MONITORING OF POPULATIONS OF *LEPIDIUM HYSSOPIFOLIUM* (SOFT PEPPERCRESS) AT SELECTED SITES UNDER THE JURISDICTION OF STATE GROWTH

Environmental Consulting Options Tasmania (ECO*tas*) for Department of State Growth

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DISCLAIMER

Except where otherwise stated, the opinions and interpretations of legislation and policy expressed in this report are made by the author and do not necessarily reflect those of the relevant agency. The client should confirm management prescriptions with the relevant agency before acting on the content of this report. This report and associated documents do not constitute legal advice.

NOTES

Reference to the Department of Primary Industries, parks, Water & Environment (DPIPWE) now also refers to the Department of Natural Resources and Environment Tasmania.

COVER ILLUSTRATIONS

Main: verge of Tunnack Road where *Lepidium hyssopifolium* persists in roadside gravel. Inset: novel plants of *Lepidium hyssopifolium* growing in gravel of truck pull-off at Spring Hill.

Please note: the blank pages in this document are deliberate to facilitate double-sided printing.

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INTRODUCTION

The Tasmanian Department of State Growth (DSG) engaged Environmental Consulting Options Tasmania (ECO*tas*) to undertake monitoring of selected subpopulations of *Lepidium hyssopifolium* (soft peppercress) as outlined in:

> Department of State Growth (2017). *Species Protection Plan for Populations of* Lepidium hyssopifolium *(Soft Peppercress) under the Jurisdiction of the Tasmanian Department of State Growth, 2018-2028*. Department of State Growth, Hobart. [known herein as the "*Soft Peppercress Protection Plan (SPPP)*"]

Section 2.3.3 of the SPPP requires:

> *During spring or early summer of 2021 and 2026 the Lyell Highway, Maclaines Creek (as shown in Annexure 1 of EPBC 2007/3807) and Tunnack Road sites will be subject to a population count and site mapping to estimate number and location of plants on these sites. This information will be presented in a field survey form with a summary of the sub population location description, plant count and maps of surveyed locations.*
>
> *Spring Hill and Ormley populations are already subject to monitoring under formal DPIPWE arrangements as part of the State Growth Roadside Conservation Program.*
>
> *As part of the periodic compliance reports required under Condition 2 of approval for 2007/3807, State Growth will report on the implementation of this plan and the condition of* Lepidium hyssopifolium *subpopulations within the jurisdiction of State Growth (including populations monitored under DPIPWE managed State Growth RCP).*

It is here noted that reference to "during spring or early summer of 2021 and 2026" was intended to refer to the spring-summer period of the 2021/2022 and 2026/2027 seasons, rather than specifically to the spring-summer within 2021 and 2026 because Lepidium hyssopifolium is a perennial subshrub that is easily detectable and identifiable at most times of the year, such that there is no significant seasonal constraint on this monitoring activity.

Further background on *Lepidium hyssopifolium* subpopulations under the jurisdiction of State Growth was provided in:

> ECO*tas* (2017). *Review of Records and Collections of* Lepidium hyssopifolium *(Soft Peppercress) in Tasmania: Background Information to Inform Long-Term Management Options of Sites under the Jurisdiction of the Tasmanian Department of State Growth*. Environmental Consulting Options Tasmania (ECO*tas*) for Department of State Growth, 30 April 2017.

Subsequent to the information gathered as part of the project described in ECO*tas* (2017), the following papers were also produced, providing a broader overview of the distribution, ecology and conservation status of the species:

> Wapstra, M. (2018). Distribution, habitat characteristics and conservation status of *Lepidium hyssopifolium* Desv. (Brassicaceae) in Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* 152: 33–52.
>
> Wapstra, M. (2018). When divine protection is not enough: extinction of *Lepidium hyssopifolium* Desv. (Brassicaceae) from Tasmanian cemeteries. *The Tasmanian Naturalist* 140: 33–41.

