

Populations of Main's Assassin Spider (*Austrarchaea mainae*) near Albany

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Female Main's Assassin Spider (*Austrarchaea mainae*). Image by M. Rix.



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EXECUTIVE SUMMARY

Main's Assassin Spider (listed as 'Threatened' under the *Western Australian Wildlife Conservation Act 1950*) was known from only two localities as of January 2008:

- Eclipse Island Road, Torndirrup National Park (first collected 1983);
- Albany Wind Farm (*Biota* rediscovery 2007).

After 14 days of survey work during March – May 2008, 40 specimens of Main's Assassin Spider were collected at 25 different sites between William Bay National Park and Gull Rock National Park, across a linear distance of 70 km.

Main's Assassin Spider favours peppermint (*Agonis*) coastal habitats where it inhabits shaded, long unburnt groves with an understorey of sedges (*Lepidosperma*), grasses and 'wiry' herbs (Restionaceae). Its microhabitat within these *Agonis* groves is the elevated leaf-litter layer which collects amongst the crowns of the understorey plants.

Within its known range, Main's Assassin Spider has very specific habitat requirements, and recognition of these habitats will be essential to minimising the disturbance caused by any future developments.

Assassin Spiders

The 'assassin spiders' (family Archaeidae) are a group of ancient and extremely unusual spiders known only from Madagascar, South Africa and mainland Australia. Assassin spiders are specialist predators on other spiders, and possess a remarkable 'pelican-like' morphology which is used to hunt and capture their spider prey. The family was first discovered and described in Europe from Baltic amber fossil specimens, before living representatives were subsequently found in the forests of Madagascar in the mid 19th century. Other fossil assassin spiders have been discovered in fossil strata of Jurassic age, some 150 million years old. Indeed, assassin spiders very similar to the modern species were probably present throughout the Mesozoic Era, having survived both the evolution and extinction of the dinosaurs.



Female Main's Assassin Spider (left) and the Albany Wind Farm (right). Images by M. Rix.

Main's Assassin Spider: a Threatened Species

Main's Assassin Spider (*Austrarchaea mainae*) was first discovered in 1983 at Torndirrup National Park, south of Albany, and was scientifically described in 1991 (see Platnick, 1991). At the time of its discovery and description it was the only species of assassin spider known from Western Australia, and the species was listed as 'Threatened' under the *Western Australian Wildlife Conservation Act 1950* (as the 'Western Archaeid Spider'). By 2007 no new populations or living representatives of Main's Assassin Spider had been discovered, although two new species of assassin spiders had been found in the Stirling Range National Park and in forests near Pemberton.

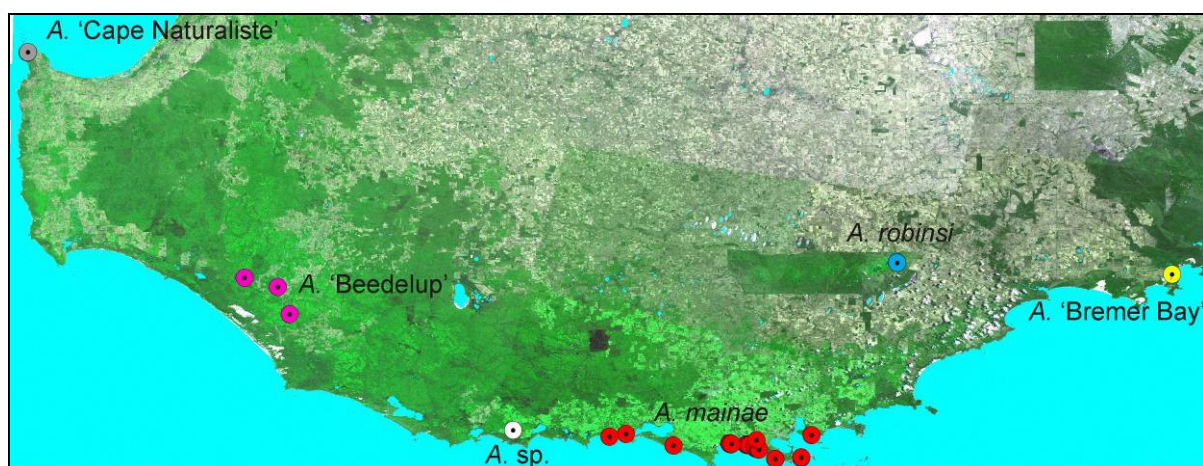
Main's Assassin Spider was rediscovered in late 2007 at the Albany Wind Farm during an environmental fauna survey conducted by *Biota Environmental Sciences* and funded by *Verve Energy*. The single specimen collected by *Biota* was sent to the Department of Terrestrial Zoology at the *Western Australian Museum* for identification, where it was confirmed as being Main's Assassin Spider.

