



Department of
Environment and Conservation

Our environment, our future



Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2010.

NOTICE: Incomplete forms may result in delays in assessment, or rejection of the nomination. To fill out this form you must refer to the Guidelines and contact the relevant Officer in the DEC Species and Communities Branch. DEC staff can advise you on how to fill out the form and may be able to supply additional, unpublished information.

Answer all relevant sections, filling in the white boxes and indicating when there is no information available. **Note**, this application form applies to both flora and fauna species, and hence some questions or options may not be applicable to the nominated species – for these questions, type “N/A”.

To mark boxes with a **cross**, double click the box and select not checked or checked.

SECTION 1. NOMINATION				
1.1. Nomination for:				
Flora <input type="checkbox"/>	Fauna <input type="checkbox"/>	Threatened / DRF <input type="checkbox"/>	Change of category <input type="checkbox"/>	Delisting <input type="checkbox"/>
1.2. Scientific Name				
This name will be used to identify the species on all official documentation. Use the approved name used by the Western Australian Museum or Herbarium. If this is not possible, use unpublished names or numbers of voucher specimens.				
<i>Idiosoma nigrum</i>				
1.3. Common Name				
If the species has a generally accepted common name, please show it here. This name will be used on all official documentation.				
Shield-back Trapdoor Spider				
1.4. Current Conservation Status. If none, type ‘None’.				
	IUCN Red List Category e.g. Vulnerable	IUCN Red List Criteria e.g. B1ab(iv);D(1)		
International IUCN Red List				
National EPBC Act 1999				
State of Western Australia	Vulnerable	A2		
State of WA Priority	1 <input checked="" type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
Is the species listed as ‘Threatened’ in any other Australian State or Territory? If Yes, list these States and/or Territories and the status for each.				

No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>				
Does the species have specific protection (e.g. listed on an annex or appendix) under any other legislation, inter-governmental or international arrangements e.g. CITES? If Yes, please provide details.				
No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>				
1.5. Nominated Conservation Status.				
	IUCN Red List Category e.g. Vulnerable			IUCN Red List Criteria e.g. B1ab(iv);D(1)
State of Western Australia	Vulnerable			B2ab
State of WA Priority	1 <input checked="" type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/> 5 <input type="checkbox"/>
1.6. Reasons for the Nomination.				
Briefly summarise the reasons for the nomination in dot points. Please include details relevant to the IUCN Categories and Criteria where appropriate.				
<p>AOO is defined as the area within a species distribution range which is occupied by a taxon, excluding cases of vagrancy. This reflects the fact that a species will not occur throughout its distribution range but be limited due to unsuitable or unoccupied habitat. In evaluating the AOO a uniform grid is projected on to a map covering the entire species distribution, the number of occupied grids counted and then input in to the equation below to determine the AOO.</p> <p>AOO = no. occupied cells x area of an individual cell</p> <p>The IUCN has determined that an appropriate scale of a cell is 2km x 2km, resulting in an area of 4km² for an individual cell. Therefore for a species to be classified as vulnerable there would need to be less than 500 occupied cells, but more than 125 (which is the line between a species being listed as vulnerable or endangered).</p> <p>Each of the major populations were treated individually (Karara, Weld Range, Jack Hills, Dalgaranga and Lakeside) and all other records were input as an individual grid for each record. This approach is quick but has a number of inaccuracies which are likely to present an AOO higher than the true known situation.</p> <p>Results</p> <p>The table below outlines the results of the grid mapping exercise.</p>				
Location	Number of Grids	Local AOO (Grids x 4 km²)		
Lakeside	4 (as per Figure 1)	16		
Dalgaranga	5	20		
Karara	7	28		
Jack Hills	~25	~100		
Weld Range	~44	~176		
Remaining records	~160	~640		
Total	~245	~980 km²		

SECTION 2. SPECIES

2.1. Taxonomy.

Describe the taxonomic history, using references, and describe the key distinguishing features that can be used to separate this taxon from closely related taxa. Include details of the type specimen, changes in taxonomy, scientific names and common names used for the species.

