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## Taxonomic status and distribution of Australian caddisflies (Insecta: Trichoptera)

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### Abstract

Cartwright D., Wells A., Dean J., St Clair R. & Shackleton M. 2023. Taxonomic status and distribution of Australian caddisflies (Insecta: Trichoptera) *Memoirs of Museum Victoria* 82: 97–117.

This review of the status of Australian caddisflies focuses on publications from 1982 to 2022. Information is provided on new species described in that period, new keys, new descriptions of both adults and larvae, and the distribution of families and genera from states/regions and the Northern Territory. Australia's caddisfly fauna now totals 27 families, 111 genera and 868 species, with 97.9% of species endemic to Australia (only 19 of the 868 species are known from outside Australia, mainly from the nearby island of New Guinea – Papua New Guinea and Papua Province, Indonesia); some species also extend into New Zealand and South-East Asia.

The biogeography of the Australian fauna is discussed briefly in terms of “northern” and “southern” faunal elements, faunal provinces, distributional barriers, areas of highest biodiversity and refuge areas. Northern and southern elements in the Australian Trichoptera fauna are indicated. The highest biodiversity is recorded in the following states/regions: New South Wales with 263 species, northern Queensland (N-Qld) with 248 species and Victoria with 247 species. The highest endemism is in southern Western Australia (S-WA), with 73% endemic species, followed by N-Qld with 58% and Tasmania with 57%. The lowest numbers of species have been recorded from South Australia and S-WA, with 42 and 49 species respectively.

### Keywords

Trichoptera, caddisflies, Australia, distribution, biogeography, review

### Introduction

Neboiss (1981) reviewed the caddisfly faunas of the three faunal provinces of Australia (Bassian, Eyrean and Torresian). Over the 40 years since Neboiss' review, there have been many further contributions to the taxonomy of Australian caddisflies. A nomenclatural and taxonomic catalogue (Neboiss, 1988; *Zoological Catalogue of Australia* series) is now updated and available online in the Australian Faunal Directory (ABRS, 2022). Regional compilations are available for Tasmania (Neboiss, 1977, 2003), southern Western Australia (S-WA) (Neboiss, 1982), the Alligator Rivers Region of the Northern Territory (NT) (Wells, 1991 [unpublished]), the Jardine River Region of Cape York Peninsula in north-eastern Queensland (Wells and Cartwright, 1993b), and the Queensland Wet Tropics (QWT) (Walker et al., 1995). These are now out of date, but give introductions to the caddisfly fauna of these areas. Other earlier publications include Neboiss (1983), which records 405 species of Australian caddisfly fauna, representing 24 families, and Walker et al.

(1995, Table 3), which compares the caddisfly fauna of Australia (26 families, 106 genera and 590 species), the QWT (21 families, 67 genera and 217 species, including many undescribed taxa) and the Tasmanian World Heritage Area (TWhA – 19 families, 62 genera and 134 species) and identifies higher species richness in the QWT (about 37% of known Australian fauna) than the TWhA (about 23%). In 1986, Neboiss published the *Atlas of Trichoptera of the SW Pacific–Australian region*, in which all known caddisfly species in Australia (some 439) and the south-west Pacific were figured (Neboiss, 1986b). Since 1982, occasional contributions have added considerably to the Australian fauna, which at the end of 2022 totalled 868 described species in 27 families.

This review aims to provide a useful reference for workers in state and territory agencies, those monitoring stream health, environmental consultants, and students of Trichoptera. It includes the distribution of each family and genus and a bibliography of taxonomic studies since 1982. A summary of the described genera and numbers of species in

each Australian family is shown in Table 1 and is expanded in Supplementary Table 1. Readers are referred to the online Australian Faunal Directory (ABRS, 2022) for taxonomic and nomenclatural information and to the Atlas of Living Australia (2022), which allows access to museum specimen records, particularly those in the large Trichoptera collection of Museums Victoria (accessed from the Online Zoological Collections of Australian Museums – OZCAM).

### Caddisfly taxonomy

#### *History of the description of Australian caddisflies.*

Prior to 1900, only ten caddisflies were described from Australia (Neboiss, 1988). Another four species, subsequently listed for Australia, were described from non-Australian locations prior to 1900 and recorded in Australia subsequently: *Philanisus plebeius* Walker (1852; described from New Zealand), *Aethaloptera sexpunctata* (Kolenati) (1859; described from India), *Macrostemum saundersii* (McLachlan) (1866; described from Irian Jaya) and *Oecetis hemerobioides* (McLachlan) (1866; described from Sulawesi [as Celebes]). Neboiss, in his 1988 catalogue, listed the trickle of descriptions of new species published in the years from 1900 to 1940 by Ulmer, Martynov, Banks, Navás, Mosely and Tillyard; Tillyard (1922) listed a total of 49 species. In 1953, Mosely and Kimmins published a comprehensive study of 177 species. Many of these were newly described, and the authors provided a brief analysis of the distributions of Australian caddisflies.

Several smaller additions followed Mosely and Kimmins' work: Ross (1956), Neboiss (1962, 1974, 1975), Korboot (1964b), Jacquemart (1965), Schmid (1969) and Riek (1977). In 1977, Neboiss published his major study of Tasmanian caddisflies, listing 21 families with about 160 species, of which around 74% were endemic to Tasmania. Further, in 1982, Neboiss recorded for S-WA some nine families and 43 species, about 70% of which were listed as endemic. In a checklist published in 1983, Neboiss listed 24 families and 405 species, and later an atlas (Neboiss, 1986b) that included 436 figured species.

#### *Descriptions of adult Trichoptera since 1982.*

Since 1982, many new taxa in assorted families have been described, including Antipodoeciidae (St Clair et al., 2018), Calocidae (Neboiss, 1984a; Shackleton, 2010, 2013; Shackleton and Webb, 2014a, 2015; Shackleton et al., 2014b), Hydrobiosidae (Schmid, 1989), Hydropsychidae (Neboiss, 1984c; Dean, 2001; Wells and Neboiss, 2018), Hydroptilidae (Wells, 1985a, 1990, 1998, 1999, 2002, 2005, 2010b, 2021; Wells and Dostine, 2016; Wells and Kjer, 2016), Leptoceridae (St Clair, 1988; Neboiss, 1989; Neboiss and Wells, 1998; Wells, 2000, 2004, 2006), Ecnomidae (Cartwright, 1990b, 2008, 2009, 2010a, 2011a), Odontoceridae (Wells and St Clair, 2021), Polycentropodidae (Neboiss, 1992b, 1994; Cartwright, 2021), Helicopsychidae (Johanson, 1995, 1997), Conoesucidae (Jackson, 1998b), Atriplectidae (Neboiss, 1999), Philopotamidae (Cartwright, 2002, 2010b, 2012a, 2012b, 2012c), Glossosomatidae (Wells, 2010a), Tasmanian species (Neboiss, 2003) and other small papers (Neboiss, 1984b,

1986a; Cartwright, 2011b; Wickson et al., 2014; Wells, 2020; Cartwright and Dostine, 2022).

We currently recognise a total of 27 Trichoptera families, 111 genera and 868 species from Australia. Fig. 1 illustrates the rapid increase in description of Australian species in recent years. This increase, along with the knowledge that many undescribed species exist in collections, suggests that the total Australian Trichoptera fauna will certainly exceed 900 and possibly 1000 species. Many descriptions of new species from several families are currently being prepared.

#### *Larval keys and descriptions since 1982.*

Keys to larvae are available for Victorian free-living families and genera (Dean and Cartwright, 1982); for Australian voucher species in the families Ecnomidae, Philopotamidae and Tasimiidae (Cartwright, 1997); Hydroptilidae Wells (1997); Philorheithridae, Calamoceratidae and Helicopsychidae (St Clair, 1997); Polycentropodidae, Glossosomatidae, Dipsuedopsidae and Psychomyiidae (Cartwright, 1998); Calocidae, Helicophidae and Conoesucidae (Jackson, 1998a); Hydropsychidae (Dean, 1999); Antipodoeciidae, Atriplectidae, Limnephilidae and Plectrotarsidae (Dean, 2000); Leptoceridae (St Clair, 2000a); Odontoceridae, Kokiriidae and Oeconesidae (St Clair, 2000b); and for all Australian genera (Dean, St Clair, and Cartwright, 2004). The major keys published for the series of workshops run by the Murray–Darling Freshwater Research Centre are now available online in *The bug guide* (Hawking et al., 2009) and the *Interactive guide to Australian aquatic invertebrates* (Gunn et al., 1999) is available online through LucidCentral (<https://www.lucidcentral.org>). Detailed larval descriptions are comparatively few, and are listed in Table 2.

#### *Summary of major taxonomic changes since 1982.*

Neboiss (1983) documented the status of Australian adult Trichoptera taxonomy up to the end of 1982. His work included a checklist of species, with areas of distribution, and data on type specimens and depository institutions. In 1986, Neboiss published the *Atlas of Trichoptera* of the SW Pacific–Australian region, in which figures were provided for all known Australian species.