Surveying for Main's Assassin Spider: March – May 2008

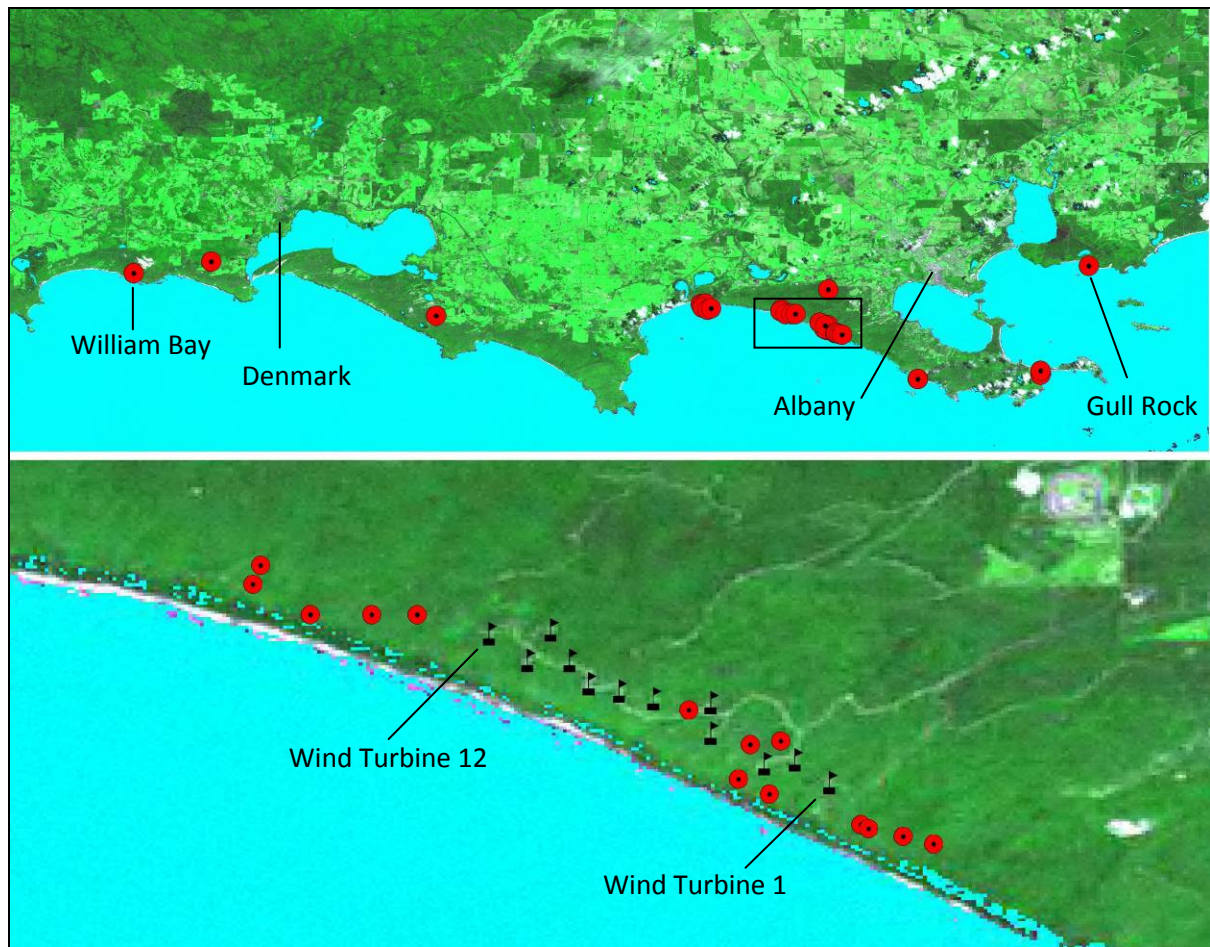
After the rediscovery of Main's Assassin Spider in 2007, the Department of Terrestrial Zoology at the *Western Australian Museum* was funded to survey the south-coast of Western Australia for new populations of Main's Assassin Spider. This survey work was conducted over 14 days between March and May 2008, and covered a focal area between William Bay National Park and Two Peoples Bay Nature Reserve. The results of this survey work are as follows:

