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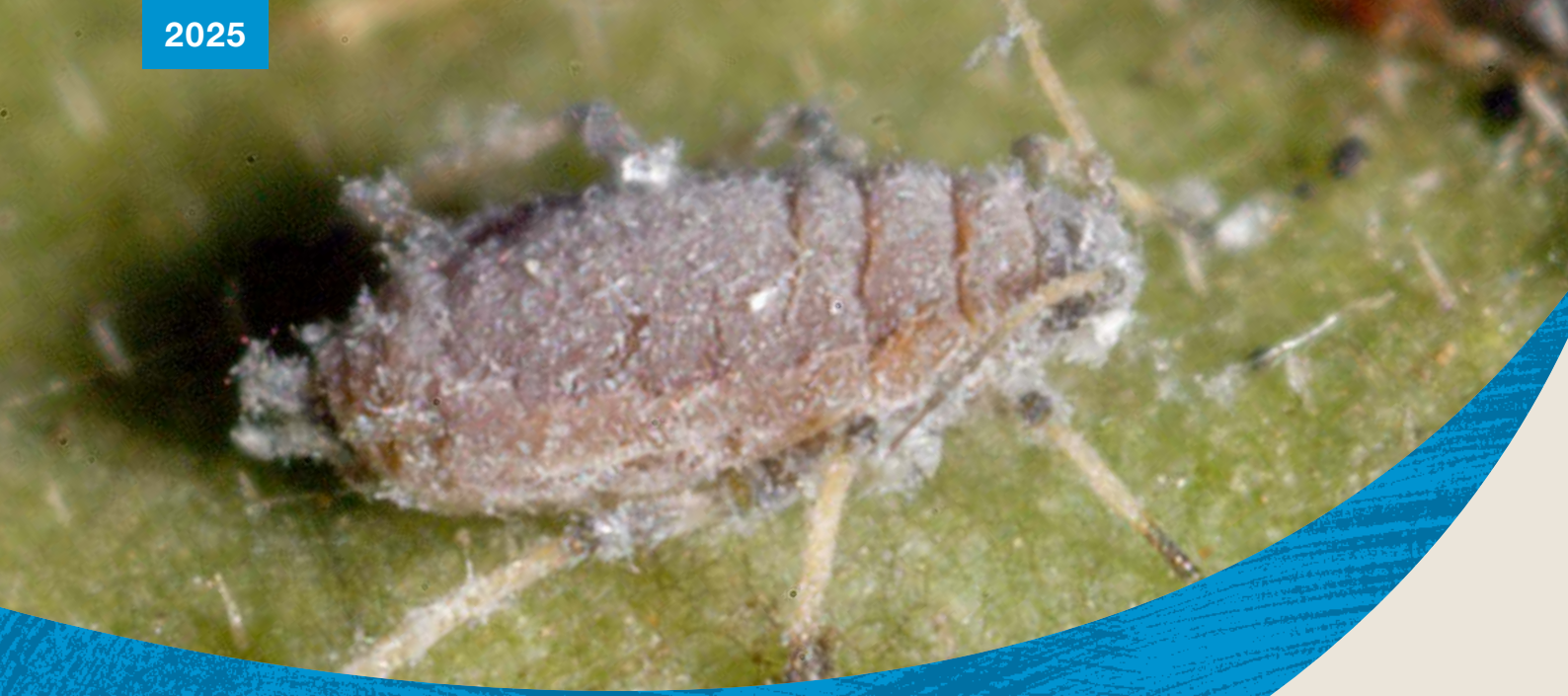

NEW ZEALAND THREAT CLASSIFICATION SERIES 45

Conservation status of indigenous aphids in Aotearoa New Zealand, 2024

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Te Papa Atawhai

Te Kāwanatanga o Aotearoa
New Zealand Government

Cover: *Aphis coprosmae* (At Risk – Naturally Uncommon) on a *Coprosma rubra* leaf. *Photo: Plant & Food Research*

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ISSN 2324-1713 (web PDF)
ISBN 978-1-0670773-8-9 (web PDF)

This report was prepared for publication by Te Rōpū Ratonga Auaha, Te Papa Atawhai / Creative Services, Department of Conservation. Publication was approved by Henley McKegg, Manager Reporting & Insights, Department of Conservation, Wellington, New Zealand.

