# Global Re-introduction Perspectives: 2010

## Additional case-studies from around the globe

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IUCN/SSC Re-introduction Specialist Group (RSG)

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# Translocation of the giant Gippsland earthworm in Victoria, Australia

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## Introduction

The giant Gippsland earthworm (*Megascolides australis*) (hereafter GGE) is endemic to an area of approximately 40,000 ha in the Gippsland region of south-eastern Australia. Its distribution is fragmented and is determined by a combination of topographical, hydrological and soil factors. There have been dramatic changes to the original forested habitat, mostly associated with agricultural development. The vast majority of populations now occur on private land, with increased pressures from infrastructure development associated with urban expansion. GGE has a long life span, low reproductive and recruitment rates, and low dispersal ability; these render populations vulnerable. The GGE is listed as Vulnerable by the IUCN (IUCN/SSC, 2003), Vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999, and as Threatened under the Victorian Flora and Fauna Guarantee Act 1988. A large population of GGE's was found on a hillslope in the path of a proposed realignment of a dangerous section of the South Gippsland Highway near the small, rural township of Loch, Victoria. Options for the conservation of this population included establishing an alternative route for the highway or attempting to translocate the population. Due to the likelihood of encountering other populations with an alternate alignment, translocation was considered the most feasible option. Translocation of GGE's had not been attempted previously and it appears to be the first for any earthworm species.

## Goals

- Goal 1: The overall objective is *in situ* conservation and protection of GGE populations where possible, and consideration of other conservation measures, such as translocation, if the former is not feasible.

Giant Gippsland earthworm in box

- Goal 2: Refine and test GGE translocation protocol to reduce mortality inherent in existing collecting methods and enable the transfer of as many individuals as possible across age classes to re-introduction site.
- Goal 3: Habitat recreation and management of re-introduction site.
- Goal 4: Development of monitoring protocols for translocated populations.

## Success Indicators

- Indicator 1: Decision to proceed with translocation on the basis that no feasible alternatives to protect and maintain the target population were available.
- Indicator 2: Establishment of effective translocation protocols (collecting, transfer & release).
- Indicator 3: Short-term and long-term survival of translocated population.
- Indicator 4: Successful long-term breeding of GGE at translocation site.

## Project Summary

**Feasibility:** GGE is a subterranean species with no above ground signs to indicate presence. Individuals are very fragile and easily injured. Precise information regarding suitable habitat is unavailable. Due to the species large size and complex system of horizontal and vertical burrows, individuals can only be dug out by hand, a slow process that often results in high mortality. These factors make translocation of this species technically very difficult. The decision to conduct the translocation was made at a workshop in 2003 involving relevant specialists. Permission to proceed was obtained from the Commonwealth Government through a referral under the Environment Protection and Biodiversity Conservation Act. A project team (comprising biologists, geomorphologists, geneticists, an animal health expert, and road engineers) was established to oversee the project.

The project comprised three phases: 1) development and testing of translocation techniques, selection of translocation sites; 2) translocation of population from the target to the receptor site; and 3) implementation of a monitoring program to assess the success of the translocation. During 2004, trials were conducted on collecting methods including using non-lethal chemicals, electrical currents, and physical techniques. The target population was situated on a hillslope and trials indicated that the most efficient collection method involved pumping water into a trench above the extraction site to soften the surrounding soil, making hand extraction

Source site of the giant Gippsland earthworm

of individuals less likely to result in injury of the worm. A small scale translocation was attempted to assess survival. Surveys were conducted for suitable translocation receptor sites close to the source population.

Habitat of the giant Gippsland earthworm

**Implementation:** While several potential relocation sites were identified, the final site was chosen because 1) it was close to the original colony and supported similar conditions; and 2) it was easily accessible. To assist GGE re-establishment, a comparable soil profile of approximately 1.5 m in depth was established by transferring soil from the original population site. The surface was seeded with pasture grasses and allowed to settle for several weeks. GGE were collected using a small excavator and hand tools by a small, trained team over two months. Excavated worms and egg cocoons were placed in plastic tubs lined with wet hessian and soil. They were taken to an on-site, air-conditioned demountable shed where they were weighed, measured and their age class and reproductive status recorded. Worms were released later that same day into 60 cm x 50 cm x 30 cm holes arranged in a grid pattern with each hole 0.5 m apart. The holes were watered before releasing one to two earthworms, then gently covered with soil and watered again. A sprinkler system was used to keep the covered holes moist. A total of 901 individuals were extracted between October-December 2005; 611 were subsequently translocated, in addition to 18 egg cocoons. All age classes were represented in the translocation.