- 40 specimens of Main's Assassin Spider were collected from 25 sites between William Bay National Park and Gull Rock National Park, across a linear distance of 70 km.
- Of the 25 sites where specimens were collected, four sites were within three separate National Parks (William Bay N.P., Torndirrup N.P., Gull Rock N.P.).
- Within Torndirrup National Park, specimens were not re-collected at the original (type) locality on Eclipse Island Road (due to a recent fire), but were collected from two new sites at the eastern end of the Torndirrup Peninsula (Isthmus Hill, Salmon Hole Road).
- Specimens were collected at three sites within the Albany Wind Farm, near Turbines 2, 3 and 5, but were not located between Turbines 12 and 6.
- A large number of specimens (22) were collected from 16 sites on reserve land west, east and north of the Albany Wind Farm.
- Several specimens were also collected from reserve land near Denmark and roadside land north-west of West Cape Howe National Park.

In addition to the populations mentioned, a new population of assassin spiders (which may or may not be conspecific with *A. mainae*) was discovered at Walpole-Nornalup National Park, and a possible new species of assassin spider was discovered during surveys conducted south of Bremer Bay.



Map showing the known distribution of the five species of Archaeidae recorded from Western Australia, including all populations newly surveyed during March-May 2008. Main's Assassin Spider is shown in red. Note the undetermined 'A. sp.'.

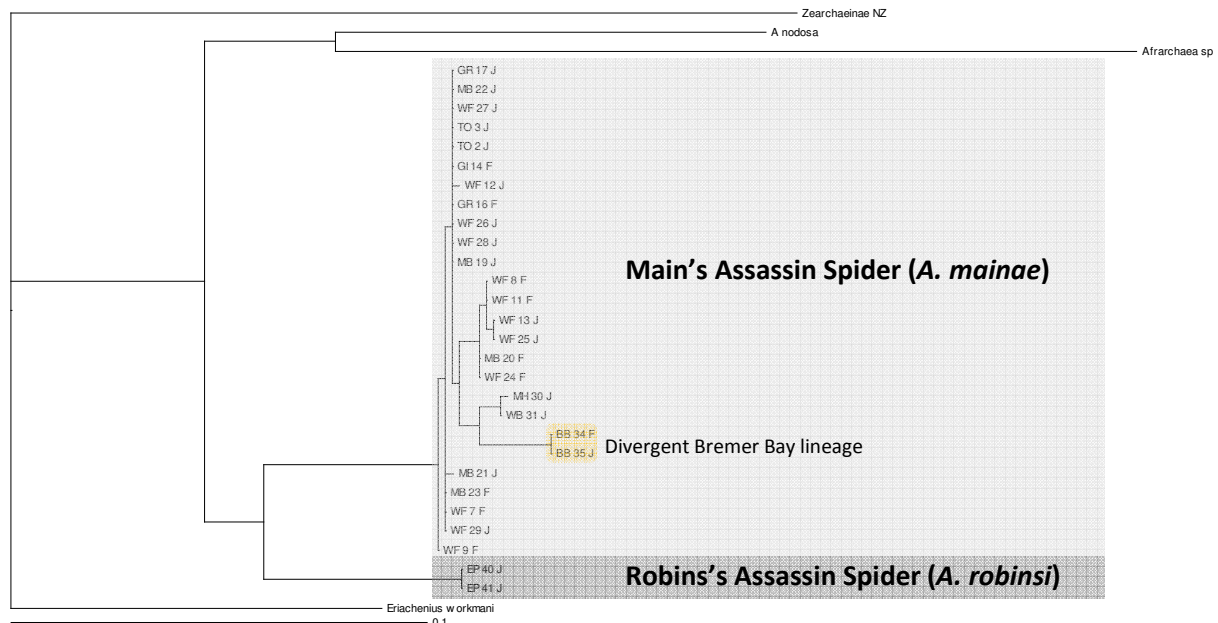


Maps showing the known (including surveyed) populations of Main's Assassin Spider between William Bay National Park and Gull Rock National Park (top) and surrounding the Albany Wind Farm (bottom).