Published by Department of Conservation Te Papa Atawhai, PO Box 10420, Wellington 6140, New Zealand.

In the interest of forest conservation, we support paperless electronic publishing.

CONTENTS

Conservation status of indigenous aphids in Aotearoa New Zealand, 2024

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Abstract

The conservation status of 22 aphid species found in Aotearoa New Zealand was assessed using the New Zealand Threat Classification System criteria. Nine species have been added since the previous threat classification listing in 2010. In total, two species were assessed as being Threatened, four as At Risk and four as Not Threatened. An additional 12 species were assessed as Data Deficient (i.e. insufficient information was available to assess their conservation status). Eleven of the species have yet to be formally described. This report provides the most comprehensive threat classification of known endemic aphid species in Aotearoa New Zealand and replaces all previous assessments.

Keywords: Aphididae, Hemiptera, insects, threatened species

Bulman, S.; Teulon, D.A.J.; Michel, P. 2025: Conservation status of indigenous aphids in Aotearoa New Zealand, 2024. *New Zealand Threat Classification Series 45*. Department of Conservation, Wellington. 16 p.

1. Background

Aphids (Hemiptera; Aphididae) are insects that feed from the phloem of plants. Some species transmit disease-causing viruses. It is estimated that there are 5000 aphid species worldwide (C. Favre, Aphid Species File, 2018; http://Aphid.SpeciesFile.org), with most being found in temperate regions of the Northern Hemisphere (Blackman & Eastop 2006). The majority of aphid species in Aotearoa New Zealand are introduced (either naturally or through trade) and have naturalised over the past 160 years (Teulon & Stufkens 2002; Macfarlane et al. 2010). The first endemic aphid to be recorded was *Aphis coprosmae* Laing ex Tillyard in 1922, but it was only more formally recognised as an endemic species in the 1950s (Cottier 1953; Teulon et al. 2013). A review of the literature recognised at least 15 endemic species in this country,[1] 11 of which belonged to subfamily Aphidinae (Teulon et al. 2013). This list included several species that were host-plant specific and genetically distinct based on both nuclear and mitochondrial DNA markers but which have not yet been formally described. DNA barcoding studies have since indicated that there are additional unrecognised species within currently accepted genera, particularly *Schizaphis* (Podmore et al. 2019).

The conservation status of aphids in Aotearoa New Zealand was first assessed using the New Zealand Threat Classification System (NZTCS) in 2005, when 12 species were listed (Hitchmough 2002; Hitchmough et al. 2007). The status of aphids was then re-assessed in 2010 (Stringer et al. 2012) using a refined NZTCS methodology (Townsend et al. 2008).

For the current assessment, an expert panel comprising the authors of this report used the work of Stringer et al. (2012) as the starting point and then evaluated newly available information. Species[2] were assessed based on known recent population sizes and were assigned to the Data Deficient category if inadequate data were available to assess the conservation status.

Assessment criteria and categories were interpreted in the context of scientific evidence (e.g. population monitoring) and expert understanding of the ecology of each species (e.g. natural population fluctuations). A precautionary approach was applied where a species was on the border of two possible threat categories, with the higher threat category being chosen. Notes from the expert panel meeting and the rationales for the reclassification of species have been summarised in the present report. Full information can also be found on the assessment page for each species on the NZTCS website (https://nztcs.org.nz/reports/1074).

[1] All native aphid species in Aotearoa New Zealand are endemic. They are found nowhere else and are host specific on native plants. For consistency, we have used 'endemic' rather than 'native' throughout.

[2] All assessments were based on species of aphids. Several of these species have not been formally named but, for consistency, we have used 'species' rather than 'taxa' throughout.

2. Summary

2.1 Additional species

Ten aphid species were assessed for the first time in 2024. Brief consideration was given to including all aphid species in Aotearoa New Zealand. However, the bulk of these (n=106) are considered to be Introduced and Naturalised, and many introduced aphid species in this country are cosmopolitan pests that are not at risk of extinction (Teulon & Stufkens 2002; Macfarlane et al. 2010).