Idiosoma nigrum was first described by Main in 1952 (Main 1952). The key distinguishing feature is the distinctive thick and hard cuticle on the abdomen. The end of the abdomen is flattened into a shield and the sides are deeply corrugated. The closest relatives to this species are *Idiosoma sigillatum* (O.P.-Cambridge 1870) and *Idiosoma hirsutum* Main 1952, which both lack the hardened shield on the abdomen.

Is this species conventionally accepted? If no, explain why. For example, is there any controversy about the taxonomy? For undescribed species, detail the location of voucher specimens (these should be numbered and held in a recognised institution and be available for reference purposes).

No Yes

There is currently some discussion about whether the species found in the rangelands of the Midwest region is the same as that found in the Wheatbelt and the coastal regions of the Midwest. There appears to be some taxonomic differences in the male morphology (V. Framenau pers comm.) and these are currently being investigated.

Describe any known hybridisation with other species in the wild, indicating where this occurs and how frequently.

2.2. Description

Describe the physical appearance, habit, behaviour/dispersion and life history. Include anatomy or habit (e.g. size and/or weight, sex and age variation, social structure) and dispersion (e.g. solitary, clumped or flocks etc), and life history (eg short lived, long lived, geophytic, etc).

Idiosoma nigrum is a dark brown to black, large (females up to 30mm in body length) spider with a distinctive thick and hard cuticle on the abdomen. The end of the abdomen is flattened into a shield and the sides are deeply corrugated. The burrows always have a lightweight, leaf litter and silk door, with leaf and twig trip-lines fanning out from the centre of the front of the burrow rim (DEWHA 2009).

Spiderlings generally construct their burrows within a very short distance (several centimetres) of the matriarch female, forming a family cluster that is typical of mygalomorph spiders that do not have aerial dispersal.

Gene flow is maintained through the dispersal of mature males in search of females for mating, ($\leq 500\text{m}$; B. Main, unpublished data), the only time males leave their burrows. Females spend their entire life in the one burrow or within its proximity.

Both males and females reach maturity after approximately 5-6 years. Males die shortly after reaching sexual maturity and mating, whereas females may live as long as 20 years, reproducing several times.

2.3. Distribution

Describe the distribution of the species in Australia and, if possible, provide a map.

The species, as it is currently accepted, is found from the central and northern Wheatbelt and north through the coastal region of the Midwest to Zuytdorp and Nanga Stations near Shark Bay (Main *et al* 2000). Most recently however significant populations have been recorded in the arid parts of the Midwest region, associated with large, isolated ranges, most notably Weld Range and Jack Hills.

<p>2.4. Habitat Describe the non-biological habitat (e.g. aspect, topography, substrate, climate) and biological habitat (e.g. forest type, associated species, sympatric species). If the species occurs in various habitats (e.g. for different activities such as breeding, feeding, roosting, dispersing, basking etc) then describe each habitat.</p>
<p>Non-biological habitat</p> <p>The Wheatbelt populations typically inhabit clay soils whereas the arid Midwest populations are associated with rocky habitats, primarily in positions with increased moisture retention properties like gullies and drainage lines on southern facing slopes. It also appears that the Wheatbelt and coastal Midwest populations are within areas with more consistent annual rainfall than those in the arid Midwest, which is likely why the populations in these areas are primarily found in sheltered habitats.</p>
<p>Biological habitat</p> <p>In the Wheatbelt Eucalypt woodlands and Acacia vegetation are primary habitats while only the latter is associated with the species in the arid Midwest. Leaf litter and twigs are extremely important to the species as it provides material for the burrows, reduced soil moisture loss and increased prey availability.</p>
<p>Does the (fauna) species use refuge habitat e.g. in times of fire, drought or flood? Describe this habitat.</p>
<p>No</p>
<p>Is the species part of, or does it rely on, a listed threatened ecological community? Is it associated with any other listed threatened species?</p>
<p>No</p>
<p>2.5. Reproduction Provide an overview of the breeding system. For <u>fauna</u>: Provide an overview of the breeding system and breeding success, including: when does it breed; what conditions are needed for breeding; are there any breeding behaviours that may make it vulnerable to a threatening process? For <u>flora</u>: When does the species flower and set fruit? Is the seed produced viable? What conditions are needed for this? What is the pollinating mechanism? If the species is capable of vegetative reproduction, a description of how this occurs, the conditions needed and when. Does the species require a disturbance regime (e.g. fire, ground disturbance) in order to reproduce?</p>
<p>It is believed that males mature and mate after the first significant rains of the year, dispersing up to 500m (Main unpub. data). There is some evidence that females may store sperm (Main unpub. data) but whether this means that males only mate with virgin females or whether adult females mate repeatedly during their life is unclear. It is also unknown whether males mate within their matriarchal unit and whether they mate with more than one female.</p> <p>The very low dispersal capabilities of the males mean that fragmentation and isolation are likely to be playing a major role in the declining populations in the Wheatbelt. This may be alleviated in the short term if females do store sperm but eventually the loss of external males, particularly with very small populations, will likely result in no breeding and reproducing taking place eventually.</p>