Family level – number of families has increased from 24 to 27 since 1982.

Psychomyiidae – first recorded from Australia by Mosely and Kimmins (1953), removed from the Australian fauna by Neboiss (1977), but then re-established by Neboiss (1990) with the recognition of two genera, *Tinodes* and *Zealandoptila*.

Dipsuedopsidae – *Hyalopsyche* first recorded from Australia and placed in the family Polycentropodidae by Neboiss (1980), moved to the family Hyalopsychidae by Schmid (1980), subsequently transferred from Hyalopsychidae to Dipsuedopsidae (Wells and Cartwright, 1993a).

Helocobucidae – *Helocobus buccinatus* Neboiss, 2002, originally placed in Helicophidae, family erected by Johanson et al. (2017).

Generic level – number of genera increased from 96 to 111 since 1982.

Table 1. A summary of families, numbers of described genera and species in Australian state/territory/region (0/L = larval record only) as at December 2012.

Family	#Genera/ species		S-WA	N-WA	NT	N-Qld	S-Qld	NSW	Vic	Tas	SA
Glossosomatidae	1	23	0	0	0	4	0	11	9	3	0
Hydrobiosidae	15	67	2	0	0	3	8	27	29	33	2
Hydroptilidae	15	162	8	27	44	58	20	38	41	22	12
Philopotamidae	2	82	2	10	7	17	12	20	17	16	0
Stenopsychidae	1	9	0	0	0	2	0	6	3	1	0
Dipseudopsidae	1	1	0	0	1	1	0	0	0	0	0
Ecnomidae	7	126	9	31	34	38	27	33	33	10	7
Hydropsychidae	9	55	2	4	5	20	16	16	12	10	1
Polycentropodidae	5	21	2	2	6	7	0	3	3	7	0
Psychomyiidae	2	3	0	0	1	3	0	0	0	0	0
Limnephilidae	1	2	0	0	0	0	0	1	2	1	0
Oeconesidae	1	1	0	0	0	0	0	0	0	1	0
Plectrotarsidae	3	5	1	0	0	0	0	1	1	4	0
Atriplectididae	1	2	1	0	0	2	0	1	1	1	1
Calamoceratidae	1	10	0	2	2	5	2	3	3	1	1
Kokiriidae	3	5	0	0	0	0	0	0	2	3	0
Leptoceridae	15	180	21	42	51	72	37	49	53	35	16
Odontoceridae	2	11	0	0	0	2	3	7	1	1	0
Philorheithridae	5	15	1	0	0	0	0	5	7	11	0
Antipodoeciidae	1	1	0	0	0	0	0	1	0	0	0
Calocidae	6	32	0	0	0	7	3	13	11	5	0
Chathamidae	1	2	0	0	0	0	0	2	1	0	0
Conoesucidae	6	23	0	0	0	0	0	7	6	19	1
Helicophidae	2	7	0	0	0	0	1	4	1	5	0
Helocobucidae	1	1	0	0	0	0	1	1	1	0	0
Helicopsychidae	1	15	0	2	2	6	5	7	5	2	0
Tasimiidae	2	7	0	0	0	1	2	6	5	4	1
<b>Total in all families</b>	<b>111</b>	<b>868</b>	<b>49</b>	<b>118</b>	<b>153</b>	<b>248</b>	<b>138</b>	<b>263</b>	<b>247</b>	<b>195</b>	<b>42</b>
% of total Aust. species		6	14	18	29	16	30	29	23	5	
% of species endemic		73.5	21	25	58	25	31	30	57	7	

A more complete family, genus and species number checklist with associated state/territory/region distribution is attached in the Appendix 1 (or Supplementary file). A complete species checklist is not included here because it would duplicate information available on several websites: internet checklists in various forms are incorporated in the Trichoptera World Checklist (Morse, J.C. (ed.) 2022. <http://entweb.clemson.edu/database/trichopt/index.htm> (accessed 25 November 2022) and the Australian Faunal Directory ([www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/taxa/Trichoptera/checklist](http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/taxa/Trichoptera/checklist)). They do have limitations with respect to regional or state species numbers, but have the advantage of being constantly upgraded. A table with a complete list of Australian species shown in each state/territory/region is available in the Appendix.

Table 2. List of described Trichoptera larvae from Australia, with references.

Family	Name	Reference	Notes
Antipodoeciidae	<i>Antipodoecia turneri</i> Mosely, 1934	St Clair et al., 2018	Not certain this particular species is described.
Atriplectididae	<i>Atriplectides dubius</i> Neboiss, 1978	Neboiss, 1978	
	<i>Atriplectides ikmaleus</i> Neboiss, 1999	Neboiss, 1999	
Calocidae	<i>Coenota cudonis</i> Shackleton and Webb, 2015	Shackleton and Webb, 2015	
	<i>Coenota equustagna</i> Shackleton and Webb, 2015	Shackleton and Webb, 2015	
	<i>Coenota nemerosa</i> Shackleton and Webb, 2015	Shackleton and Webb, 2015	
	<i>Caloca saneva</i> Neboiss, 1979	Neboiss, 1979	
	<i>Calocoides pravuspina</i> , Shackleton and Webb 2014	Shackleton and Webb, 2014	
	<i>Calocoides mynottae</i> Shackleton and Webb, 2014	Shackleton and Webb, 2014	
	<i>Latarima explicatala</i> Shackleton, Webb, Lawler and Suter, 2014	Shackleton et al., 2014	
	<i>Pliocaloca fidesria</i> Shackleton, 2010	Shackleton, 2010	
	<i>Pliocaloca kleithria</i> Shackleton, 2010	Shackleton, 2010	
Chathamidae	<i>Philanitus plebius</i> Riek, 1977	Riek, 1977	
Conoesucidae	<i>Conoesucus adiastolus</i> Jackson 1998	Jackson, 1998b	
	<i>Conoesucus notialis</i> Jackson, 1998	Jackson, 1998b	
Dipseudopsidae	<i>Hyalopsyche disjuncta</i> Neboiss 1980	Wells and Cartwright, 1993	
Helicophidae	<i>Allocoella grisea</i> Banks 1939	Drechtrah 1984	
Helicopsychidae	<i>Helicopsyche cochleatesta</i> Korboot, 1964	Korboot, 1964a	
Helocabusidae	<i>Helocabus buccanatus</i> Neboiss, 2002	Neboiss, 2002	
Hydrobiosidae	<i>Apsilochorema urdalum</i> Neboiss, 1962	Dean and Bunn, 1989	
	<i>Taschorema pallescens</i> (Banks, 1939)	Dean and Bunn, 1989	
Hydropsychidae	<i>Baliomorpha pulchripenne</i> Tillyard, 1922	Dean, 1984	
	<i>Cheumatopsyche dostinei</i> Dean, 2001	Dean, 2001	
	<i>Cheumatopsyche kakaduensis</i> Dean, 2001	Dean, 2001	
	<i>Cheumatopsyche suteri</i> Dean, 2001	Dean, 2001	
	<i>Cheumatopsyche wellsae</i> Dean, 2001	Dean, 2001	
	<i>Smicrophylax australis</i> Tillyard, 1989	Dean and Bunn, 1989	
Hydroptilidae	<i>Acritoptila globosa</i> Wells, 1982	Wells, 1985b	
	<i>Hellyethira basilobata</i> Wells, 1979	Wells, 1985b	
	<i>Hellyethira cornuta</i> Wells, 1979	Wells, 1985b	
	<i>Hellyethira eskensis</i> (Mosely, 1934)	Wells, 1985b	
	<i>Hellyethira exserta</i> Wells, 1979	Wells, 1985b	
	<i>Hellyethira litua</i> Wells, 1979	Wells, 1985b	
	<i>Hellyethira malleoforma</i> Wells, 1979	Wells, 1985b	
	<i>Hellyethira ramosa</i> Wells, 1983	Wells, 1985b	
	<i>Hellyethira simplex</i> (Mosely, 1934)	Wells, 1985b	
	<i>Hellyethira vernoni</i> Wells, 1983	Wells, 1985b	
	<i>Hydroptila acinacis</i> Wells, 1979	Wells, 1985b	