**Post-release monitoring:** A five year monitoring program (2006-2011) was established  Attempts to develop non-destructive monitoring techniques, such as subterranean sound recorders to measure GGE movement or ground penetrating radar to monitor burrow development, were not fully explored due to budgetary constraints. Monitoring was conducted manually by 1) listening for gurgles, the sound GGE makes when moving through moist burrows; 2) digging of soil quadrats to find active burrows and fresh cast; and 3), assessing the breeding status of a small number of GGE.

Due to the inherent difficulties in monitoring, GGE it is not possible to obtain information on numbers of earthworms that survived the translocation. Monitoring during the first year after translocation (2006) found that an unknown number had survived at least 12 months after translocation and there was evidence of breeding. Monitoring in 2007 revealed a more active breeding population with gurgles and burrows located across the entire translocation site. South Gippsland

Removing giant earthworm from the soil

experienced a drought that had its most severe impacts during 2008 and early 2009. In 2008, only one earthworm was recorded in the only area that had moist soil. By May 2009, the entire site had dried, with no signs of recent earthworm activity. However, in September 2009 and in May 2010, after good rainfall, an active population was found. It is speculated that the earthworms may have been able to survive the severe drought conditions by moving deeper into the soil. The receptor site was created by building up the soil profile so that the moist soil was several meters below the soil surface. For the first 18 months after translocation, the receptor site was watered during summer with a sprinkler system. This was crucial for the initial establishment of the population and for their survival from 2005-2007, during a period of severe drought. Observations of soil moisture levels varied considerably across the site. The location of the quadrats with GGE corresponded to the areas with high visible soil moisture content. A year remains of the five year monitoring plan.

## Major difficulties faced

- Subterranean habitat of GGE. Lack of information about the complex topographical, hydrological and soil factors required by GGE to assist creating and sustaining essential habitat parameters for survival.
- No effective non-destructive collecting and monitoring techniques have been developed. Although a collecting method that reduced mortality from 50% to 30% was used, it is a technique that is primarily suited to hill slopes. No non-destructive monitoring methodology has been found yet.
- Severe drought during translocation project.
- Scale & budget. Large scale of project meant high budget and only possible with major logistic support from Vic Roads (road building authority) including provision of site infrastructure, mechanical excavator (and operator), and water tanks.

## Major lessons learned

- Translocation of GGE is technically feasible, but a cost-benefit analysis needs to be conducted for each case.
- While the collection methods developed for this population reduced the mortality rate, the success of this methodology may vary depending on the position of the population in the landscape (e.g. hillslope compared to creek bank).

- Effect of severe drought highlighted the importance of hydrology for GGE. The receptor site location must be able to sustain the appropriate hydrological conditions over time and be buffered to some degree from drought, otherwise supplementary watering may be required.
- Longevity of GGE makes short-term assessment of success translocations difficult. (Currently only five years).
- Team worked well but different organizational priorities of members took precedence and certain elements of program were reduced in effectiveness.
- Site management. Control of weeds a problem because effects of herbicides on GGE unknown. Adjacent tree planting has unknown effect on the hydrology of the translocation site.

## Success of project

| Highly Successful | **Successful** | Partially Successful | Failure |
|---|---|---|---|
| | √ | | |

**Reason for success/failure:**

- Translocation technique for GGE developed.
- GGE survived & breeding at least four years post-translocation.
- Monitoring short-term but longer term success unknown.
- Longer term effects of drought & climate change uncertain.

## References

IUCN Species Survival Commission, 2003. 2003 IUCN Red List of Threatened Species, (http://www.redlist.org/)

## Project Partners

Vic Roads, Department of Primary Industries, Department of Sustainability and Environment, La Trobe University (Bendigo and Bundoora), Healesville Sanctuary.