A key to the native and naturalised species of Lepidium was also developed, as follows:

> Wapstra, M. (2018). *Species of* Lepidium *in Tasmania*. IN: *KeyBase*. Council of Heads of Australasian Herbaria online resource [http://www.rbg.vic.gov.au/keybase/index.php/key/keys]

FIELD MONITORING

During February 2022, the target sites were assessed by Mark Wapstra, as follows:

- Maclaines Bridge: 16 Feb. 2022
- Ouse: 2 & 25 Feb. 2022
- Tunnack Road: 20 Feb. 2022
- Ormley: 20 Feb. 2022
- Spring Hill: 20 Feb. 2022

At each site, the previously reported point locations were assessed with reference to the *Natural Values Atlas* data (pre-uploaded to the iPhone iGIS application) and the author's previous knowledge of the sites (ECO*tas* 2017, including site reports).

The waypoint function on the hand-held GPS (Garmin Oregon 600) was used as a field counter of individuals with notes made on site conditions and population structure. Digital images were taken for each site.

Any plant material was collected under DPIPWE permit TFL 21138 (in the name of Mark Wapstra). All data was handled in Excel and transferred to ArcGIS for production of maps. All relevant data has been supplied to the Tasmanian Department of Natural Resources and Environment Tasmania's *Natural Values Atlas* database by the author.

More details are provided on the extent of surveys at each site under **FINDINGS**.

FINDINGS

Maclaines Bridge, Triabunna

The long-term management of this site has changed since the SPPP with the "peppercress reserve" between the "Woodstock" property and the Tasman Highway no longer subject to specific management for *Lepidium hyssopifolium*. In line with the approved SPPP, the road reserve at this location is now part of the routine roadside maintenance program with a management commitment to "survey and protect from any roadside/construction works as far as practical".

Surveys in 2022 confirmed the continued absence of the species (Plates 1 & 2). The species remains present (1 individual) under the spruce tree at the edge of the private property fence above the river slope (Plate 3). The patch of the species under the *Pinus radiata* tree on the southern edge of the "Woodstock" property entrance remains present with 14 individuals of various ages observed (Plate 4).

ECO*tas* (2017) reported the following summary for this site:

> *As part of the present assessment of known sites of* Lepidium hyssopifolium*, I took the opportunity to once again survey this population. Interestingly, there are now 50 individuals (admittedly mainly seedlings but also several mature and fertile individuals), which is approaching the maximum ever reported from this general area of 60. Certainly, what is clear is that despite the failed active management, the species has persisted under the old radiata pine at the entrance to "Woodstock" (and now represented by both mature individuals and 15 seedlings – it was a "good" season for weedy species on road verges across the State), remains present under the old spruce at the end of the "reserve", is still present in the "reserve" and has now colonised the dense grass at the entrance to the reserve (under the gate). Refer to more detailed site report for more information.*

I had informally surveyed the "peppercress reserve" area in 2019 and recorded no individuals but had noted persistence under the *Pinus radiata*, which I reported to State Growth in an email of 14 Mar. 2019, as follows:

> *Last week while on jobs at Orford and Swanport, I contacted John Salmon about checking out the* Lepidium *at Woodstock. I indicated this was very much a personal mission as part of my ongoing research into* Lepidium hyssopifolium*. I checked out the site under the pine tree in the property entrance (southern side) – two mature Lh (1 x 40 cm fruiting, 1 x 35 cm fruiting): no change to this site. None under the pine tree on the northern side of the entrance (never were any). None at the gate to the "reserve" (remember one year I found numerous seedlings?) – John Salmon told me these did grow up but there is now no evidence. Inside the "reserve", there is just one Lh and this is just in the reserve on the fence under the spruce in the northwest corner (1 x 50 cm fruiting). Outside the "reserve" over the fence and under the spruce there are four Lh (2 x 20 cm fruiting, 1 x 15 cm fruiting, 1 x 5 cm seedling).*

That is, the "peppercress reserve" remained unsuitable with no individuals present but the species persists to the north and south under ornamental conifers, with numbers continuing to fluctuate between years.

RECOMMENDATION: Maintain a "watching brief" on this site. No active management is suggested.