Family	Name	Reference	Notes
	<i>Hydroptila losida</i> Mosely, 1953	Wells, 1985b	
	<i>Hydroptila scamandra</i> Neboiss, 1977	Wells, 1985b	
	<i>Maydenoptila baynesi</i> Wells, 1983	Wells, 1985b	
	<i>Maydenoptila rupina</i> Neboiss, 1977	Wells, 1985b	
	<i>Orphninostrichia maculata</i> Mosely, 1934	Wells, 1985b	
	<i>Orthotrichia bishopi</i> Wells, 1979	Wells, 1985b	
	<i>Oxyethira columba</i> (Neboiss, 1977)	Wells, 1985b	
	<i>Tricholeiochiton fidelis</i> Wells, 1982	Wells, 1985b	
Kokiriidae	<i>Tanjistomella verna</i> Neboiss, 1974	Neboiss, 1974	
Leptoceridae	<i>Hudsonema aptus</i> (Neboiss, 1982)	St Clair, 2002	
	<i>Hudsonema paludosus</i> (Neboiss, 1977)	St Clair, 1994	
	<i>Lectrides varians</i> Mosely, 1953	Jackson, 1985	
	<i>Leptocerus sounta</i> Schmid, 1988	St Clair, 1994	
	<i>Leptorussa darlingtoni</i> (Banks, 1939)	Jackson, 1985	
	<i>Notalina arena</i> St Clair, 1991	St Clair, 1991	
	<i>Notalina bifaria</i> Neboiss, 1977	St Clair, 1991	
	<i>Notalina fulva</i> Kimmins, 1953	St Clair, 1991	
	<i>Notalina ordina</i> St Clair, 1991	St Clair, 1991	
	<i>Notalina salina</i> St Clair, 1991	St Clair, 1991	
	<i>Notalina spira</i> St Clair, 1991	St Clair, 1991	
	<i>Notoperata maculata</i> (Mosely, 1953)	St Clair, 1994	
	<i>Notoperata sparsa</i> (Kimmins, 1953)	St Clair, 1994	
	<i>Notoperata tenax</i> Neboiss, 1982	St Clair, 2002	
	<i>Oecetis australis</i> (Banks, 1920)	Korboot, 1964a	Larvae described as <i>O. situlus</i> but is <i>Notalina fulva</i>
	<i>Oecetis laustra</i> Mosely, 1953	St Clair, 1994	Description no longer adequate for species recognition.
	<i>Russobex cuneatus</i> St Clair, 1988	St Clair, 1988	
	<i>Symphitonueria neboissi</i> , Wells, 2011	Wells, 2011	Detailed notes given in Wells, 2011
	<i>Symphitonueria opposita</i> (Walker, 1852)	St Clair, 2002	
	<i>Symphitoneuria wheeleri</i> Banks, 1939	St Clair, 1994	
	<i>Triaenodes volda</i> Mosely, 1953	St Clair, 1994	Description no longer adequate for species recognition.
	<i>Tripletides altenogus</i> Morse & Neboiss, 1982	St Clair, 1994	
	<i>Tripletides australicus</i> Banks, 1939	St Clair, 1994	
	<i>Tripletides australis</i> Navas, 1934	St Clair, 1994	
	<i>Tripletides ciuskus ciuskus</i> Mosely, 1953	St Clair, 1994	
	<i>Tripletides elongatus</i> Banks, 1939	St Clair, 1994	
	<i>Tripletides entthesis</i> Morse & Neboiss, 1982	St Clair, 2002	
	<i>Tripletides magnus</i> (Walker, 1852)	St Clair, 1994	
	<i>Tripletides niveipennis</i> Mosely, 1953	St Clair, 2002	
	<i>Tripletides proximus</i> Neboiss, 1977	St Clair, 1994	

Family	Name	Reference	Notes
	<i>Triplectides truncatus</i> Neboiss, 1977	St Clair, 1994	
	<i>Triplectides similis</i> Mosely, 1953	St Clair, 1994	
	<i>Triplectides voldi</i> Mosely, 1953	St Clair, 1994	
	<i>Triplectides varius</i> Kimmins, 1953	St Clair, 1994	
	<i>Triplectidina nigricornis</i> Mosely, 1936	St Clair, 1994	
	<i>Triplexa villa</i> Mosely, 1953	St Clair, 1994	
	<i>Westriplectides pedderensis</i> Neboiss, 1977	St Clair, 1994	
Limnephilidae	<i>Archaeophylax ochreus</i> Mosely, 1953	Neboiss, 1958	
Odontoceridae	<i>Marilia disjuncta</i> Wells and St Clair, 2021	Drecktrah, 1990	As <i>M. fusca</i> , now <i>Marilia</i> larval sp. 2 in Wells and St Clair, 2018.
	<i>Barynema costatum</i> Banks, 1939	Cartwright and Dean, 1987	Possibly the larva of <i>B. paradoxa</i> , Wells and St Clair, 2018.
Oeconesidae	<i>Tascuna ignota</i> Neboiss, 1975		Larva discussed and figured in Neboiss, 1987.
Philopotamidae	<i>Chimarra australica</i> (Ulmer, 1916)	Cartwright, 1990a	
	<i>Chimarra monticola</i> Kimmins, 1953	Cartwright, 1990a	
	<i>Hydrobiosella letti</i> Korboot, 1964	Korboot, 1964a	Larva illustrated is a species of <i>Chimarra</i>
Plectrotarsidae	<i>Plectrotarsus gravenhorsti</i> Kolenati, 1848	Neboiss, 1987	
Polycentropodidae	<i>Neureclipsis napaea</i> Neboiss, 1986	Cartwright, 1991	
Psychomyiidae	<i>Tinodes radona</i> Neboiss, 1990	Wells, 1995	
Tasimiidae	<i>Tasiagma eremica</i> Wells, 2011	Wells, 2011	Figured in Wells, 2011
	<i>Tasimia natasia</i> Mosely, 1953	Riek, 1968	

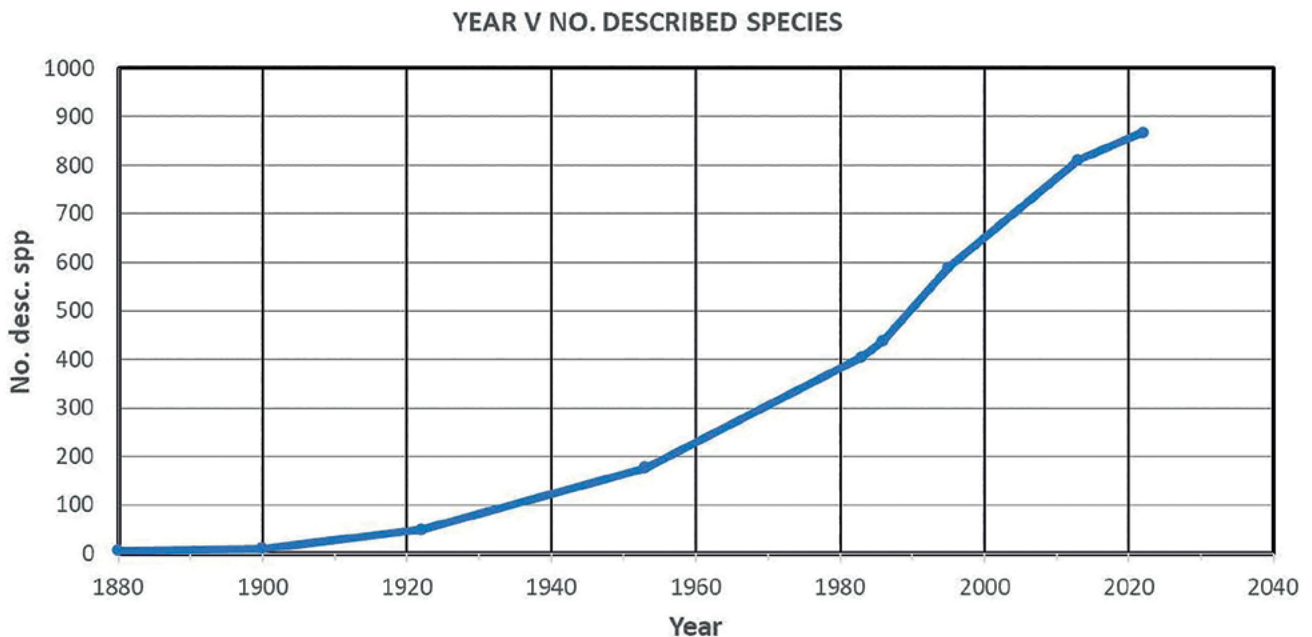


Figure 1. Cumulative number of described species of Australian caddisflies, 1880–2022.

Helicopsychidae – the genus *Saetotricha* was removed from the Australian fauna when *S. ptychopteryx* was transferred to *Helicopsyche* (Neboiss, 1986c).

Hydrobiosidae – a new genus *Poecilochorema* was created with the transfer of four species (*P. complexa*, *P. crinitum*, *P. evansi* and *P. lepnevae*) from *Austrochorema* and the description of one new species, *P. circumvoltum* Schmid (Schmid, 1989).

Hydroptilidae – *Gnathotrichia* and *Stenoxyethira* were synonymised with *Oxyethira* (Kelley, 1984); one species of each of the SE Asian genera *Chrysotrichia* Schmid 1989 (Wells, 1990) and *Scelotrichia* Ulmer, 1951 (Cairns and Wells, 2008) (name now replaced by *Pseudoxyethira* Schmid, 1958) were new genus records for Australia, and a new genus, *Jabitrichia* Wells, 1990 was erected for a single species (the genus has since been recorded from W Malaysia and E Africa).