Genetic Identification of Surveyed Populations: May-July 2008

After the curation of all specimens collected during the survey, the exact identification of populations was determined using molecular sequencing techniques. A 610 bp fragment of the mitochondrial Cytochrome C Oxidase Subunit I (COI) gene was sequenced for 26 specimens, representing all of the populations of Main's Assassin Spider recorded during the survey. These genetic data (see figure, below) confirm the identification and known distribution of Main's Assassin Spider, and provide a useful molecular framework for the future identification of new populations or species of assassin spiders discovered in Western Australia. Although the data are necessarily preliminary, the DNA sequences do provide evidence for genetic divergence at least among those populations from Bremer Bay and west of Wilson Inlet (Mount Hallowell and William Bay), the former of which may represent a new or incipient species.

DNA sequences could not be determined for juvenile specimens from Walpole-Nornalup National Park, and the exact identification of this population remains unknown.



Maximum likelihood phylogram of COI mitochondrial DNA sequence data, showing the inferred phylogenetic relationships among populations of Western Australian assassin spiders.

Specimen code prefixes are as follows: BB = Bremer Bay; EP = Ellen Peak; MB = Muttonbird Rd; MH = Mt Hallowell; GI = Gilge Rd; GR = Gull Rock NP; TO = Torndirrup NP; WB = William Bay NP; WF = Albany Wind Farm.

Habitat Requirements

Main's Assassin Spider has very specific habitat requirements. Within the coastal forests in which it occurs, the species can only be found in the complex understorey layer of 'elevated leaf-litter' which forms in low-growing grasses, 'wiry' herbs (e.g. Restionaceae) and sedges (e.g. *Lepidosperma* spp.). As leaves and twigs fall into the crowns of these grasses and sedges over time, a complex, elevated and interconnected 'matrix' of debris forms above the ground, providing habitat for many small invertebrates, including assassin spiders and the other small spiders on which they feed. With the exception of a single record from Mount Hallowell, all specimens of Main's Assassin Spider have been found within long-unburnt groves of Peppermint Trees (*Agonis* spp.), especially the dark, thickly-vegetated groves which develop in valleys, gullies and depressions in the landscape. Long-unburnt groves of coastal Peppermint Trees provide excellent habitat for Main's Assassin Spider in that they: (A) form protected, shaded habitats for the spiders in an otherwise exposed landscape; (B) drop copious numbers of leaves for the formation of an elevated leaf-litter understorey; and (C) are conducive to the growth of understorey sedges and grasses. Recently burnt *Agonis* habitats appear to be unsuitable for this species.



Images showing the habitat of Main's Assassin Spider at Salmon Hole Road, Torndirrup National Park (March 2008). The boughs of Peppermint Trees form a grove surrounding sedges (*Lepidosperma* sp.) and 'wiry' herbs (Restionaceae; probably *Empodisma gracillimum*), in which leaves and twigs collect over time. Images by M. Rix.

Clearly, to ensure the survival of the remaining populations of Main's Assassin Spider, it is important that critical *Agonis* habitats are recognised and avoided during any development that occurs within the known range of the species.

Licensing and Lodgement of Specimens

Specimens were collected under permits issued by the Department of Conservation and Land Management: Licence to Take Fauna for Scientific Purposes (SF006247) and Authority to Enter CALM Land and/or Waters (CE001935). All specimens collected during this survey are lodged in the collections of the Western Australian Museum.

References Cited

Platnick, N. I. (1991). On Western Australian *Austrarchaea* (Araneae, Archaeidae). *Bulletin of the British Arachnological Society* **8**: 259-261.

Appendix 1: Table showing the sites surveyed for Main's Assassin Spider during March-May 2008, and annotated according to whether specimens were recorded during a survey visit (**marked in bold with ☑**) or whether specimens could not be found (☒). Note that a ☒ record does not confirm the absence of the species from a particular site.