The focus of the assessments was on endemic aphid species that use native Aotearoa New Zealand plant species as hosts. Uncertainty did arise with respect to the status of a few introduced pest species where populations have been found feeding and reproducing on native plant hosts. It is thought that aphids have been blown across the Tasman Sea to Aotearoa New Zealand for millennia (Close & Tomlinson 1975), so some populations of species such as *Myzus persicae*, *Aphis gossypii* and *Neomyzus circumflexus* may have been in Aotearoa New Zealand for considerably longer than indicated by first records after European settlement (Teulon & Stufkens 2002). There is preliminary evidence that a sub-population of *M. persicae* has been present in Aotearoa New Zealand long enough to develop a distinct DNA barcode sequence and has adapted to feed on native plant hosts (Bulman et al. 2021). Despite these uncertainties, we have continued to consider these as introduced species and they were not included for risk assessment.

2.2 Trends

Monitoring of aphids has remained largely the same as for many other insect groups in Aotearoa New Zealand since the previous assessment (Stringer et al. 2012) – that is, research and monitoring of populations is sporadic, with systematic assessments of aphid population sizes across the country seldom achieved. There is no regular monitoring of endemic aphid populations, and observations are biased towards Te Waipounamu / the South Island, with knowledge of endemic aphids in Te Ika-a-Māui / the North Island remaining especially weak. Recent detections of native species are heavily reliant on recreational observations made by researchers, often during trips to distant locations that are known to harbour endemic species. Observations at a small number of sites on Te Pātaka-o-Rākaihautū / Banks Peninsula over the last two decades suggest that endemic aphids may be more abundant in the environment than often thought (at least in this region; see Box 1) and illustrate that detection of aphids is, perhaps unsurprisingly, proportional to the amount of time researchers spend in the field.

Complex life histories involving both sexual and asexual generations and winged and wingless adults are characteristic of many aphid species (Blackman & Eastop 1994). Many introduced aphid species in Aotearoa New Zealand follow the life histories found in their areas of origin but with a tendency for overwintering-egg diapause to be replaced by continuous parthenogenesis (Macfarlane et al. 2010). With a few exceptions, endemic aphids in this country are restricted to closely related host plant species and mostly undergo sexual reproduction and overwinter as eggs (Teulon et al. 2013). Among the most studied endemic taxa, *Paradoxaphis plagianthi* (Kean 2002; Kean & Stufkens 2005) and *Schizaphis* on *Aciphylla* both have continuously parthenogenetic generations, whereas *Aphis healyi* has both parthenogenetic and sexual generations and overwinters as eggs (Teulon 2021). Fluctuations in population numbers for these and other endemic aphid species are not well understood. Periods of rapid asexual reproduction during flushes of fresh plant growth, often accompanying rainfall in spring and autumn, have been observed in a number of endemic species (Teulon et al. 2013; S. Bulman, pers. obs.). In the case of *P. plagianthi*, Kean & Stufkens (2005) postulated that this might be associated with plant nutritional qualities, while an upper threshold of 25°C for the development of this species (Kean & Stufkens 2005) may limit its reproduction over summer in Canterbury (the only place it has been found).

Populations of adult endemic aphids have been found at all times of the year except winter (Kean & Stufkens 2005; Teulon et al. 2013), with species in the genera *Neophyllaphis*, *Sensoriaphis* and *Schizaphis* appearing to be adapted to survive summer conditions as eggs (Teulon et al. 2013). A further consideration that has not been well studied is the influence of subalpine conditions on the life history and seasonality of endemic aphid species inhabiting these environments (Teulon et al. 2013).

The life cycle of aphids includes a winged stage when adult insects may disperse, often over considerable distances if assisted by wind. Little is known specifically about the dispersal of endemic species in Aotearoa New Zealand, but the natural landscape was likely to have been considerably less fragmented in the past than it is today. Some observations indicate localised dispersal of endemic aphid species (Box 1), but endemic species occupy only a small proportion of the available and apparently suitable host plants, suggesting that either dispersal is limited or other factors determine abundance. While some endemic aphid species have been found in urban settings, their occurrence here is much less common than for endemic hemipteran psyllid species, which are often widespread in available habitats and reach high population numbers in gardens and amenity plantings in this country (Martoni et al. 2018).

