus</i> |
| Northern Death Adder | <i>Acanthophis praelongus</i> |
| Desert Death Adder | <i>Acanthophis pyrrhus</i> |
| Lowlands Copperhead | <i>Austrelaps superbus</i> |
| Pygmy Copperhead | <i>Austrelaps labialis</i> |
| Brown Tree Snake | <i>Boiga irregularis</i> |
| | <i>Cacophis churchilli</i> |
| White - Crowned Snake | <i>Cacophis harriettae</i> |
| Dwarf Crowned Snake | <i>Cacophis krefftii</i> |
| Golden Crowned Snake | <i>Cacophis squamulosus</i> |
| Papuan Whip Snake | <i>Demansia papuensis</i> |
| Yellow faced Whip Snake | <i>Demansia psammophis</i> |
| Desert Whip Snake | <i>Demansia reticulata</i> |
| Collared Whip Snake | <i>Demansia torquata</i> |
| Black Whip Snake | <i>Demansia vestigiata</i> |
| De Vi's Banded Snake | <i>Denisonia devisi</i> |
| White Lipped Snake | <i>Drysdalia coronoides</i> |
| Masters Snake | <i>Drysdalia masteri</i> |
| Bardick | <i>Echiopsis curta</i> |
| Yellow - Naped Snake | <i>Furina barnardi</i> |
| Red- Naped Snake | <i>Furina diadema</i> |
| Orange -Naped Snake | <i>Furina ornata</i> |
| Brown Headed Snake | <i>Furina tristis</i> |
| Grey Snake | <i>Hemiaspis damelii</i> |
| Black Bellied Swamp Snake | <i>Hemiaspis signata</i> |
| Pale Headed Snake | <i>Hoplocephalus bitorquatus</i> |
| Stephens banded snake | <i>Hoplocephalus stephensii</i> |
| Peninsular Island Snake | <i>Notechis ater niger</i> |
| Western Tiger Snake | <i>Notechis ater occidentalis</i> |
| Eastern Tiger snake | <i>Notechis scutatus</i> |
| Inland Taipan | <i>Oxyuranus microlepidotus</i> |
| Coastal Taipan | <i>Oxyuranus scutellatus</i> |
| Papuan Taipan | <i>Oxyuranus scutellatus canni</i> |
| Little Whip Snake | <i>Parasuta flagellum</i> |
| Monk (hooded) Snake | <i>Parasuta monachus</i> |
| Mitchells Short Tailed Snake | <i>Parasuta nigriceps</i> |
| Mallee Black - headed Snake | |
| | <i>Parasuta spectabilis</i> |
| King Brown snake/ Mulga | <i>Pseudechis australis</i> |
| Collett's Snake | <i>Pseudechis colletti</i> |
| Spotted Black Snake | <i>Pseudechis guttatus</i> |
| Papuan Black Snake | <i>Pseudechis papuanus</i> |
| Red Bellied Black Snake | |
| | <i>Pseudechis porphyriacus</i> |
| Dugite | <i>Pseudonaja affinis</i> |
| Western Brown Snake | <i>Pseudonaja aspidorhyncha</i> |
| Speckled Brown Snake | <i>Pseudonaja guttata</i> |
| Peninsula Brown Snake | <i>Pseudonaja inframacula</i> |
| Ingram's Brown Snake | <i>Pseudonaja ingrami</i> |
| Western Brown Snake | <i>Pseudonaja mengdeni</i> |

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|-----------------------------|----------------------------------|
| Ringed Brown Snake | <i>Pseudonaja modesta</i> |
| Western Brown snake | <i>Pseudonaja nuchalis</i> |
| Common/ Eastern Brown Snake | <i>Pseudonaja textilis</i> |
| Carpentaria Whip Snake | <i>Rhinoplocephalus boschmai</i> |
| | <i>Rhinoplocephalus</i> |
| Small Eyed Snake | <i>nigrescens</i> |
| | <i>Rhinoplocephalus</i> |
| Black Striped Snake | <i>nigrostriatus</i> |
| Coral Snake | <i>Simoselaps australis</i> |
| Narrow Banded Snake | <i>Simoselaps fasciolatus</i> |
| | <i>Simoselaps incinctus</i> |
| Half Girdled Snake | <i>Simoselaps semifasciatus</i> |
| | <i>Suta dwyeri</i> |
| Little Spotted Snake | <i>Suta punctata</i> |
| Myall Snake | <i>Suta suta</i> |
| Rough scaled Snake | <i>Tropidechis carinatus</i> |
| Bandy Bandy | <i>Vermicella annulata</i> |

Appendix 2