<p>2.6. Population dynamics Provide details on ages of sexual maturity, extent of breeding success, life expectancy and natural mortality. Describe population structure (presence of juveniles/seedlings, mature and senescing individuals).</p>
<p>Both males and females reach maturity after approximately 5-6 years. Males die shortly after reaching sexual maturity and mating, whereas females may live as long as 20 years, reproducing several times.</p> <p>Spiderlings generally construct their burrows within a very short distance (several centimetres) of the matriarch female, forming a family cluster that is typical of mygalomorph spiders that do not have aerial dispersal.</p> <p>Only 37% of emergents (< 1 year old) survive to become juveniles (1-5 or 6 years old) and only 22% of these juveniles survive to adulthood (Main 2003).</p>
<p>Questions 2.7 and 2.8 apply to <u>fauna</u> nominations only</p>
<p>2.7. Feeding Summarise food items or sources and timing/availability.</p>
<p>This species is an opportunistic feeder, although ants feature as a major component.</p>
<p>Briefly describe feeding behaviours, including those that may make the species vulnerable to threatening processes.</p>
<p>The species relies on the twigs and leaves they have attached to the rim of their burrow for the detection of prey within the vicinity of their burrow.</p> <p>This reliance on leaf litter and the activity of their prey (the use of a passive prey capture technique) means that leaf litter loss through inappropriate fire regimes and management may impact significantly on the ability to feed.</p>
<p>2.8. Movements Describe any relevant daily or seasonal pattern of movement for the species, including relevant arrival/departure dates if migratory. Provide details of home range/territories.</p>
<p>The males travel up to a few hundred metres to mate, whereas the females spend their life within the immediate vicinity of their burrow and emergents disperse only a few metres (Main unpub data).</p>
<p>SECTION 3. INTERNATIONAL CONTEXT</p>
<p>For species that are distributed both in <u>Australia</u> and in <u>other countries</u>.</p>
<p>3.1. Distribution Describe the global distribution.</p>
<p>Endemic to Western Australia</p>
<p>Provide an overview of the global population size, trends, threats and security of the species outside of Australia.</p>
<p>N/A</p>
<p>Explain the relationship between the Australian population and the global population. What percentage of the global population occurs in Australia? Is the Australian population distinct, geographically separate or does part, or all, of the population move in/out of Australia's jurisdiction? Do global threats affect the Australian population?</p>
<p>N/A</p>