In Aotearoa New Zealand, aphids are preyed upon by a plethora of natural enemies, such as lacewings and ladybirds (Macfarlane et al. 2010), but there are no quantitative data on the impact of predation on endemic species. Heavily parasitised endemic aphid populations have been observed in the field, raising concern that these were attacks by introduced Aphidinae parasitoids (Teulon et al. 2008; Macfarlane et al. 2010; Cameron et al. 2013), especially after the morphological identification of a putative introduced parasitoid of *Aphis cottieri* (Carver 2000). In the period since the last NZTCS assessment, a long-term collection of parasitoids from endemic aphids has been taxonomically identified, leading to the conclusion that these aphids are primarily attacked by endemic parasitoids, while introduced aphids are generally attacked by specific introduced parasitoids (Cameron et al. 2013; Bulman et al. 2021).

Features of the life cycle, habitat and climate, along with predation and parasitism, mean that aphid populations in Aotearoa New Zealand are ephemeral and thus easily missed by the low level of monitoring dedicated to these insects. As a result, all assessed aphid species were given the qualifiers Data Poor Trend and Data Poor Size.

Of the 22 aphid species considered in this report, two were assessed as Threatened, four as At Risk and four as Not Threatened (Table 1). The remaining 12 species were categorised as Data Deficient because insufficient information was available to assess their conservation status. A total of 11 species (50%) have not yet been formally described.

Table 1. Comparison of the status of aphid species in Aotearoa New Zealand assessed in 2005 (Hitchmough et al. 2007), 2010 (Stringer et al. 2012) and 2024 (this report).

CONSERVATION STATUS	2005*	2010	2024
Data Deficient	4	4	12
Threatened – Nationally Critical	3	3	2
Threatened – Nationally Endangered	1	0	0
At Risk – Relict	0	1	1
At Risk – Naturally Uncommon	4	3	3
Not Threatened	0	1	4
Total	**12**	**12**	**22**

* Different categories and sets of criteria were being used in 2005 (revised categories and criteria were introduced in 2008; Townsend et al. 2008). In this table, those obsolete categories are compared with the nearest equivalent categories that are currently used.

Box 1: Aphids in a Te Pātaka-o-Rākaihautū / Banks Peninsula covenant

A large proportion of native aphid observations over the last two decades have been made in a small (0.8 ha) kānuka (*Kunzea ericoides*) revegetation site at Wairewa / Little River on Te Pātaka-o-Rākaihautū / Banks Peninsula. Since this site was protected from grazing in 1992, an understorey of small-leaved shrubs has developed, with emerging māhoe (*Melicytus ramiflorus* subsp. *ramiflorus*) and ngaio (*Myoporum laetum*). A broader range of native plants from the local area have been planted around the border.

Native aphid species have been progressively discovered in the covenant over time. In 2008, colonies of *Aphis coprosmae* were found on *Coprosma rubra* and *Paradoxaphis aristoteliae* on *Aristotelia serrata*; in 2010, *Paradoxaphis plagianthi* was first observed on *Plagianthus regius*. *Aphis coprosmae* has been observed each year since its first detection, often in abundance, whereas detections of the two *Paradoxaphis* species have been more sporadic. *Aphis cottieri*, which is relatively widespread in the Wairewa catchment, is intermittently observed on *Muehlenbeckia complexa*. This covenant has also seen the emergence of a cluster of previously unknown endemic Aphidiinae wasps parasitising the native aphids.

With the exception of *A. cottieri*, the aphid species seen in this covenant had previously been recorded from a limited number of distant geographical locations. For example, *A. coprosmae* was known from sites near Nelson and The Catlins, and *P. aristoteliae* was known from Southland and Nelson Lakes National Park. It is unclear how so many native aphid species have come to co-occur at this site of relatively low plant diversity, but their colonisation over several years suggests that airborne native aphid species are circulating more widely in the environment than might usually be expected, at least on Te Pātaka-o-Rākaihautū / Banks Peninsula.

(A) *Aphis coprosmae* on a *Coprosma rubra* leaf, (B) *Aphis coprosmae* eggs, and (C) *Paradoxaphis aristoteliae* eggs and nymphs on an *Aristotelia serrata* leaf. *Photos: Plant & Food Research*

Since the last assessment in 2010, the status of one species has improved – *Paradoxaphis aristoteliae* was moved from Threatened – Nationally Critical to At Risk – Naturally Uncommon because it is now known to be more widely distributed (Table 2). In the last decade, this species has been regularly detected at multiple locations on Te Pātaka-o-Rākaihautū / Banks Peninsula and in the Canterbury foothills (Podmore et al. 2019; S. Bulman, unpubl. data). It has also been detected on a second host plant, *Aristotelia fruticosa*, in addition to its known host, *A. serrata*, increasing the potential range available (Podmore et al. 2019).