Plates 1 & 2. Views of the verge between the "Woodstock" fence and Tasman Highway under routine roadside maintenance: *Lepidium hyssopifolium* remains absent , as per informal surveys of 2019 & 2020

Plate 3. (LHS) Mature spruce at edge of property fence: *Lepidium hyssopifolium* remains present as a mature and fertile individual near the base of the trunk

Plate 4. (RHS) Mature *Pinus radiata* on southern side of entrance to "Woodstock": *Lepidium hyssopifolium* remains present between the gravel of the drive and the fence to the south in the drip zone of the canopy, with 14 various aged plants present

Lyell Highway, Ouse

The survey in 2022 indicated that *Lepidium hyssopifolium* is no longer present, at least at the time of survey. In the weeks preceding the monitoring event, the road verge along the Lyell Highway has been slashed (Plates 5 & 6). While this resulted in the specific site supporting the species also been reduced in height (it was ca. 1-1.5 m tall exotic grass), there was no evidence amongst the slashed grass of fragments of *Lepidium hyssopifolium*, which would have been expected had the species still been present (because several had bene quite large). It is more likely that the species has already "naturally" senesced and/or been outcompeted in the years between 2017 and 2022.

ECO*tas* (2017) summarised this site as follows:

> *The context for long-term conservation management of this site is poor. The species is restricted to a small patch in dense roadside grass. It appears to have been present for some time (based on size of some plants), although this cannot be certain. In the absence of any active management, it seems likely that the species will persist for some time, perhaps eventually disappearing through natural attrition. Occasional (but unplanned) roadside slashing of grass is likely to be beneficial. However, no timing (schedule, time of year) is suggested because the species has flowers and fruit for much of the year.*
>
> *In my opinion, this site is not suitable for formal inclusion in the Department of State Growth's Roadside Conservation Program. At most I recommend that the standard yellow roadside markers be placed about 10 m each side of the patch. I do not recommend a particular slashing regime. It may be prudent to suggest that any herbicide application within the marked zone be a grass-only herbicide, although even this may not be beneficial to the species because while it may reduce the cover of grass, it will probably only encourage the growth of herbaceous weeds, which may outcompete* Lepidium hyssopifolium*, which is probably "hanging on" because of the shade afforded by the tall grass.*

RECOMMENDATION: Maintain a "watching brief" on this site (just in case it reappears). No active management is suggested.

Plate 5. (LHS) Habitat of *Lepidium hyssopifolium* on verge of Lyell Highway near Ouse – the species used to occur in the tall dense grass close to the fence

Plate 6. (RHS) Recently slashed road verge showing slashed barrier mesh (that used to demarcate the species but long since collapsed amongst the dense grass, hence it got slashed)

Tunnack Road

The survey in 2022 indicated that *Lepidium hyssopifolium* is still present at this site, which was genuinely surprising given the expected demise due to lack of supporting ornamental conifers (or mature natives), the dense grass and the slashing regime. At this site, the species remains in the loose gravel between the sealed road verge and the slashed grassy verge of the road (Plate 7), where it is now represented by seven individuals ca. 5-15 cm tall (notably still producing flowers and fruit).

ECO*tas* (2017) summarised this site as follows:

> *This is one of several sites along Tunnack Road between Baden (southern end) and Oatlands (northern end) for Lepidium hyssopifolium that may have originated from one or two roadside gravel piles, possibly sourced from around Oatlands, where Lepidium hyssopifolium is locally abundant. The sites along Tunnack Road were nearly all short-lived as none occurred in typical habitat i.e. not under large old conifers – sites appeared to be random adventitious "pop-ups" caused by road works (Tunnack Road was extensively re-sealed).*
>
> *Of all the sites checked, this is the only one that was extent. It is restricted to a few plants growing about 1-2 m from the sealed road edge amongst frequently slashed dense grass and weeds. The long-term prospects are poor and it is reasonable to assume this localised patch is just "hanging on" by chance. For the record, State Growth has a permit under the Tasmanian* Threatened Species Protection Act 1995 *allowing all maintenance works to be undertaken within 3 m of the sealed edge of a road without consideration of threatened flora that may be growing in roadside gravel. I fully support this management regime. It would be nonsensical to then manage this localised site as a part of the formal Roadside Conservation Program, especially since road maintenance works would also be exempt from referral under the EPBCA.*

RECOMMENDATION: Maintain a "watching brief" on this site. No active management is suggested.