SECTION 4. CONSERVATION STATUS AND MANAGEMENT					
4.1. Population					
What is the total population size in terms of number of mature individuals? Has there been any known reduction in the size of the population, or is this likely in the future? – provide details. Are there other useful measures of population size and what are they? Or if these are unavailable, provide an estimate of abundance (e.g. scarce, locally abundant etc).					
<p>There are currently around 6100 burrows databased. The overwhelming majority (around 5400) of these are from Midwest ranges and were recorded as part of the Environmental Impact Assessment process. It should also be noted that nearly all of these records were based purely on the presence of the burrow and not on someone actually viewing the animal, therefore some of these records would be inactive burrows and many would be juvenile burrows. Also many of the Wheatbelt records, outside of the main populations at Minnivale and East Yorkrakine, were recorded decades ago and many of these are likely to be extinct.</p> <p>Total population reduction has not been investigated but data from a study in East Yorkrakine Reserve from 1989 to 1999 showed a 95% reduction in the population (Main 2003). Future reduction is certain as the threatening pressures continue in the Wheatbelt and the populations at Karara, Weld Range and Jack Hills undergo mining for iron ore.</p>					
Provide locations of: captive/propagated occurrences or <i>ex situ</i> collections; recent re-introductions to the wild; and sites for proposed re-introductions. Have these sites been identified in recovery plans?					
N/A					
How many locations do you consider the species occurs in and why? Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.					
<p>There are 7 locations that appear to have confirmed populations larger than 30 individuals. Given the burrow clustering that occurs with this species it is usually easy to find reasonable numbers once they have been detected so the locations that have few records are likely to be highly disturbed, declining populations. However this shouldn't be taken to mean that the remaining 7 populations are not in decline or not severely disturbed or under threat.</p>					
For <u>flora</u>, and where applicable, for <u>fauna</u>, detail the location, land tenure, estimated number of individuals, area of occupancy, and condition of site for each known date, location or occurrence.					
Date of survey	Location	Land status	Number of individuals at location	Area of occupancy at location	Condition of site
1987 onwards	East Yorkrakine	Nature Reserve	~135 burrows	~4km ²	Heavily fragmented
2007-2009	Karara	Mining Lease	~301 burrows	~28km ²	Active mining and exproation
2007-2009	Weld Range	Mining Lease	~3058 burrows	~176km ²	Heavily grazed: active mining and exproation
2007-2009	Jack Hills	Mining Lease	~2390 burrows	~100km ²	Active mining and exproation

2008	Minnivale	Nature Reserve	~331 burrows	~4km ²	Heavily fragmented
2010	Dalgaranga	DEC Pastoral Station	~55 burrows	~28km ²	
2010	Lakeside	DEC Pastoral Station	~30 burrows	~20km ²	

Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals.

The number of individuals is based on the number of burrows that appear to be active.

Has there been any known reduction in the number of locations, or is this likely in the future? – provide details.

The Minnivale and East Yorkrakine populations (the only known significant populations in the Wheatbelt) are likely to continue declining because of secondary salinity.

What is the extent of occurrence (in km²) for the species; explain how it was calculated and datasets used. If an accurate estimate is unavailable, provide a range of values or a minimum or maximum area estimate. Include estimates of past, current and possible future extent of occurrence. If available, include data that indicates the percentage decline over 10 years or 3 generations (whichever is longer) that has occurred or is predicted to occur.

The extent of occurrence of the recorded populations since 1952 is approximately 21,000km². This is based on using a 32 x 32 km grid on a map of the species occurrences. It is highly likely that the species occurs throughout much of the Midwest region, again associated with large ranges with deep gullies and possibly with breakaways.

Is the distribution of the species severely fragmented? Why?

Yes. In the arid Midwest the populations are all isolated because of their persistence only on ranges, a natural, historically based fragmentation based on aridity. The Wheatbelt and coastal Midwest populations are all severely fragmented because of land clearing.

Identify important occurrences necessary for the long-term survival and recovery of the species? This may include: key breeding populations, those near the edge of the range of the species or those needed to maintain genetic diversity.

The populations in the arid Midwest are important because they contain the most arid-adapted elements of the species and are at the northern limit of their range. There are only two confirmed significant populations in the Wheatbelt, East Yorkrakine and Minnivale. These two populations are extremely important for maintaining the southern genetic component of this species. If it is shown that *Idiosoma nigrum* is polyphyletic (a southern and northern species) then these Wheatbelt populations become even more important.

4.2. Survey effort

Describe the methods to conduct surveys. For example, (e.g. season, time of day, weather conditions); length, intensity and pattern of search effort (including where species not encountered); any limitations and expert requirements.

