Ecological Management
Peripatus (velvet worm) Translocation

CASE STUDY

Issue 1, February 2017

Expansion of the state highway (SH1) corridor in the Caversham Valley near Dunedin was undertaken by the NZ Transport Agency between 2010 and 2012 ("the Project"). The purpose of the Project was to improve the safety and efficiency of vehicular movement along this stretch of highway which links Dunedin city centre with Mosgiel and the south. A widening of the designation to accommodate the increased road corridor was obtained prior to works commencing.

Peripatus, sometimes referred to as velvet worms, have remained largely unchanged for 500 million years. They are so unique they are classified in a Phylum of their own (Onychophora). To give context on how special this is, people are in the Phylum Chordata, which they share with, cats, frogs, birds and fish. New Zealand has possibly 30 different species of peripatus, but only nine have been described. Peripatus are thought to inhabit moist environments like damp woody debris.

The NZ Transport Agency became aware of the significance of the Caversham Valley peripatus (Peripatoides novaezealandiae) through the process of Notice of Requirement approvals for the project, along with consultation with local residents and interested ecologists.

The widening of the highway footprint involved expansion onto residential and reserve properties owned by the Dunedin City Council, which were either known or thought to be peripatus habitat. This required translocation of the peripatus population as part of an impact management approach implemented by the project.

To date there has been no previous attempts to relocate peripatus in New Zealand. This case study focuses on the peripatus translocation undertaken by NZ Transport Agency in the Caversham Valley.

Caversham Valley Road, Dunedin

Threatened Species?

Peripatus species, including *Peripatus novaezealandie* found in Caversham Valley, are not currently listed as threatened species. Little work has been undertaken to determine the taxanomic status of the Caversham Valley peripatus (*Peripatus novaezealandie)*, however Gleeson and Ruhberg[1] (2010) believe this species is likely to be made up of a complex, or number of species, that are yet to be classified by taxonomists. If the Caversham population was reclassified as a unique species or genus then their threatened species classification status could change as a result of their restricted range.

1 Gleeson DM, Ruhberg H 2010. ***Phylum Onychophora: velvet worms, peripatus.*** 3 3 In: Gordon DP ed. New Zealand inventory of biodiversity Volume 2 : Kingdom Animalia : Chaetognatha, Ecdysozoa, Ichnofossils. Christchurch, Canterbury University Press. Pp. 36-39.

Caversham Valley peripatus. *Photograph courtesy of Otago Daily Times.*

Impact management

An "impact management framework" was implemented on the Project in order to guide the development of translocation methodology and future management of peripatus in the area. This involved the following steps, which were also required by designation conditions:

1. Protect an area of suitable habitat equivalent to that lost to the highway footprint;
2. Identify areas of land adjacent to the project (either private, council land or land purchased by the NZ Transport Agency) which would provide suitable habitat;
3. Enhance the new habitat to increase its potential carrying capacity for peripatus;
4. Search for, capture and translocate peripatus individuals occupying the highway footprint to the new habitat;
5. Monitor release and occupation sites within the new habitat to assess translocation success (i.e. survey peripatus occupation of the artificially constructed monitoring sites);
6. Carry out roadside planting in a way that supports the ecological habitat of the area;
7. Fund Department of Conservation to prepare a Peripatus Management Plan for peripatus in the Caversham Valley; and
8. Vest surplus land purchased by the NZ Transport Agency with Department of Conservation upon completion of the works for ongoing peripatus protection.

Addressing information gaps – pre-translocation surveys

Before undertaking the translocation, additional information about the resident populations and associated habitat attributes were gained via ecological surveys.

An initial survey highlighted the location of existing populations and the attributes of the habitat used by peripatus. Using the information gained about habitat preferences, a second survey determined whether there were any suitable areas for release of peripatus within the identified translocation land areas.

This information was essential to further planning around the logistics, practicality of collecting and moving the animals, as well as determining specific translocation sites. Important information gained through the survey included:

- Peripatus appeared to be reasonably widespread on the south-facing flanks of Caversham Valley adjacent to the area of proposed works, including at 23 locations within the highway footprint;
- There was no unoccupied suitable habitat in either of the land parcels identified for translocation. Consequently an alternative source of suitable habitat for the release of translocated animals was required;
- The size of the population appeared to be constrained by the availability of suitably decayed woody habitat; and
- Woody material occupied by peripatus was of a nature that it could be moved in its entirety to release sites i.e. whole logs uplifted and moved to a relocation site.

Translocation

Using the mitigation framework and the information provided by the surveys, a translocation plan was prepared. The plan included habitat enhancement requirements for the release sites and confirmed the translocation methodology.

Translocation was carried out in conjunction with the Project enabling works. Twelve release sites were prepared by felling trees and leaving the decaying woody material in situ. Decaying stumps and logs (identified previously during surveys) were lifted and moved in their entirety (including their peripatus inhabitants) from the Project footprint to the release sites, either by skilled digger operators or manually. All extracted peripatus habitat was placed at release sites within an hour of being removed. The translocation activities were a joint effort between NZ Transport Agency contractors, local ecologists (including Dave Randle a Caversham Valley resident and keen peripatus ecologist) and other volunteers.