Two species, *Schizaphis* sp. 3 (NZAPH015; *Aciphylla*) "A1" and *Megoura stufkensi*, were assessed as Data Deficient because of greater uncertainty about their status (Table 2). *Megoura stufkensi* has not been seen since its original detections at Kaitorete Spit in 2005/06 (Teulon et al. 2013). It is unclear if this is genuinely an endemic species, as it has no taxonomic linkage to other endemic aphid lineages. The categorisation of *Schizaphis* sp. 3 reflects the uncertainty created by the DNA barcoding study of Podmore et al. (2019), which has revealed several new, yet to be formally described species within this genus. Knowledge about the distribution of each new species is particularly low.

One species, *Aphis nelsonensis*, was assessed as Threatened – Nationally Critical in 2010 and remains in this category but has been given the qualifier Possibly Extinct. This species has not been seen since 1965 and may have been displaced by the exotic *Aphis* nr *epilobii* (Teulon et al. 2013). One additional species, *Aphis* sp. *Clematis* (AspLW1), was assessed for the first time in 2024 and placed into the Threatened – Nationally Critical category. This species was discovered from a single plant at Wairewa / Little River on Te Pātaka-o-Rākaihautū / Banks Peninsula in 2008 and has not been seen since (Podmore et al. 2019). No systematic survey has been possible in the region, and this aphid may easily go undetected due to the fact that its host *Clematis foetida* is frequently entwined with *Muehlenbeckia complexa*, which is colonised by the more abundant but morphologically similar *A. cottieri*.

Table 2. Summary of changes to the number of aphid species in Aotearoa New Zealand assigned to each conservation status between 2010 (Stringer et al. 2012) and 2024 (this report). A 'neutral' change refers to any movement into or out of Data Deficient.

TYPE OF CHANGE	REASON FOR CHANGE (*n*)	CONSERVATION STATUS IN 2024	NO. SPECIES
Improved	More knowledge (1)	At Risk – Naturally Uncommon	1
		Total improved	**1**
Neutral	Greater uncertainty (2)	Data Deficient	2
		Total neutral	**2**
No change		Data Deficient	4
		Threatened – Nationally Critical	1
		At Risk – Relict	1
		At Risk – Naturally Uncommon	2
		Not Threatened	1
		Total no change	**9**
New listing		Data Deficient	6
		Threatened – Nationally Critical	1
		Not Threatened	3
		Total new listing	**10**
		TOTAL SPECIES ASSESSED	**22**

Table 3. Summary of status changes of aphid species in Aotearoa New Zealand between 2010 (rows; Stringer et al. 2012) and 2024 (columns; this report). Numbers on the diagonal (shaded black) represent those species that have not changed status between 2010 and 2024, numbers to the right of the diagonal (shaded green) represent species with an improved status (e.g. one of the three species assessed as Threatened – Nationally Critical in 2010 moved to At Risk – Naturally Uncommon in 2024), numbers to the left of the diagonal (shaded pink) represent species with a worse status, and numbers without shading represent species that were previously assessed as Data Deficient, were new to this assessment or are no longer considered to be distinct from other species that were assessed in 2024.

		CONSERVATION STATUS 2024					
		Total	DD	NC	Rel	NU	NT
		22	12	2	1	3	3
CONSERVATION STATUS 2010	Data Deficient (DD)	**4**	4				
	Threatened – Nationally Critical (NC)	**3**	1	1		1	
	At Risk – Relict (Rel)	**1**			1		
	At Risk – Naturally Uncommon (NU)	**3**	1			2	
	Not Threatened (NT)	**1**					1
New listing		**10**	6	1			3

3. Conservation status of 22 species of aphids in Aotearoa New Zealand

3.1 Assessments

The conservation status of 22 aphid species in Aotearoa New Zealand is presented in Table 4. Species were assessed according to the criteria of Townsend et al. (2008) and have been grouped by conservation status and then alphabetically by scientific name. Data Deficient appears at the top of the list and categories are then ordered by degree of loss, with Threatened – Nationally Critical at the top and Not Threatened at the bottom. The true status of Data Deficient species will span the entire range of available categories, but species have been placed in this category mainly because they are very seldom seen.