Searching for burrows is the most common and most effective way of surveying for the species, generally during the wetter parts of the year. The burrow is quite distinctive but can be easily mistaken for other twig-lining species, even by people who have a bit of experience. Searching within and on the edges of leaf litter in suitable habitats is the most effective approach.

Pit traps placed around vegetation in suitable habitats during autumn can be used to catch wandering males.

Provide details on the distinctiveness and detectability of the species, or the distinctiveness of its habitat, that would assist survey success.

The burrow has two tufts of leaf litter radiating out from the centre of the burrow rim, similar to a moustache. The atrium of the burrow is cup shaped and narrows to the main shaft of the burrow. It is this characteristic that is often missed or misinterpreted by surveyors.

Has the species been reasonably well surveyed? Provide an overview of surveys to date (include surveys of known occurrences and surveys for additional occurrences) and the likelihood of its current known distribution and/or population size being its actual distribution and/or population size. Include comments on potential habitat and surveys that were conducted, but where the species was not present/found.

Survey work has been carried out at Minnivale and East Yorkrakine Nature Reserves, Karara, Weld Range and Jack Hills mining leases and more recently on likely conservation areas and DEC managed lands through the northern Wheatbelt and the southern/central Midwest. This latter survey work is the only one aimed at finding new populations in conservation areas. This survey found many areas in the northern Wheatbelt and southern Midwest where the species does not occur (and found many occurrences that had been attributed to this species were actually a different species). This work showed that there are unlikely to be any populations in the interior of the Wheatbelt and Midwest until you reach the large BIF ranges of the Midwest to the north and the higher rainfall of the central Wheatbelt to the south.

This work also showed that there is a likelihood that the species occurs throughout more of the Midwest region than currently known, with up to 60 sites identified as possibilities. However more than half of these occur east of the current known eastern extent, and a number of mining tenements in these areas have not found the species despite significant survey work, and at least half a dozen occur further north than the northern known extent. There are about 20 sites that have a high potential for harbouring significant populations of this species.

4.3. Threats

Identify past, current and future threats indicating whether they are actual or potential. For each threat describe:

- a). how and where they impact this species
- b). what the effect of the threat(s) has been so far (indicate whether it is known or suspected
- c). present supporting information/research
- d). does it only affect certain populations?
- e). what is its expected effect in the future (is there supporting research/information; is the threat only suspected; does it only affect certain populations?).

Secondary salinisation: The widespread clearing of the Wheatbelt has resulted in the water table rising and an increase in salinisation close to the surface. This results in vegetation changes that directly affect *Idiosoma nigrum* because of its reliance on the vegetation and associated leaf litter for habitat. This threat has affected the Wheatbelt populations in the past and will continue to do so until secondary salinisation is managed/controlled.

Grazing: Grazing by stock and feral animals has and continues to affect both the Wheatbelt and Midwest populations largely through the disturbance of leaf litter, vegetation and soil. Work in the Midwest has shown that areas where grazing occurs have fewer emergents and juveniles (Ecologia Environmental unpub. data). Unless controlled this will continue to negatively affect populations.

Land clearing/Fragmentation: The clearing of habitat has resulted in the severe fragmentation of populations in the Wheatbelt. The populations at Karara, Weld Range and Jack Hills will all be negatively affected by land clearing because of the mining operations, which will fragment these significant populations. The long term affects of this fragmentation is unknown.

Dust Pollution: Dust can directly affect vegetation and, in turn, the invertebrate assemblages that rely on that vegetation. This may have occurred at either of the three mining operations during the exploration phases and will continue to be a threat unless strictly controlled.

Vibration: Vibrations associated with vehicles and exploration drilling have the potential to affect nearby populations. Recent work at Jack Hills and Weld Range has shown a possible reduction in emergents and juveniles within 50m of exploration drilling pads (Phoenix Environmental unpub. data). Exploration restrictions have been put in place at Weld Range and Jack Hills based on this research but the long term effects of vibrations are unknown.