SITE	LATITUDE	LONGITUDE	RECORD
Albany Wind Farm	35°03'35"S	117°47'22"E	☑
Albany Wind Farm	35°03'43"S	117°47'46"E	☑
Albany Wind Farm	35°03'44"S	117°47'38"E	☑
Albany Wind Farm	35°03'10"S	117°46'29"E	☒
West of Albany Wind Farm	35°02'57"S	117°45'30"E	☑
West of Albany Wind Farm	35°03'02"S	117°45'28"E	☑
West of Albany Wind Farm	35°03'07"S	117°45'39"E	☒
West of Albany Wind Farm	35°03'07"S	117°45'39"E	☒
West of Albany Wind Farm	35°02'25"S	117°46'23"E	☒
West of Albany Wind Farm	35°03'10"S	117°45'43"E	☑
West of Albany Wind Farm	35°03'10"S	117°45'59"E	☑
West of Albany Wind Farm	35°03'10"S	117°46'11"E	☑
East of Albany Wind Farm	35°04'05"S	117°48'07"E	☑
East of Albany Wind Farm	35°04'06"S	117°48'09"E	☑
East of Albany Wind Farm	35°04'08"S	117°48'18"E	☑
East of Albany Wind Farm	35°04'10"S	117°48'26"E	☑
End of Mutton Bird Road	35°02'42"S	117°41'36"E	☑
End of Mutton Bird Road	35°02'43"S	117°41'43"E	☑
End of Mutton Bird Road	35°02'40"S	117°41'50"E	☑
End of Mutton Bird Road	35°02'41"S	117°41'31"E	☒
East of Mutton Bird Road	35°02'52"S	117°41'43"E	☑
East of Mutton Bird Road	35°02'58"S	117°41'56"E	☑
East of Mutton Bird Road	35°02'54"S	117°42'07"E	☑
Cuthbert, west of Roberts Rd	35°01'59"S	117°47'47"E	☑
Cuthbert, west of Roberts Rd	35°01'56"S	117°47'57"E	☒
Cuthbert, west of Roberts Rd	35°02'03"S	117°47'32"E	☒
Torndirrup NP, end of Salmon Hole Rd	35°06'07"S	117°58'03"E	☑
Torndirrup NP, base of Isthmus Hill	35°05'55"S	117°58'02"E	☑
Torndirrup NP, end of Eclipse Island Rd	35°06'22"S	117°52'04"E	☒
Torndirrup NP, Frenchman Bay Rd	35°05'33"S	117°57'06"E	☒
Limeburners Rd, near Torndirrup NP	35°05'27"S	117°54'40"E	☒
Gull Rock NP, end of Ledge Point Rd	35°00'51"S	118°00'23"E	☑
Gull Rock NP, Ledge Beach Rd	35°00'31"S	117°59'16"E	☒
Gull Rock NP, Gull Rock Rd	35°00'31"S	118°02'29"E	☒
William Bay NP, near Elephant Rock carpark	35°01'12"S	117°14'12"E	☑
West Cape Howe NP, Cosy Corner	35°03'40"S	117°38'37"E	☒
West Cape Howe NP, Torbay Beach Rd	35°04'22"S	117°38'28"E	☒
West Cape Howe NP, off Torbay Beach Rd	35°04'35"S	117°38'49"E	☒
Tennessee Rd South	35°04'17"S	117°31'20"E	☒
Tennessee Rd South	35°04'10"S	117°31'32"E	☒
Gilge Rd	35°03'15"S	117°28'49"E	☑
Mount Hallowell, near Monkey Rock	35°00'38"S	117°17'57"E	☑
Porongurup National Park, near Waddy's Hut	34°40'55"S	117°50'55"E	☒

Appendix 1: Continued.

SITE	LATITUDE	LONGITUDE	RECORD
Emu Point, Albany	35°00'14"S	117°55'50"E	☒
Emu Point, Albany	35°00'13"S	117°55'52"E	☒
Two Peoples Bay NR, near Ranger's Station	34°58'24"S	118°10'30"E	☒
Two Peoples Bay NR, top of Robinson's Gully	34°59'34"S	118°11'47"E	☒
Two Peoples Bay NR, Robinson's Gully	34°59'30"S	118°11'52"E	☒
Two Peoples Bay NR, track near Coast	34°59'29"S	118°09'35"E	☒
Two Peoples Bay NR, Sinker Reef Rd	34°59'09"S	118°07'39"E	☒
Two Peoples Bay NR, Sinker Reef Rd	34°59'12"S	118°08'56"E	☒
Two Peoples Bay NR, near picnic area	34°58'27"S	118°10'42"E	☒

Appendix 2: Table showing the sites surveyed for Main's Assassin Spider during March-May 2008, for which undetermined populations or possible new species of *Austrarchaea* were discovered.

SITE	LATITUDE	LONGITUDE	RECORD
South of Bremer Bay, near Yate Rd	34°24'10"S	119°22'43"E	A. sp. nov.?
Walpole-Nornalup NP, Anderson Rd	34°59'43"S	116°52'14"E	A. unknown