The translocation plan considered known habitat preferences of peripatus, as well as survey results, to develop criteria to help identify areas where peripatus could be relocated too.

This included south-facing moist slopes, contiguous stands of forest trees with a well formed linked canopy, abundant decomposing woody material and organic matter on the forest floor, cracks and crevices that are not accessible to rodents, and minimal disturbance (i.e. low levels of human activity).

Monitoring success

Monitoring was considered an essential step to confirm whether the translocation had been successful and was a condition of the designation. Due to the difficulties involved with tracking or hand searching for individual peripatus, the only way to monitor for success was to construct artificial monitoring sites so their presence could be safely checked. These artificial monitoring sites were constructed from brick stacks covered by organic material at peripatus release locations. Once translocation was complete, twelve brick stacks were placed against felled trees and adjacent to translocated logs and stumps containing peripatus. Three control stacks were erected in suitable habitat away from release sites, and an additional three control sites were constructed on dry exposed sites considered unsuitable for peripatus (six control sites in total).

In order to measure the success of the translocation an occupation target (of the brick stacks) was set. The lack of documented attempts at peripatus translocation made it difficult to set a meaningful occupation target. Despite this a target was specified within the Translocation Plan whereby if "50% of the release sites were occupied by peripatus 12 months after release then the programme can be considered to have contributed significantly to the enhancement of the peripatus population[1]".

Translocating decaying stumps and logs from project site to translocation site

Monitoring – are they still there?

The brick stacks were monitored for occupation by peripatus in May 2013, approximately six months after the translocation was carried out. Monitoring found no peripatus occupying any of the translocation brick stacks or the control (suitable and unsuitable habitat) brick stacks. Wood piles adjacent to each of the brick stacks were also checked for occupation and some peripatus were found in this woody material. One hypothesis for the non-occupation of brick stacks alluded to the dry summer conditions preceding monitoring in 2012/13.

Extensive desiccation of the forest floor was observed during monitoring, with little organic decay taking place. This may have resulted in the activity of peripatus being limited and reducing the likelihood of peripatus colonising the brick stacks in the six months since translocation took place[2]. In addition, the artificially created stacks may not have sufficiently replicated the habitat preferences of peripatus (which are largely unknown) and may not ever be occupied.

Further monitoring is required to confirm whether the translocation was successful and whether population numbers have recuperated, and is planned for the near future.

Ongoing Management

In order to further protect the Caversham Valley peripatus population the NZ Transport Agency were required, by a designation condition, to fund a management plan for peripatus which is available from the NZ Transport Agency (https://www.nzta.govt.nz/projects/caversham-highway-improvements/). While the preparation and funding of the development of a management plan was covered by the Notice of Requirement conditions for the State Highway designation, responsibility for implementation of the management plan was not. To date, no post translocation management of the peripatus population has been undertaken.

2 Connolly, T, 2013. ***Caversham Valley Peripatus: Survey, Translocation & 6-Month Post Translocation Monitoring*** (Caversham Highway Improvements: Stage 2- Caversham Valley Safety Improvements). Opus International Consultants Ltd, Hamilton

Lessons learnt

- Monitoring over numerous years allowing for variations in climatic conditions is required to confirm the success of a translocation or management strategy.
- Where possible, methodologies to monitor mitigation should be tested for effectiveness if previously unused on a target species. For example, different artificial monitoring sites could have been trialled prior to translocation to help select an optimal method to measure success of the translocation.
- Adaptive management is a key to the success of any ecological management strategy. By carrying out the translocation process some important information has been gained that could be transferred to other projects. For example, the impact management could have been improved by establishing alternative methods if the occupation target was not met (i.e. were found not to be occupying brick stacks).
- Moist decaying material is an essential component of peripatus habitat at translocation spots. Projects need to consider the time required to provide suitable alternative decaying habitat if suitable habitat does not already exist.
- It is important to frequently monitor habitat at translocation sites to ensure it's ongoing suitability. Ensuring habitat at translocation sites was kept moist was thought to be essential to the survival of peripatus.
- Land acquisition and the associated negotiation process is an important consideration when undertaking translocations. Land outside the designation was required for peripatus translocation sites along with long term management/habitat enhancement.
- Preparing plans to help guide the ongoing management of a habitat or species is an essential step in mitigating potential impacts from a roading project. It is imperative that:
  - responsibilities for the implementation of such plans are established early on in the project process to ensure the value of the plan is not lost;
  - one final management plan with clear outcomes and responsibilities is agreed by all parties so there is no confusion as to who has to do what; and
  - there is commitment and funding to undertake monitoring, and clear understanding of when this will be, methods, reporting etc.

Local landowner Dave Randle looking for peripatus with NZ Transport Agency staff . *Photograph courtesy of Otago Daily Times.*

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