Brief descriptions of the NZTCS categories and criteria for assessments are provided in section 3.2. See Townsend et al. (2008) and Rolfe et al. (2021) for full definitions of categories, criteria and qualifiers, as well as an explanation of the assessment process.

The full data for the assessments listed in Table 4 can be viewed and downloaded at https://nztcs.org.nz/reports/1074.

Table 4. Conservation status of 22 aphid species in Aotearoa New Zealand.

Qualifiers are abbreviated as follows: DPS = Data Poor Size, DPT = Data Poor Trend, OL = One Location, PE = Possibly Extinct, RR = Range Restricted, Sp = Sparse.

ASSESSMENT NAME AND AUTHORITY	HOST PLANT	CRITERIA	QUALIFIERS	STATUS CHANGE
DATA DEFICIENT (12)				
Taxonomically determinate (2)				
Megoura stufkensi Eastop, 2011	*Carmichaelia* spp.		OL	Neutral
Myzus dycei Carver, 1961	*Urtica ferox*			New listing
Taxonomically unresolved (10)				
Aphis sp. *Olearia* (AspMi1)	*Olearia* spp.		RR	No change
Aphis sp. *Veronica* (AspCV1)	*Veronica* (*Hebe*) spp.		RR	No change
Casimira sp. *Ozothamnus* (CaCa1)	*Ozothamnus* spp.			
Rhopalosiphum sp. 1 (RFBAE001-09; Mt Benger)	In association with tussock grassland turf; host uncertain			New listing
Schizaphis sp. 1 (NZAPH013; *Dracophyllum*) "D1"	*Dracophyllum* spp.			No change
Schizaphis sp. 1 (NZAPH059; *Dracophyllum*) "D2"	*Dracophyllum* spp.			New listing
Schizaphis sp. 1 (NZAPH059; *Dracophyllum*) "D3"	*Dracophyllum* spp.			New listing
Schizaphis sp. 1 (NZAPH059; *Dracophyllum*) "D4"	*Dracophyllum* spp.			New listing
Schizaphis sp. 3 (NZAPH015; *Aciphylla*) "A1"	*Aciphylla spp.*			Neutral
Schizaphis sp. 3 (NZAPH129; *Aciphylla*) "A2"	*Aciphylla* spp.			New listing
THREATENED (2)				
NATIONALLY CRITICAL (2)				
Taxonomically determinate (1)				
Aphis nelsonensis Cottier, 1953	*Epilobium* spp.	A(3)	DPS, DPT, PE, RR	No change
Taxonomically unresolved (1)				
Aphis sp. *Clematis* (AspLW1)	*Clematis foetida*	A(3)	DPS, DPT, RR	New listing
AT RISK (4)				
RELICT (1)				
Taxonomically determinate (1)				
Paradoxaphis plagianthi Eastop, 2001	*Plagianthus regius*			
NATURALLY UNCOMMON (3)				
Taxonomically determinate (2)				
Aphis coprosmae Laing ex Tillyard, 1926	*Coprosma* spp.		DPS, DPT, RR, Sp	No change
Paradoxaphis aristoteliae Sunde, 1987	*Aristotelia serrata, A. fruticosa*		DPS, DPT, OL	Better
Taxonomically unresolved (1)				
Neophyllaphis n. sp. (ex *Podocarpus nivalis*)	*Podocarpus nivalis*		DPS, DPT, OL, RR	No change
NOT THREATENED (4)				
Taxonomically determinate (4)				
Aphis cottieri Carver, 1999	*Muehlenbeckia* climbers		DPS, DPT	New listing
Aphis healyi Cottier, 1953	*Carmichaelia* spp.		DPS, DPT	No change
Neophyllaphis totarae Cottier, 1953	*Podocarpus laetus, P. totara, P. acutifolius*		DPS, DPT, RR	New listing
Sensoriaphis nothofagi Cottier, 1953	*Fuscospora* spp.		DPS, DPT, RR	New listing

3.2 NZTCS categories, criteria and qualifiers

Full details of the criteria and qualifiers included in Table 4 can be found in Townsend et al. (2008) and Rolfe et al. (2021). Summary definitions for the categories are presented below.