Hydropsychidae – the genus *Macronema* was removed from Australia when three species (*M. banksi*, *M. dubia* and *M. pulchripenne*) were transferred to a new genus *Baliomorpha* (Neboiss, 1984c); *Macrostemum* added (Neboiss, 1984c); the generic name *Sciops* was removed from the Australian fauna with the transfer of two species (*S. spinata* Banks and *S. inermis* Banks) to *Diplectronea* (Neboiss, 1986a); the new genus *Diemeniluma* Neboiss, 2003 was described to accommodate two Tasmanian species, one new and the other having previously been placed in the genus *Diplectronea*. *Diemeniluma* was synonymised subsequently with *Diplectronea* by Wells and Neboiss (2018), who also established a new genus, *Arcyphysa* Wells and Neboiss.

Polycentropodidae – the genus *Neureclipsis* was newly recorded from Australia (Neboiss, 1986a), *Nyctiophylax* species were moved to *Paranyctiophylax* (Neboiss, 1992b, 1994), and back to *Nyctiophylax* (Malicky, 1994); *Tasmanoplegus* was synonymised with *Plectrocnemia* (Oláh and Johanson, 2010).

Calocidae – genera *Calocoides* and *Pliocaloca* described from Queensland (Neboiss, 1984b), *Latarima* described from Victoria (Shackleton et al., 2014).

Leptoceridae – a new monotypic genus *Russobex* St Clair, 1988 described from Victoria; *Condocerus* removed to *Hudsonema* (Malm and Johanson, 2011) based on DNA and adult morphology, but none of the available information on larvae was included in the analysis.

Helicophidae – a new monotypic genus *Heloccabus* Neboiss, 2002 from eastern Australia, provisionally placed in this family; subsequently moved to new family (Heloccobucidae) by Neboiss (2002).

Ecnomidae – *Ecnomina* split into two: *Ecnomina* s. str. and *Daternomina* by Neboiss (2003) in revision of Tasmanian adults. South and central American genus *Austrotinodes* recorded from Australia (Cartwright, 2009); three additional genera established by Cartwright in 2010 (*Absensomina* and *Wellsomina*) and in 2011 (*Neboisomina*).

Species level – the number of species increased from 405 (Neboiss, 1983) to 868 in 2022.

### Australia – biogeography

Neboiss (1981) reviewed the characterisation of Australia's faunal provinces, refuge areas and distributional barriers. A map of Australia (based on Neboiss, 1981) showing states, regions, faunal barriers and drainage basins and their total caddisfly fauna and percentage endemism was included in Neboiss (1988, Zoological Catalogue, Map 1), and is shown in Fig. 2.

#### Summary of the Australian Trichoptera fauna.

The known Australia Trichoptera fauna consists of 27 families, 111 genera and 868 species (Table 2). Table 3 shows that Australia has approximately 57% of the world's described families, 18% of the world's described genera and 6% of the world's described species (Morse, 2022).

Australia's caddisfly fauna is dominated by the families Leptoceridae, Hydroptilidae, Ecnomidae, Philopotamidae, Hydrobiosidae and Hydropsychidae, with a combined total of 672 species or approximately 77% of the known Australian fauna. The top six dominant or most speciose families are shown in Table 4. Unsurprisingly, Australia's eight most

Table 3. Caddisfly fauna richness in Australia and other regions of the world (Morse, 2022). NB. Some regional figures are approximate, because some newly described species have not been updated on the World Checklist (Morse, pers. comm.)

Biogeographical region	Families	No of species 2022	% of world species 2022
Australia	27	868	4.9
Australasian	29	1880	10.7
Neotropical	23	3350	19.1
Neartic	27	1700	9.7
East Palearctic	29	1300	7.5
West Palearctic	26	2160	12.3
Afrotropical	23	1250	7.1
Oriental	28	5890	33.6
<b>World</b>	<b>47</b>	<b>17530</b>	<b>100</b>

Table 4. Australia's most speciose families with percentage of total Australian Trichoptera fauna.

Family	No. of genera	No of species	% of fauna
Leptoceridae	15	180	20.7
Hydroptilidae	15	162	18.7
Ecnomidae	7	126	14.5
Philopotamidae	2	82	9.4
Hydrobiosidae	15	67	7.7
Hydropsychidae	9	55	6.3
<b>Total (% of Aust. total)</b>	<b>63 (57%)</b>	<b>672 (77%)</b>	<b>77.3%</b>

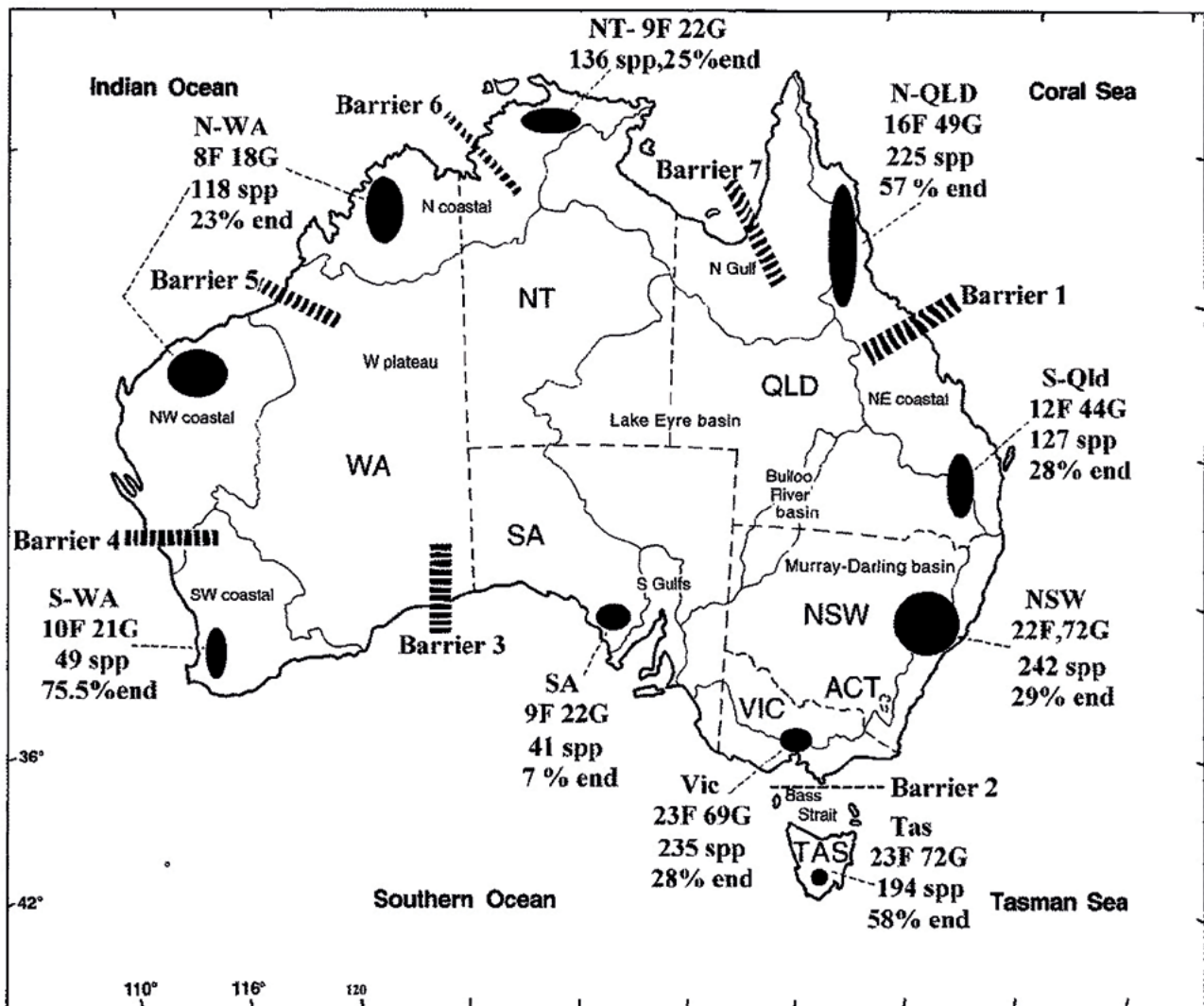


Figure 2. Map of Australia showing breakdown of states and regions (= major drainage basins) as adopted for the Zoological Catalogue of Australia series (e.g., Walton and Houston, 1988, Map 1). Map abbreviations: N-Qld = northern Queensland, S-Qld = southern Queensland, NSW = New South Wales (incorporating ACT = Australian Capital Territory), Vic = Victoria, Tas = Tasmania, SA = South Australia, S-WA = southern Western Australia, N-WA = northern Western Australia (incorporating Pilbara and Kimberley Regions), NT = Northern Territory. For convenience, the larger states, WA and Qld, are divided into two areas: north (N) and south (S). Barriers 1–7 are detailed below. We have divided Western Australia at Barrier 4 (between Geraldton and Pilbara region) and Queensland at Barrier 1 (area between Townsville and Rockhampton); F = family, G = genus, spp = species, end = endemism.



speciose genera (shown in Table 5) are also in the families Leptoceridae (*Oecetis* with 67 and *Triaenodes* with 48 species), Philopotamidae (*Hydrobiosella* with 54 and *Chimarra* with 28 species), Hydroptilidae (*Orthotrichia* with 55 and *Hellyethira* with 30 species) and Ecnomidae (*Ecnomus* with 40 and *Ecnomina* with 37 species).