Plate 7. Site still supporting *Lepidium hyssopifolium* on the verge of Tunnack Road – the keys (front), GPS (middle) and notebook (far) indicate the three specific locations of 2, 1 & 4 individuals, respectively

Ormley, Esk Main Road

The assessment in 2022 indicated just 19 individuals of *Lepidium hyssopifolium*, several near-dead but also multiple ages of healthy plants, all effectively within the drip zone of the pine between the fence and the road verge (Plates 10 & 11). While I did not enter the private property, I did not observe any individuals of *Lepidium hyssopifolium* "over the fence". The abundance in 2022 appears to be well down on last year's formal monitoring by North Barker Ecosystem Services (104 ± 5) but similar to informal observations in the last couple of months (G. Wardle pers. comm.).

ECO*tas* (2017) summarised this site as follows:

> *This is one of State Growth's current Roadside Conservation Program sites. Lepidium hyssopifolium is performing extremely well (see site report), present in high numbers along the densely grassy roadside verge and extending into the private property. The species appears to be tolerating the roadside slashing and herbicide regime, persisting in the gravel of the immediate road verge (this is quite typical for the species viz. Oatlands where it grows through compacted blue metal and gravel of car parks).*
>
> *I see no need to change the current management regime at this site. I do note, however, that the persistence of the population in the long-term will be reliant on the maintenance of the shading conifers. These are on private property and while there may be an informal agreement to maintain this tree, State Growth has no direct influence over this (e.g. landowner changes, primary production priorities, etc.). It is noted that this is one of the longer-persistent sites for the species and continuing the effort to maintain the population is warranted.*

RECOMMENDATION: Active intervention as this site is part of RCS Program management. Propagation of plants with a view to planting on private land is being progressed.

Plates 8 & 9. Overview of the Ormley site – *Lepidium hyssopifolium* occurs under the macrocarpa pine

Plates 10 & 11. *Lepidium hyssopifolium* persisting beneath the macrocarpa pine

Spring Hill, Midland Highway

Monitoring in 2022 indicated that the species is persisting at this site, as follows (Figure 1):

- eastern side of Midland Highway

  This was a locally dense population associated with ornamentally planted *Acacia* species. These have been removed as part of the road upgrade works. In 2014, when the species was originally recorded, there were 33 individuals. In 2017, when I checked on the site, I recorded 71 individuals. In 2022, there is a single plant, growing on the new road bank (Plates 12 & 13), which I believe represents a new plant (even though it is already 0.5 m tall) arisen post-works. The site that once supported the *Acacia* species is now infested with tall exotic grass and thistles. For the record, I also (once again), surveyed for *Lepidium hyssopifolium* further south higher on this highway cutting near a macrocarpa pine (superficially ideal habitat) but did not record any further plants.

  RECOMMENDATION: Whether this single plant on the edge of a new roadside batter will persist or not is unknown but the species can be long-lived and the plant is fertile, so is likely to act as a local seed source. In my opinion, it should be protected from inadvertent slashing.

- western side of Midland Highway (truck pull-off)

  Prior to the present assessment, I had never recorded *Lepidium hyssopifolium* amongst the weedy/grassy verge of the truck pull-off. This year, I recorded seven individuals growing in the gravel at the edge of the truck pull-off, amongst recently slashed grass/weeds (Plates 14-17.) I presume these plants all to be new since my surveys in 2017.

  RECOMMENDATION: The long-term prospect for these plants is probably not good, given the high activity at this site. I do not suggest any active intervention.

- western side of Midland Highway (northern patch)

  This appears to be a persistent population, benefiting from the planted *Eucalyptus globulus* and *Acacia baileyana*, although the latter is now sprawling and becoming dense (Plates 18 & 19), probably to the detriment of *Lepidium hyssopifolium* (although there are still individuals amongst its dense shaded canopy).

  When first recorded in 2014, 25 plants were noted. I recorded 87 in 2017. Formal monitoring as part of the RCS Program recorded 44 plants in 2017, 41 and/or 44 in 2018 and 24 in 2019. In 2022, I recorded 20 on the highway side of the fence in various stages of growth. I also recorded an additional five plants along the fenceline (or just inside the fence), bringing the total of this sub-site to 25 in 2022 i.e. on a par with recent years (G. Wardle pers. comm.).

  RECOMMENDATION: I suggest that some judicious trimming of the lower ground-hugging branches of the *Acacia baileyana* in the next 12 months may be prudent to reduce the degree of shading.