Data Deficient

Species that cannot be assessed due to a lack of current information about their distribution and abundance. It is hoped that listing such species will stimulate research to find out the true category (for a fuller definition, see Townsend et al. (2008)).

Threatened

Species that meet the criteria specified by Townsend et al. (2008) for the categories Nationally Critical, Nationally Endangered, Nationally Vulnerable and Nationally Increasing.

NATIONALLY CRITICAL

A – very small population (natural or unnatural)

A(1) The total population size is < 250 mature individuals; or
A(2) There are ≤ 2 sub-populations *and* ≤ 200 mature individuals in the larger sub-population; or
A(3) The total area of occupancy is ≤ 1 ha (0.01 km^2)

B – small population with a high ongoing or predicted decline of 50–70%

B(1) The total population size is 250–1000 mature individuals; or
B(2) There are ≤ 5 sub-populations *and* ≤ 300 mature individuals in the largest sub-population; or
B(3) The total area of occupancy is ≤ 10 ha (0.1 km^2)

C – population (irrespective of size or number of sub-populations) with a very high ongoing or predicted decline of > 70%

At Risk

RELICT

Species that have undergone a documented decline within the last 1000 years and now occupy < 10% of their former range and meet one of the following criteria:

A The total population is 5000–20 000 mature individuals *and* stable (± 10%); or
B The total population is > 20 000 mature individuals *and* stable or increasing at > 10%

The range of a relictual species takes into account the area currently occupied as a ratio of its former extent. Relict can also include species that exist as reintroduced and self-sustaining populations within or outside their former known range (for more details, see Townsend et al. (2008)).

NATURALLY UNCOMMON

Species whose distributions are confined to a specific geographical area or which occur within naturally small and widely scattered populations, where these distributions are not the result of human disturbance.

Not Threatened

Resident native species that have large, stable populations.

4. Acknowledgements

We acknowledge Jeremy Rolfe, who initiated the assessment of aphid species in 2019. We warmly thank Amanda Todd for her editorial feedback and Holly Slade for her contribution to the layout of this publication.

5. References

Blackman, R.L.; Eastop, V.F. 1994: Aphids on the world's trees. CAB International, Wallingford, UK. 987 p.

Blackman, R.L.; Eastop, V.F. 2006: Aphids on the world's herbaceous plants and shrubs. John Wiley & Sons, Chichester, UK. 1439 p.

Bulman, S.; Drayton, G.M.; Cameron, P.J.; Teulon, D.A.J.; Walker, G.P. 2021: Endemic New Zealand aphids (Hemiptera: Aphididae) parasitised by native Aphidiinae (Hymenoptera: Braconidae), not biological control parasitoids. *Austral Entomology 60(4)*: 713–721.

Cameron, P.J.; Hill, R.L.; Teulon, D.A.J.; Stufkens, M.A.W.; Connolly, P.G.; Walker, G.P. 2013: A retrospective evaluation of the host range of four *Aphidius* species introduced to New Zealand for the biological control of pest aphids. *Biological Control 67*: 275–283.

Carver, M. 2000: A new indigenous species of *Aphis* Linnaeus (Hemiptera: Aphididae) on *Muehlenbeckia* (Polygonaceae) in New Zealand. *New Zealand Entomologist 22*: 3–7.

Close, R.C.; Tomlinson, A.I. 1975: Dispersal of the grain aphid *Macrosiphum miscanthi* from Australia to New Zealand. *New Zealand Entomologist 6(1)*: 62–65.

Cottier, W. 1953: Aphids of New Zealand. *New Zealand DSIR Bulletin 106*. Department of Scientific and Industrial Research, Wellington, New Zealand.

Hitchmough, R. (comp.) 2002: New Zealand Threat Classification System lists – 2002. *Threatened Species Occasional Publication 23*. Department of Conservation, Wellington, New Zealand. 210 p. www.doc.govt.nz/nz-threat-classification-system-lists-2002

Hitchmough, R.; Bull, L.; Cromarty, P. (comps) 2007: New Zealand Threat Classification System lists 2005. Department of Conservation, Wellington. 194 p. www.doc.govt.nz/nz-threat-classification-system-lists-2005

Kean, J.; Stufkens, M. 2005: Phenology, population ecology, and rarity of the New Zealand ribbonwood aphid, *Paradoxaphis plagianthi*. *New Zealand Journal of Zoology 32(3)*: 143–153.