**Major patterns in the Australian Trichoptera fauna.** Generally, the Australian fauna can be divided primarily into northern and southern elements (even within the same family) (for examples, see Figs 3a and b).

**Northern Australian Trichoptera fauna (N-WA, NT, N-Qld) (= Torresian Province).** Northern or Torresian Australia includes three sub-regions – N-WA (Kimberley and Pilbara Regions), NT and N-Qld – and is dominated numerically by species of the Leptoceridae (*Oecetis* and *Triaenodes*), Ecnomidae (*Ecnomus* and *Wellsomina*), Hydroptilidae (*Orthotrichia* and *Hellyethira*), and Philopotamidae (*Chimarra*) (see Table 6). Twenty families are represented in northern Australia (however, only ten northern families are found outside the QWT). *Wellsomina* is an endemic northern genus; examples of predominantly northern genera are *Tricholeiochiton*, *Hellyethira*, *Chimarra* and *Oecetis*. Some of these genera, for example, *Oecetis* and *Triaenodes*, have possibly moved to Australia comparatively recently from the north after the Australian plate moved close to New Guinea.

N-WA faunal elements include nine families, 20 genera and 118 species, with 21% of species endemic. The most speciose three families, Leptoceridae (42), Ecnomidae (31) and Hydroptilidae (27), with a combined 100 species, comprise 85% of the total.

NT faunal elements include ten families, 24 genera and 153 species, with 24% of species endemic. The most speciose three families, Leptoceridae (51), Hydroptilidae (44) and

Ecnomidae (34), with a combined 129 species, comprise 84% of the total.

N-Qld faunal elements include 17 families, 55 genera and 248 species, with 58% of species endemic. The most speciose three families, Leptoceridae (72), Hydroptilidae (58) and Ecnomidae (38), with a combined 168 species, comprise 68% of the total.

**Southern Australian Trichoptera fauna (S-Qld, New South Wales [NSW], Victoria, Tasmania, South Australia [SA], S-WA) (= Bassian Province).** Neboiss (1981) reviewed the caddisfly fauna of the three sub-regions of southern or Bassian Australia: SE mainland, with 23 families and an estimated 200 species (Neboiss, 1981); Tasmanian – 23 families, about 160 species, 74% endemic (Neboiss, 1977); and SW Australia – nine families, 43 species, about 70% endemic; dominant families Leptoceridae, with 18 species in nine genera, and Ecnomidae, with three genera and nine species (Neboiss, 1982).

Our current assessment is that southern or Bassian Australia is dominated numerically by species in mostly the same families as those that dominate northern Australia, although we find that, generally, different genera are predominant: Leptoceridae (*Triplectides* and *Notalina*), Philopotamidae (*Hydrobiosella*), Ecnomidae (*Ecnomina*), Glossosomatidae (*Agapetus*) and Hydroptilidae (*Orphninostrichia*) (see Table 7). Other predominantly southern families include the Hydrobiosidae, Philorheithridae, Conoesucidae, Calocidae, Helicophidae, Tasiimidae and Plectrotarsidae. Many of the ‘southern families and genera (e.g., Philorheithridae, Helicophidae, *Triplectides* and *Notalina*) are of Gondwanan origin and probably have been in Australia for far longer than the northern families and genera.

Twenty-four Trichoptera families are represented in southern Australia.

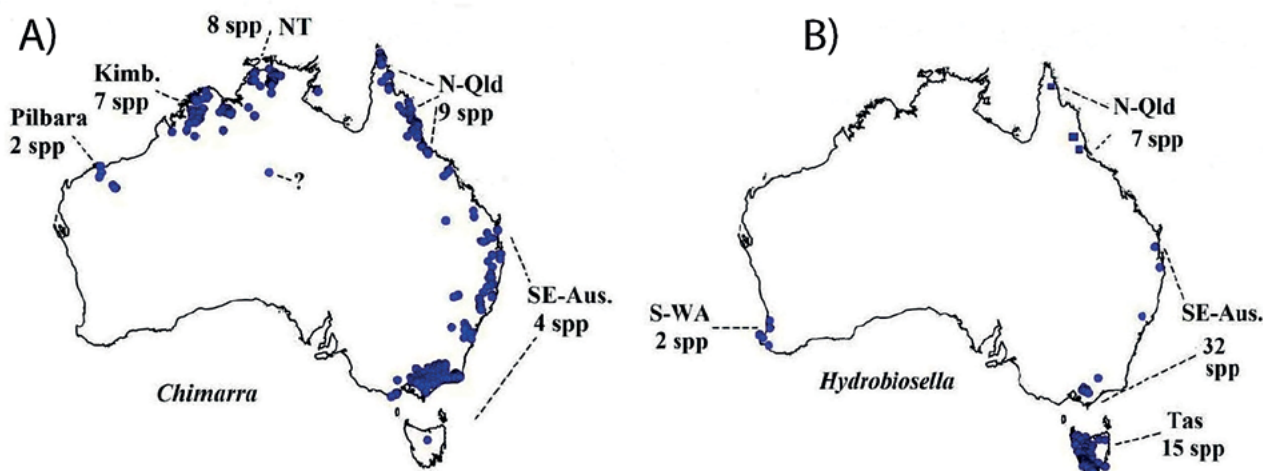


Figure 3. Australian maps showing records (in blue) of A) a mostly ‘northern’ genus *Chimarra* (with 79% species northern) and B) a mostly ‘southern’ genus *Hydrobiosella* (with 89% species southern) (after Atlas of Living Australia (accessed 2012))

Table 5. Australia's most speciose Trichoptera genera.

Genus	Family	No. of species
<i>Oecetis</i>	Leptoceridae	67
<i>Orthotrichia</i>	Hydroptilidae	55
<i>Hydrobiosella</i>	Philopotamidae	54
<i>Triaenodes</i>	Leptoceridae	48
<i>Ecnomus</i>	Ecnomidae	40
<i>Ecnomina</i>	Ecnomidae	37
<i>Hellyethira</i>	Hydroptilidae	30
<i>Chimarra</i>	Philopotamidae	28

Table 6. Major families, genera, and number and percentage of species of Trichoptera represented in 'northern' or Torresian Australia.

Family	Genus	N-WA	NT	N-Qld	Total spp in genus 'northern'	% spp in genus 'northern'
Leptoceridae	<i>Oecetis</i>	26	32	35	40	60
Hydroptilidae	<i>Orthotrichia</i>	12	21	24	36	65
Leptoceridae	<i>Triaenodes</i>	11	13	18	31	65
Ecnomidae	<i>Ecnomus</i>	20	23	16	25	63
Philopotamidae	<i>Chimarra</i>	10	7	10	22	79
Hydroptilidae	<i>Hellyethira</i>	9	10	13	21	70
Ecnomidae	<i>Wellsomina</i>	8	7	2	13	100

Table 7. Major families, genera and number and percentage of Trichoptera represented in 'southern' or Bassian Australia.

Family	Genus	S-WA	SA	Tas	Vic	NSW	S-Qld	Total spp in genus 'southern'	% spp in genus 'southern'
Philopotamidae	<i>Hydrobiosella</i>	2	0	15	15	17	8	48	89
Ecnomidae	<i>Ecnomina</i>	4	1	3	14	11	6	27	73
Glossosomatidae	<i>Agapetus</i>	0	0	3	9	11	0	19	83
Hydroptilidae	<i>Orphinotrichia</i>	0	1	2	6	6	1	14	70
Leptoceridae	<i>Notalina</i>	5	1	5	8	4	0	15	100
Leptoceridae	<i>Triplectides</i>	3	1	7	11	12	7	14	56

SE-mainland Australia (S-Qld, NSW, Victoria, SA) faunal elements include 23 families, 89 genera and 406 species, with 71% of species endemic. The most speciose three families, Leptoceridae (80), Hydroptilidae (63) and Ecnomidae (59), total 202 species and comprise about 50% of the total.

The fauna of SE mainland Australia can be divided into four component states/substates.

S-Qld: 14 families, 46 genera and 137 species, with 26% of species endemic. The most speciose three families, Leptoceridae (37), Ecnomidae (26) and Hydroptilidae (20), with a combined

83 species, comprise 61% of the total.

NSW (including the Australian Capital Territory [ACT]): 23 families, 78 genera and 263 species, with 31% of species endemic. The most speciose three families, Leptoceridae (47), Hydroptilidae (38) and Ecnomidae (33), with a combined 118 species, comprise 45% of the total.

Victoria: 23 families, 74 genera and 247 species, with 30% of species endemic. The most speciose three families — Leptoceridae (54), Hydroptilidae (41) and Ecnomidae (33), with a combined 128 species, comprise 52% of the total.

SA: nine families, 24 genera and 42 species, with 7% of species endemic. The most speciose three families, Leptoceridae (15), Hydroptilidae (12) and Ecnomidae (7), with a combined 34 species, comprise 81% of the total.