Fire: Fire is far more of an issue in the Wheatbelt populations because the gullies of the Midwest ranges afford the species some level of protection. In the Wheatbelt however the combination of fragmentation and intense fire has a high potential to result in local extinctions, with little to no chance of recolonisation (Main 1995). Intense fires can not only remove burrow doors but also remove all the leaf litter, providing no material for reparation work and dramatically affecting the prey population.

Inappropriate reserve management: Aside from the obvious control of manmade disturbance and threats, the protection of reserves from natural disturbance is likely having a very serious impact on populations. Although *Idiosoma nigrum* requires leaf litter to survive, excessive, deep litter can restrict the establishment of emergent burrows, forcing them further away from vegetation and exposing them to the elements that likely decrease their chances of surviving to adulthood. Similarly deep litter reduces the chances of understorey vegetation growing, reducing the diversity of invertebrates and the health of the habitat and increases the chances of hot, intense fires going through a population.

If possible, provide information threats for each current occurrence/location:

Location	Past threats	Current threats	Potential threats	Management requirements (see section 4.4)

Minnivale N.R.	Secondary salinisation, land clearing/fragmentation and grazing	Secondary salinisation, land clearing/fragmentation and grazing	Fire, inappropriate reserve management	
East Yorkrakine N.R.	Secondary salinisation, land clearing/fragmentation and grazing	Secondary salinisation, land clearing/fragmentation and grazing	Fire, inappropriate reserve management	
Karara	Land clearing, fragmentation, grazing, dust, vibration	Land clearing, fragmentation, grazing, dust, vibration		
Weld Range	Land clearing, fragmentation, grazing, dust, vibration	Land clearing, fragmentation, grazing, dust, vibration		
Jack Hills	Land clearing, fragmentation, grazing, dust, vibration	Land clearing, fragmentation, grazing, dust, vibration		
Dalgaranga	Grazing	Grazing	Land clearing, fragmentation, grazing, dust, vibration	
Lakeside	Grazing	Grazing	Land clearing, fragmentation, grazing, dust, vibration	

Identify and explain why additional biological characteristics particular to the species are threatening to its survival (e.g. low genetic diversity). Identify and explain any models addressing the survival of the species.

4.4. Management
Identify key management documentation for the species e.g. recovery plans, conservation plans, threat abatement plans etc.

None

Does this species benefit from the management of another species or community? Explain.

No

How well is the species represented in conservation reserves or covenanted land? Which of these are actively managed for this species? Provide details.

The two main populations in the Wheatbelt are in Nature Reserves. Two of the Midwest populations are on ex-pastoral stations managed by DEC. The only active management of the species occurs on Weld Range and Jack Hills by the mining companies running those operations.

Are there any management or research recommendations that will assist in the conservation of the species? Provide details.

4.5. Other

Is there any additional information that is relevant to consideration of the conservation status of this species?

SECTION 5. NOMINATOR

Nominator(s) name(s)

Organisation(s)

Address(s)

Telephone number(s)

Email(s)

Date

If the nomination has been refereed or reviewed by experts, provide their names and contact details.

SECTION 6. REFERENCES

What references or sources did you use to prepare your nomination? Include written material, electronic sources and verbal information. Include full references, address of web pages and the names and contact details of authorities with whom you had verbal communications.

DEWHA. (2009) Species Bank: *Idiosoma nigrum* (Family Idiopidae). Accessed 22/01/2010.
<http://www.environment.gov.au/cgi-bin/species-bank/sbank-treatment.pl?id=66798>

Main, B.Y. (1952) Notes on the genus *Idiosoma*, a supposedly rare Western Australian trap-door spider. *The Western Australian Naturalist*. 3: 130-136.

Main, B.Y. (1995) Survival of trapdoor spiders during and after fire. *CALMScience Supplement*. 4: 201-216.

Main, B.Y. (2003) Demography of the Shield-Back Trapdoor Spider *Idiosoma nigrum* in remnant vegetation of the Western Australian Wheatbelt. *Records of the South Australian Museum*. Mono. Series. 7: 179-185.

Main, B.Y., Sampey, A. and West, P.J.L. (2000) Mygalomorph spiders of the southern Carnarvon Basin, Western Australia. *Records of the Western Australian Museum*. 61: 281-293.