- western side of Midland Highway (southern patch)

  This also appears to be a persistent population, growing amongst grass- and weed-infested scrubby regrowth *Acacia dealbata* on the rise above the now very old highway pavement (Plates 20 & 21).

  When first recorded in 2014, 7 plants were noted. I recorded 42 in 2017. Formal monitoring as part of the RCS Program recorded 17 plants in 2017 and apparently 1 in 2018. In 2022, I recorded nine plants, an apparent reduction from previous years.

  RECOMMENDATION: This site may benefit from some limited removal of *Acacia dealbata* and light slashing of grass to open the canopy slightly.

OVERALL RECOMMENDATION: This site should remain as part of the formal RCS Program, with periodic monitoring, especially if some of the minor suggestions are implemented.

ECO*tas* (2017) summarised this site as follows:

> *This population comprises two main parts: there is a locally dense patch on the eastern side of the Midland Highway under some weedy wattles, and two patches on a steep rise on the western side of the Midland Highway above the truck pull-off.*
>
> *The eastern population is restricted to the shade of several closely-planted introduced wattle species (*A. baileyana, A. pravissima, A. floribunda, A. longifolia*). It is assumed that these were planted as some form of highway beautification. However, as with many of these shrubby wattles, these specimens are all showing signs of senescence (these species simply do not live long). Current management is to slash the grass around the clump of wattles only.*
>
> *As soon as the wattles die, it is presumed that Lepidium hyssopifolium will begin to decline. It may persist amongst dense grass for some time (as it has at sites such as Hollow Tree Road) and may even spread due to roadside slashing now being able to cut through the fertile heads and deposit seed further afield. This obviously implies that active management is not warranted. Note that I am not suggesting that the population should not be protected during any road works – I fully support temporary protection measures (such as barrier mesh and/or bollards) to minimise the risk of inadvertent disturbance during works.*
>
> *The two sites on the western side of the highway are actually growing on the flat above the now very steep roadside batter – this flat is the old alignment of the Midland Highway. The northern patch occurs under planted (c. 20-30 years old?)* Eucalyptus globulus *and the introduced* Acacia baileyana*. The southern patch is growing amongst very dense grass and young* Acacia dealbata*. There is no active management of either of these patches. There is no reason to expect that the species will not persist in the long-term in the continued absence of active management i.e. benign neglect is recommended for this site. I understand that the species has been fully accounted for in the design of proposed upgrades to the Midland Highway in this area and that there will be no disturbance to this part of the population.*
>
> *There is no practical need to install the standard yellow roadside markers for either the eastern or western side of the highway as they will serve no practical purpose. This is based on the current road configuration but may need to be re-assessed if changes affect how exposed the populations become to inadvertent disturbance.*

In 2019/2020, the Midland Highway upgrade included field survey for *Lepidium hyssopifolium,* design changes to avoid populations and exclusion zones to protection known populations.

Plates 12 & 13. Single, presumed new, plant of *Lepidium hyssopifolium* on new road bank – the white pages of the notebook are sitting on top of the plant


Plate 14. (LHS) Overview of truck pull-off – *Lepidium hyssopifolium* occurs in the soft gravel at the edge of the slashed grass

Plate 15. (RHS) Plants of *Lepidium hyssopifolium* growing in gravel at edge of truck pull-off


Plates 16 & 17. Views of where *Lepidium hyssopifolium* occurs in the gravel edge of the truck pull-off: LHS – looking west frrom highway; RHS – looking east from grass (notebook indicates location of plants)


Plates 18 & 19. Habitat of *Lepidium hyssopifolium* at the northern site showing how dense the *Acacia baileyana* is becoming – the species persists beneath the wattle but seems "happier" in the open under the bare trunk and sparse canopy of the *Eucalyptus globulus* and over the fence amongst dense grass


Plates 20 & 21. Habitat of *Lepidium hyssopifolium* at the southern site showing how *Acacia dealbata* is gradually thickening up, perhaps to the detriment of *Lepidium hyssopifolium*

Figure 1. Distribution of *Lepidium hyssopifolium* at Spring Hill: red = *Natural Values Atlas* records pre-2022; yellow = 2022 point locations