Tasmania faunal elements include 22 families, 71 genera and 195 species, with 57% of species endemic. The most speciose three families, Leptoceridae (35), Hydrobiosidae (33) and Hydroptilidae (22), with a combined 90 species, comprise 46% of the total.

S-WA faunal elements include ten families, 27 genera and 49 species, with 73% of species endemic. The most speciose three families, Leptoceridae (21), Ecnomidae (9) and Hydroptilidae (8), with a combined 38 species, comprise 78% of the total.

*Central Australia (Pilbara region of N-WA, S-NT, SW-Qld, W-NSW, N-SA) or Eyrean Province.* Only four Trichoptera families, containing some 29 species, are known from this large province: Leptoceridae (genera *Oecetis* and *Triplectides*), and other widely distributed families including Ecnomidae (*Ecnomus* – 7 species, 3 in the Pilbara, 4 in central Australia, among them 3 that have predominantly a Bassian distribution – *E. continentalis*, *E. pansus* and *E. turgidus*), Hydropsychidae (*Cheumatopsyche*), three species of Hydroptilidae (2 species of *Hellyethira* and 1 species of *Orthotrichia*) and two species of Philopotamidae (*Chimarra*) (see Table 8). Only four species – *Ecnomus ingibandi* Cartwright, *Chimarra luminaris* Cartwright, *C. yoolumba* Cartwright and *O. glebula* Wells – are endemic to the Pilbara; another ecnomid (*Ecnomus centralis*) is endemic to central Australia.

Pilbara region faunal elements include 21 species: 13 Leptoceridae (8 spp *Oecetis*, 2 spp. *Triaenodes*, 3 spp. *Triplectides*), 2+ species Hydroptilidae (one species each of *Hellyethira* and *Orthotrichia*), three species of *Ecnomus* (with one endemic), two species of *Chimarra* and one species of *Cheumatopsyche*.

*Faunal provinces.* Spencer (1896) first proposed the concept of three Australian faunal provinces based on a limited knowledge of some animal groups. Neboiss (1981) summarised some of the modifications to this, based on vegetation, rainfall and concepts of faunal barriers and refuge areas. Neboiss (1988) followed the

standard system adopted for the Australian Biological Resources *Zoological Catalogue of Australia* series, assigning fauna to the main drainage basins (Fig. 2). More recently, the Australian Government adopted as standard the Interim Biogeographic Regionalisation for Australia regions for the Australian Biological Resources Study faunal directory (ABRS, 2009) based on Ebach (2012), which are less appropriate for assignment of aquatic organisms. In the present review, we apply a broader approach by defining regions based on political boundaries (i.e., states or territories), with the addition that the two states spanning the greatest range of latitude and climatic variation, WA and Qld, are partitioned into northern and southern regions. Based on our knowledge of the Australian fauna, we divided WA at Barrier 4 (between Geraldton and the Pilbara region; see Fig. 2) and Qld at Barrier 1 (area between Townsville and Rockhampton; see Fig. 2).

*Refuge areas and distributional barriers.* Neboiss (1981) reviewed the concept and characterisation of refuge areas and distributional barriers in Australia. Put simply, refuge areas often support additional animal populations due to more hospitable conditions (such as greater rainfall and diversity of vegetation) than the surrounding land. Distributional barriers for dispersal for many Australian animals are predominantly the numerous arid zones and encircling seas. The following Australian arid areas and marine barriers are somewhat variable in impact, because better-dispersing species, such as some widespread leptocerids (particularly some *Oecetis* and *Triplectides*), *Ecnomus* and *Chimarra* species, commonly span some of these barriers.

East Coast. Barrier 1 (dry area between Townsville and Rockhampton) separating NE Queensland's northern or Torresian fauna (predominantly QWT and Cape York Peninsula) from SE Australia's southern or Bassian fauna. (Note: 21 Trichoptera families are recorded in the QWT, 19 in common with southern Australia. However, only ten northern families are recorded outside the QWT, of which nine also occur within the QWT, therefore, the QWT arguably has a Trichoptera fauna more in common with Australia's southern states than with other northern states/territories).

Table 8. Main families and number of Trichoptera species within central Australia (Eyrean province).

Family	Genus	Central Eyrean	Pilbara Eyrean	Total Eyrean
Leptoceridae	<i>Oecetis</i>	7	8	10
	<i>Triplectides</i>	2	3	3
	<i>Triaenodes</i>	0	2	2
Hydroptilidae	<i>Hellyethira</i>	2	1	3
	<i>Orthotrichia</i>	1	1	1
Ecnomidae	<i>Ecnomus</i>	4	3	7
Hydropsychidae	<i>Cheumatopsyche</i>	0	1	1
Philopotamidae	<i>Chimarra</i>	0	2	2
Total 5 families	Total 8 genera	16	21	29

South Coast. Barrier 2 (Bass Strait) separating SE mainland Australia's fauna from that of Tasmania (with 57% of Tasmanian species being endemic). Barrier 3 (arid Nullabor Plain) separating SE mainland Australia's (SE Bassian) fauna from SW Australia (SW Bassian) fauna (with 73.5% of S-WA species being endemic).

West Coast. Barrier 4 (arid zone between Geraldton and Pilbara region) separating SW Australia (southern or Bassian) fauna from the (northern Eyrean) Pilbara. Barrier 5 (arid zone south of Broome) separating the (Eyrean) Pilbara fauna from NW Australia (Torresian), predominantly Kimberley Region.

North Coast (NC). Barrier 6 (arid zone east of WA–NT border) separating NW Australia (Torresian), principally Kimberley fauna, from (NC Torresian) the “Top End” of the NT. Barrier 7 (dry zone east of NT–Qld border), separating (NC Torresian) the “Top End” fauna of the NT from NE Queensland (Torresian), largely the Wet Tropics and Cape York Peninsula.

Neboiss (1981) stated that refuge areas have more hospitable conditions (presumably over long periods of time), and are usually mountainous areas with high rainfall and diverse vegetation. These criteria apply to much of eastern and south-eastern coastal Australia and, not surprisingly, the eastern and south-eastern states of Qld (especially the northern part), NSW, Victoria and Tasmania have the highest number of caddisfly species (Table 1).

States/regions/subregions with highest biodiversity are NSW with 263 species, Victoria with 246 species and N-Qld with 248 species (incl. QWT with 217 spp/taxa – Walker et al., 1995). The highest endemicity is recorded in S-WA, with 73.5% endemic species, followed by N-Qld with 58% and Tasmania with 57%, and lowest in SA with 7%. All other states/regions have endemicity levels of 21–31%.

This pattern of biodiversity is somewhat reflected on a much smaller scale, that is, at individual stream sites. The highest number of Trichoptera taxa recorded in Australia in the literature are from Yuccabine Creek in the QWT region of northeastern Queensland, with approximately 80 species reported, followed distantly by Gunshot Creek (Cape York Peninsula) with 47; Franklin River, TWH, with 45; and OShannassy River in central Victoria, with 40-odd species (see Table 9). Walker et al. (1995) provided further evidence that the QWT area is a high diversity or refuge area, reporting that the ten most speciose sites within the QWT averaged nearly 42 taxa.

*Potential future studies or considerations on Australian caddisflies.*

During the early scoping of this review, we expanded our thinking to filling perceived information gaps in other areas of caddisfly studies, which may lead to some of the following possible outcomes, in increasing order of wishful thinking.

1. *Continue as is.* Unfortunately, reviews like this are never complete for long. No sooner are they written than they are out of date. We have papers underway describing new species and genera.
2. *Embrace new technology.* Our current analysis of the DNA of Australian Trichoptera using the Biodiversity Of Life Database (BOLD) program is producing exceptional results. Information from interim BOLD DNA results will lead to improved identification of individual or complex species, both for expert and novice taxonomists. DNA information will also enable association of adults and larvae. Biological monitoring using DNA is feasible (Shackleton et al., 2021) and is likely to improve our knowledge of the ecology and distribution of caddisflies.
3. *Update Neboiss's (1992a) key for adult Trichoptera.* This key needs amending to include new families and genera and incorporate changes caused by the increase in diversity of species and increased understanding of morphology.
4. *Update web-based keys for adults and larvae.* The web-based key for identification of larvae produced by Gunn et al. (1999), and that in *The bug guide* (Hawking et al., 2009), are based on existing keys and therefore require upgrades.
5. *A web page.* An Australian caddis website, with updated information on Australian caddisfly research, publications and links to useful sites, would be an extremely useful research resource.
6. *Production of an updated atlas of Australian–SW Pacific Trichoptera.* Due to the almost doubling of Australian species since the first atlas in 1986 (Neboiss, 1986b), the usefulness of this publication has declined. It will be difficult to produce an atlas of all species, and any update will presumably include only new species and updated names or distributions for the species in the original atlas. It may also have to be confined to Australia and not include the SW Pacific.

Table 9. Australian stream sites with highest number of Trichoptera taxa listed in the literature.