Kean, J.M. 2002: Population patterns of *Paradoxaphis plagianthi*, a rare New Zealand aphid. *New Zealand Journal of Ecology 26(2)*: 171–175.

Macfarlane, R.P.; Maddison, P.A.; Andrew, I.G.; Berry, J.A.; Johns, P.M.; Hoare, R.J.B.; Larivière, M.-C.; Greenslade, P.; Henderson, R.C.; Smithers, C.N.; Palma, R.L.; Ward, J.B.; Pilgrim, R.L.C.; Towns, D.R.; McLellan, I.D.; Teulon, D.A.J.; Hitchings, T.R.; Eastop, V.F.; Martin, N.A.; Fletcher, M.J.; Stufkens, M.A.W.; Dale, P.J.; Burckhardt, D.; Buckley, T.R.; Trewick, S.A. 2010: Phylum Arthropoda, subphylum Hexapoda: Protura, springtails, Diplura, and insects. Checklist of New Zealand Hexapoda. Pp. 233–467 in Gordon, D.P. (Ed.): New Zealand Inventory of Biodiversity Volume 2: Kingdom Animalia: Chaetognatha, Ecysozoa, Ichnofossils. Canterbury University Press, Christchurch, New Zealand.

Martoni, F.; Bulman, S.; Pitman, A.; Taylor, G.; Armstrong, K. 2018: DNA barcoding highlights cryptic diversity in the New Zealand Psylloidea (Hemiptera: Sternorrhyncha). *Diversity 10(3)*: 50.

Podmore, C., Hogg, I.D.; Drayton, G.M.; Barratt, B.I.P.; Scott, I.A.W.; Foottit, R.G.; Teulon, D.A.J.; Bulman, S.R. 2019: Study of COI sequences from endemic New Zealand aphids highlights high mitochondrial DNA diversity in Rhopalosiphina (Hemiptera: Aphididae). *New Zealand Journal of Zoology 46(2)*: 107–123.

Rolfe, J.; Makan, T.; Tait, A. 2021: Supplement to the New Zealand Threat Classification System manual 2008: new qualifiers and amendments to qualifier definitions, 2021. Department of Conservation, Wellington, New Zealand. 7 p. www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs-supplement-2021.pdf

Stringer, I.A.N.; Hitchmough, R.A.; Larivière, M.-C.; Eyles, A.C.; Teulon, D.A.J.; Dale, P.J.; Henderson, R.C. 2012: The conservation status of New Zealand Hemiptera. *New Zealand Entomologist 35(2)*: 110–115.

Teulon, D.A.J. 2021: Distribution and population trends of two New Zealand endemic aphids (Hemiptera, Aphididae, Aphidinae). *New Zealand Entomologist 44(2)*: 81–87.

Teulon, D.A.J.; Stufkens, M.A.W. 2002: Biosecurity and aphids in New Zealand. *New Zealand Plant Protection 55*: 12–17.

Teulon, D.A.J.; Drayton, G.M.; Scott, I.A.W. 2008: Exotic introductions of primary parasitoids of aphids in New Zealand: the good and the bad. Pp. 421–430 in Mason, P.G.; Gillespie, D.R.; Vincent, C. (Eds): Proceedings of the Third International Symposium on Biological Control of Arthropods, Christchurch, New Zealand.

Teulon, D.A.J.; Stufkens, M.A.W.; Drayton, G.M.; Maw, H.E.L.; Scott, I.A.W.; Bulman, S.R.; Carver, M.; Von Dohlen, C.D.; Eastop, V.F.; Foottit, R.G. 2013: Native aphids of New Zealand – diversity and host associations. *Zootaxa 3647(4)*: 501–517.

Townsend, A.J.; de Lange, P.J.; Duffy, C.A.J.; Miskelly, C.M.; Molloy, J.; Norton, D.A. 2008: New Zealand Threat Classification System manual. Department of Conservation, Wellington, New Zealand. 35 p. www.doc.govt.nz/documents/science-and-technical/sap244.pdf