Site	State	Families	Genera	Species
Yuccabine Ck	NE Qld	15	39	78+–83*
Gunshot Ck	NE Qld	9	21	47*
Franklin R	Tas			45+
OShannassy R	EC Vic	13	30	40#–44+

Sources: \* Wells and Cartwright (1993a), # Dean and Cartwright (1987), + at Roaring Ck in Walker et al. (1995).

7. *Production of a pictorial e-book.* This could consist of photos or illustrations with a single species per page, including adults and larvae, in typical habitats and with brief biological and ecological information. This would have to cover just a selection of species.

### Acknowledgements

This review is dedicated to the late Dr Arturs Neboiss, in recognition of his enormous contribution to knowledge of the Australian Trichoptera fauna. For many years we were privileged to have Arturs as a valued colleague, mentor and friend who was always very keen to provide guidance and advice, as well as access to specimens in the collection under his curatorship. The format of this paper follows to some degree the short summary paper by Arturs on the status of the Australian caddisflies (Neboiss, 1981). The material in this review was originally presented at the Fifth TRIN Taxonomy Workshop, La Trobe University, Albury-Wodonga Campus, 5–6 February 2013, since reviewed and updated. We thank Gunther Theischinger for his inspirational short presentation on the status of dragonflies, presented at the same venue in 2012.

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Note: this list includes mostly taxonomic publications and keys on the Australian Trichoptera fauna published during 1983–2022. See Neboiss (1983) for pre-1983 references and Neboiss (1986a) for pre-1986 references.

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**Supplementary Table**

Supplementary Table 1. A list of Trichoptera families, numbers of described genera (1983 checklist and 2022) and species (family totals in red) recorded in Australian states/territories/regions.

<b>Family/Genus</b>	<b>SPP</b>	<b>#GENERA 2022 (1981)</b>	<b>S-WA</b>	<b>N-WA</b>	<b>NT</b>	<b>N-Qld</b>	<b>S-Qld</b>	<b>NSW</b>	<b>Vic</b>	<b>Tas</b>	<b>SA</b>
<b>Glossosomatidae</b>	<b>23</b>	<b>1(2)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>13</b>	<b>12</b>	<b>3</b>	<b>0</b>
<i>Agapetus</i> Curtis, 1834	23		0	0	0	4	1	13	12	3	0
<b>Hydrobiosidae</b>	<b>67</b>	<b>15(14)</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>8</b>	<b>27</b>	<b>29</b>	<b>33</b>	<b>2</b>
<i>Allobiosis</i> Mosely, 1953	1		0	0	0	0	0	1	0	0	0
<i>Allochorema</i> Mosely, 1953	2		0	0	0	0	0	1	1	1	0
<i>Apsilochorema</i> Ulmer, 1907	4		1	0	0	2	2	3	2	2	0
<i>Austrochorema</i> Mosely, 1953	10		0	0	0	0	0	6	5	1	1
<i>Ethochorema</i> Neboiss, 1977	7		0	0	0	0	2	3	3	3	0
<i>Ipsobiosis</i> Neboiss, 1977	1		0	0	0	0	0	0	0	1	0
<i>Koetonga</i> Neboiss, 1962	1		0	0	0	0	0	1	1	1	0
<i>Megogata</i> Neboiss, 1962	1		0	0	0	0	0	1	1	0	0
<i>Moruya</i> Neboiss, 1962	3		0	0	0	0	0	0	0	3	0
<i>Poecilochorema</i> Schmid, 1989	6		0	0	0	0	0	0	0	6	0
<i>Psyllobetina</i> Banks, 1939	5		0	0	0	0	1	2	4	0	0
<i>Ptychobiosis</i> Neboiss, 1977	4		0	0	0	0	1	2	0	1	0
<i>Tanjilana</i> Neboiss, 1962	2		0	0	0	0	0	1	2	0	0
<i>Taschorema</i> Mosely, 1936	11		1	0	0	0	0	+	3	8	1
<i>Ulmerochorema</i> Mosely, 1953	9		0	0	0	1	2	6	7	6	0
<b>Hydroptilidae</b>	<b>162</b>	<b>15(14)</b>	<b>8</b>	<b>27</b>	<b>44</b>	<b>58</b>	<b>20</b>	<b>38</b>	<b>41</b>	<b>22</b>	<b>12</b>
<i>Acanthotrichia</i> Wells, 1982	1		0	0	0	0	1	1	1	0	0
<i>Acritoptila</i> Wells, 1982	6		2	0	0	2	1	1	0	0	0
<i>Austratrichia</i> Wells, 1982	1		0	0	0	0	0	0	1	0	1
<i>Chrysotrichia</i> Schmid, 1958	1		0	0	0	1	0	0	0	0	0
<i>Hellyethira</i> Neboiss, 1977	30		2	9	10	13	3	7	7	5	4
<i>Hydroptila</i> Dalman, 1819	11		1	1	2	3	4	5	6	4	3
<i>Jabitrichia</i> Wells, 1990	1		0	0	1	1	0	0	0	0	0
<i>Maydenoptila</i> Neboiss, 1977	8		1	0	0	1	1	2	4	3	1
<i>Mulgravia</i> Wells, 1982	2		0	0	0	1	0	1	0	0	0
<i>Orphminotrichia</i> Mosely, 1934	20		0	0	1	4	1	9	7	2	1
<i>Orthotrichia</i> Eaton, 1873	55		0	12	18	23	7	9	12	2	1
<i>Oxyethira</i> Eaton, 1873	18		2	1	5	6	1	3	2	5	1
<i>Scelotrichia</i> Ulmer, 1951	1		0	0	0	1	0	0	0	0	0
<i>Tricholeiochiton</i> Kloet&Hincks,1944	6		0	4	4	2	0	0	0	1	0
<i>Xuthotrichia</i> Mosely, 1934	1		0	0	0	0	1	1	1	0	0

Family/Genus	SPP	#GENERA 2022 (1981)	S-WA	N-WA	NT	N-Qld	S-Qld	NSW	Vic	Tas	SA
<b>Philopotamidae</b>	<b>82</b>	<b>2(2)</b>	<b>2</b>	<b>10</b>	<b>7</b>	<b>17</b>	<b>12</b>	<b>20</b>	<b>17</b>	<b>16</b>	<b>0</b>
<i>Chimarra</i> Stephens, 1829	28		0	10	7	10	4	3	2	1	0
<i>Hydrobiosella</i> Tillyard, 1924	54		2	0	0	7	8	17	15	15	0
<b>Stenopsychidae</b>	<b>9</b>	<b>1(1)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>6</b>	<b>3</b>	<b>1</b>	<b>0</b>
<i>Stenopsychodes</i> Ulmer, 1916	9		0	0	0	2	0	6	3	1	0
<b>Dipseudopopsidae</b>	<b>1</b>	<b>1(0)</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<i>Hyalopsyche</i> Ulmer, 1904	1		0	0	1	1	0	0	0	0	0
<b>Ecnomidae</b>	<b>126</b>	<b>7(2)</b>	<b>9</b>	<b>31</b>	<b>34</b>	<b>38</b>	<b>26</b>	<b>33</b>	<b>33</b>	<b>10</b>	<b>7</b>
<i>Absensomina</i> Cartwright, 2010	1		0	0	0	1	0	0	0	0	0
<i>Austrotinodes</i> Schmid, 1955	11		0	0	0	6	1	3	1	0	0
<i>Daternomina</i> Neboiss, 2003	16		3	0	0	3	3	4	5	3	0
<i>Ecnomina</i> Kimmins, 1953	37		4	1	2	7	6	11	14	3	1
<i>Ecnomus</i> McLachlan, 1864	40		2	21	23	16	14	15	13	4	6
<i>Neboissomina</i> Cartwright, 2011	8		0	1	2	3	2	0	0	0	0
<i>Wellsomina</i> Cartwright, 2010	13		0	8	7	2	0	0	0	0	0
<b>Hydropsychidae</b>	<b>55</b>	<b>9(8)</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>20</b>	<b>16</b>	<b>16</b>	<b>12</b>	<b>10</b>	<b>1</b>
<i>Aethaloptera</i> Brauer, 1875	1		0	0	0	1	0	0	0	0	0
<i>Asmicridea</i> Mosely, 1953	3		0	1	1	1	1	1	1	2	0
<i>Arcyphysa</i> Wells & Neboiss, 2018	20		0	0	0	10	7	3	1	0	0
<i>Austropsyche</i> Banks, 1939	6		0	0	0	0	2	5	3	0	0
<i>Baliomorpha</i> Neboiss, 1984	4		0	0	0	1	3	2	2	0	0
<i>Cheumatopsyche</i> Wallengren, 1891	9		1	3	4	4	1	3	2	3	1
<i>Diplectrona</i> Westwood, 1840	6		0	0	0	1	2	2	2	3	0
<i>Macrostemum</i> Kolenati, 1859	1		0	0	0	1	0	0	0	0	0
<i>Smicrophylax</i> Neboiss, 1977	5		1	0	0	1	0	0	1	2	0
<b>Polycentropodidae</b>	<b>21</b>	<b>5(7)</b>	<b>2</b>	<b>2</b>	<b>6</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>7</b>	<b>0</b>
<i>Adectophylax</i> Neboiss, 1982	1		1	0	0	0	0	0	0	0	0
<i>Neureclipsis</i> McLachlan, 1864	1		0	0	0	0	0	1	1	0	0
<i>Nyctiophylax</i> Brauer, 1865	8		0	1	4	5	0	0	0	1	0
<i>Plectrocnemia</i> Stephens, 1836	8		1	0	0	1	0	1	1	5	0
<i>Polyplectropus</i> Ulmer, 1905	3		0	1	2	1	0	1	1	1	0
<b>Psychomyiidae</b>	<b>3</b>	<b>2(2)</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<i>Tinodes</i> Curtis, 1834	2		0	0	1	2	0	0	0	0	0
<i>Zelandoptila</i> Tillyard, 1924	1		0	0	0	1	0	0	0	0	0

Family/Genus	SPP	#GENERA 2022 (1981)	S-WA	N-WA	NT	N-Qld	S-Qld	NSW	Vic	Tas	SA
<b>Limnephilidae</b>	<b>2</b>	<b>1(1)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>0</b>
<i>Archaeophylax</i> Kimmins, 1953	2		0	0	0	0	0	1	2	1	0
<b>Oeconesidae</b>	<b>1</b>	<b>1(1)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
<i>Tascuna</i> Neboiss, 1975	1		0	0	0	0	0	0	0	1	0
<b>Plectrotarsidae</b>	<b>5</b>	<b>3(3)</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>0</b>
<i>Liapota</i> Neboiss, 1959	1		0	0	0	0	0	0	0	1	0
<i>Nanoptectrus</i> Neboiss, 1977	1		0	0	0	0	0	0	0	1	0
<i>Plectrotarsus</i> Kolenati, 1848	3		1	0	0	0	0	1	1	2	0
<b>Atriplectididae</b>	<b>2</b>	<b>1(1)</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
<i>Atriplectides</i> Mosely, 1936	2		1	0	0	2	0	1	1	1	1
<b>Calamoceratidae</b>	<b>10</b>	<b>1(1)</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>
<i>Anisocentropus</i> McLachlan, 1863	10		0	2	2	5	2	3	3	1	1
<b>Kokiriidae</b>	<b>5</b>	<b>3(3)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>0</b>
<i>Tanjistomella</i> Neboiss, 1974	1		0	0	0	0	0	0	1	0	0
<i>Taskiria</i> Neboiss, 1977	3		0	0	0	0	0	0	1	2	0
<i>Taskiropsyche</i> Neboiss, 1977	1		0	0	0	0	0	0	0	1	0
<b>Leptoceridae</b>	<b>180</b>	<b>15(14)</b>	<b>21</b>	<b>42</b>	<b>51</b>	<b>72</b>	<b>37</b>	<b>47</b>	<b>54</b>	<b>33</b>	<b>15</b>
<i>Hudsonema</i> Mosely, 1936	2		1	0	0	0	0	1	1	1	1
<i>Lectrides</i> Mosely, 1953	2		1	0	0	0	1	1	1	1	0
<i>Leptocerus</i> Leach, 1815	4		0	0	1	3	2	0	1	0	1
<i>Leptorussa</i> Mosely, 1953	1		0	0	0	0	0	1	1	1	1
<i>Notalina</i> Mosely, 1936	15		5	0	0	0	1	5	8	6	1
<i>Notoperata</i> Neboiss, 1977	5		3	0	0	0	0	1	2	2	0
<i>Oecetis</i> McLachlan, 1877	67		5	26	32	36	18	21	16	11	7
<i>Russobex</i> St Clair, 1988	1		0	0	0	0	0	0	1	0	0
<i>Setodes</i> Rambur, 1842	1		0	0	0	1	0	0	0	0	0
<i>Symphitoneuria</i> Ulmer, 1906	4		1	0	0	1	1	1	0	1	1
<i>Triaenodes</i> McLachlan, 1865	48		1	11	13	18	5	3	9	1	2
<i>Triplectides</i> Kolenati, 1859	25		3	5	5	11	7	12	11	7	1
<i>Triplectidina</i> Mosely, 1936	1		0	0	0	0	0	0	1	1	0
<i>Triplexa</i> Mosely, 1953	1		0	0	0	0	1	0	0	0	0
<i>Westriplectes</i> Neboiss, 1977	3		1	0	0	0	1	0	2	1	0

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<b>Odontoceridae</b>	<b>11</b>	<b>2(2)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>0</b>
<i>Barynema</i> Banks, 1939	8		0	0	0	2	3	5	1	0	0
<i>Marilia</i> F. Müller, 1878	3		0	0	0	0	0	2	0	1	0
<b>Philorheithridae</b>	<b>15</b>	<b>5(5)</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>7</b>	<b>11</b>	<b>0</b>
<i>Aphilorheithrus</i> Mosely, 1936	4		0	0	0	0	0	1	1	4	0
<i>Austrheithrus</i> Mosely, 1953	3		0	0	0	0	0	2	3	2	0
<i>Kosrheithrus</i> Mosely, 1953	3		1E	0	0	0	0	1	2	1	0
<i>Ramiheithrus</i> Neboiss, 1974	2		0	0	0	0	0	1	1	1	0
<i>Tasmanthrus</i> Mosely, 1936	3		0	0	0	0	0	0	0	3	0
<b>Antipodoeciidae</b>	<b>1</b>	<b>1(1)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>
<i>Antipodoecia</i> Mosely, 1934	1		0	0	0	1	1	1	1	0	0
<b>Calocidae</b>	<b>32</b>	<b>6(3)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>3</b>	<b>13</b>	<b>11</b>	<b>5</b>	<b>0</b>
<i>Caenota</i> Mosely, 1953	7		0	0	0	3	1	3	1	1	0
<i>Caloca</i> Mosely, 1953	13		0	0	0	0	0	5	6	3	0
<i>Calocoides</i> Neboiss, 1984	3		0	0	0	1	0	2	0	0	0
<i>Latarima</i> Shackleton, 2014	2		0	0	0	0	0	0	2	0	0
<i>Pliocaloca</i> Neboiss, 1984	5		0	0	0	3	2	1	0	0	0
<i>Tamasia</i> Mosely, 1936	2		0	0	0	0	0	2	2	1	0
<b>Chathamiidae</b>	<b>2</b>	<b>2(1)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>
<i>Chathamia</i> Tillyard, 1925	1		0	0	0	0	0	1	0	0	0
<i>Philanisis</i> Walker, 1852	1		0	0	0	0	0	1	1	0	0
<b>Conoesucidae</b>	<b>23</b>	<b>6(6)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>6</b>	<b>19</b>	<b>1</b>
<i>Coenoria</i> Mosely, 1953	1		0	0	0	0	0	1	0	0	0
<i>Conoesucus</i> Mosely, 1936	8		0	0	0	0	0	1	0	7	0
<i>Costora</i> Mosely, 1936	8		0	0	0	0	0	1	2	8	0
<i>Hampa</i> Mosely, 1953	1		0	0	0	0	0	1	1	1	0
<i>Lingora</i> Mosely, 1936	4		0	0	0	0	0	2	2	2	1
<i>Matasia</i> Mosely, 1936	1		0	0	0	0	0	1	1	1	0
<b>Heloccabucidae</b>	<b>1</b>	<b>1(0)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>
<i>Heloccabus</i> Neboiss, 2002	1		0	0	0	0	1	1	1	0	0
<b>Helicophidae</b>	<b>7</b>	<b>2(2)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>5</b>	<b>0</b>
<i>Alloecella</i> Banks, 1939	3		0	0	0	0	0	1	1	3	0
<i>Helicopha</i> Mosely, 1953	4		0	0	0	0	1	3	0	2	0

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<b>Helicopsychidae</b>	<b>15</b>	<b>1(2)</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>6</b>	<b>5</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>0</b>
<i>Helicopsyche</i> Siebold, 1856	15		0	2	2	6	5	7	5	2	0
<b>Tasimiidae</b>	<b>7</b>	<b>2(2)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>1</b>
<i>Tasiagma</i> Neboiss, 1977	2		0	0	0	1	1	2	1	1	0
<i>Tasimia</i> Mosely, 1936	5		0	0	0	0	1	4	4	3	1
<b>Australian total</b>	<b>868</b>	<b>111</b>	<b>49</b>	<b>118</b>	<b>153</b>	<b>248</b>	<b>138</b>	<b>263</b>	<b>247</b>	<b>195</b>	<b>42</b>
% endemics	98		7	21	25	58	25	31	30	57	7

Notes on distribution tables and abbreviated references.

Distribution records for each species are based mainly on published adult records, supplemented by published larval records (+ = unpublished record). The distribution records are based on state and territory boundaries. Abbreviations are WA = Western Australia (N and S), NT= Northern Territory, Qld = Queensland (N and S), NSW = New South Wales (ACT = Australian Capital Territory, here included under NSW), Vic = Victoria, Tas = Tasmania and SA = South Australia (see Fig. 2).