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Gartcosh great crested newts: the story so far

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ABSTRACT
The Gartcosh Industrial Site, North Lanarkshire is home to the largest known population of great crested newts (*Triturus cristatus*,) in Scotland. Economic development of the site required the translocation of the great crested newt and four other amphibian species from existing ponds to a purpose built reserve around the periphery. Monitoring the effectiveness of translocation as a mitigation method has shown that in this case, the breeding adult population is being maintained at levels comparable with the previous site although there are indications of possible declines with other life stages. Longer term monitoring is required at a level more in-depth than currently planned. The aquatic and terrestrial habitat created appears sufficient to support the population although there are problems with fragmentation, both within the site and connections to external locations. There is still pressure for further development in an area that could affect the newt population.
KEYWORDS: *Triturus cristatus*, amphibians, translocation, mitigation, habitat, Scotland

INTRODUCTION

Great crested newt (*Triturus cristatus*, GCN) populations have declined across their range in Scotland (SNH Trends, 2004) and across the UK (Langton *et al*., 2001) at a rate faster than other common amphibian species throughout their entire European range (AmphibiaWeb, 2008). Habitat degradation or destruction is a significant causal factor as GCN populations are reliant upon both good quality terrestrial and aquatic habitat. Terrestrial habitats are threatened by development, urbanisation and other land use changes. The resulting fragmented populations are generally small, isolated and vulnerable to extinction (Hanski & Gilpin, 1997; Hitchings & Beebee, 1997; 1998). Aquatic habitats are at risk through deliberate destruction, lack of management and natural succession. In Scotland, the number of ponds declined during the 1950s to 1980s by 7%, although numbers were found to have stabilised during a survey in the 1990s (SNH Trends, 2004).

In the UK, GCN are protected by the Conservation *(Natural Habitats etc.)* Regulations, 1994. The regulations make it an offence to kill, injure or take the animals and to disturb them in certain circumstances. Furthermore, the legislation protects breeding sites and hibernacula. Development is the key pressure to GCN in the Scottish central belt where the known GCN populations are concentrated. Development of land containing GCN populations is only possible under licence from the local Government agency (in this case, Scottish Natural Heritage). Licenses can only be issued for specific purposes and providing the impacts of the proposal does not compromise the conservation status of the species. This normally entails the provision of a mitigation plan to ensure that impacts on individual newts, populations and habitats are minimised and, if appropriate, compensatory habitat is created or existing habitats enhanced.

The Gartcosh Industrial site in North Lanarkshire is home to the largest known GCN population in Scotland, with 1,012 adults present. This was estimated to be 9-29% of the total Scottish population (McNeill, 2010). Approval for economic regeneration of this brownfield site meant that in 2003, the Scottish Executive granted a licence for the largest GCN translocation in Scotland. However, despite a number of reviews (Oldham *et al*., 1991; Oldham & Humphries, 2000; May, 1996 unpublished; Edgar & Griffiths, 2004; Edgar *et al*., 2005), the question as to whether or not translocation can be an effective mitigation method remains unanswered. Some projects were doomed to failure due to poor design and implementation. Other projects were inconclusive as it was not possible to gauge success due to issues such as a lack of pre or post monitoring.

The Gartcosh translocation offered an opportunity to undertake an in-depth case study on the effectiveness of translocation as a mitigation method; what would constitute a successful translocation and how this could be achieved within the Scottish context? The research was carried out by the University of Glasgow in consultation with North Lanarkshire Council and

Scottish Natural Heritage, which also funded the research.

Development of the Gartcosh business interchange
Gartcosh former steelworks: site history
The Gartcosh Iron and Steel works was constructed between 1858 and 1872, with the rolling mill built in 1960. British Steel took over operations in 1962 until its closure and subsequent demolition in 1986. The site has since been subject to a long-term regeneration plan, including establishing motorway access, reopening the railway station and the creation of an industrial park.

Ponds developed naturally within the site and anecdotal evidence suggests that the GCN population was in residence from 1972, possibly earlier, although not known to SNH (Archibald Laing *pers. comm.).* The site was also home to populations of *Lissotriton vulgaris* (smooth newts), *Lissotriton helveticus* (palmate newts), *Bufo bufo* (common toad) and *Rana temporaria* (common frog).
In 1998, a field survey of the site identified 13 water bodies, seven deemed suitable for GCN. The original plan had been to protect the GCN *in-situ* within the industrial park. The seven optimal ponds plus a ten hectare area of land was designated the Amphibian Conservation Area (ACA), with an additional eight new ponds dug in 1998 (Fig. 1).

An options appraisal process was then undertaken by the Gartcosh Regeneration Partnership (members included North Lanarkshire Council, Scottish Enterprise and others from the public and private sectors). They supported a regeneration 'masterplan' that incorporated economic development of the area intended as the ACA. As an alternative for the GCN, the Gartcosh Nature Reserve (GNR) would be created around the periphery of the industrial park and all captured amphibians moved from the ACA to the GNR. The GNR was completed in 2003, encompassing 24 ponds within 29 hectares of land (Fig. 2). The site was divided into three zones: Bothlin Burn (9.1Ha, 8 ponds), Garnqueen Hill (14.1Ha, 7 ponds) and Railway Junction (5.4Ha, 6 ponds). There were a further three 'Stepping Stone' ponds in the Bothlin Burn area, intended to aid dispersal.

Pre translocation monitoring: 1998-2003
Heritage Environmental Ltd (HEL) were contracted to undertake a baseline survey of the ACA for six years prior to the translocation. Torchlight surveys were used to establish annual adult counts of all five amphibian species present within the breeding ponds. Peak counts for four species were observed in 2001 (GCN: 140, palmate: 148, smooth: 161, toad: 801). The peak count for frogs (747) was recorded during 2000.

The Gartcosh translocation: 2004-2006
The translocation was undertaken by HEL, with 25% of the estimated adult GCN population in the ACA (sex ratio 1:1±10%) moved to the Railway Junction zone of the GNR during 2004 (the population estimate was based on pre-translocation monitoring). During 2005 and 2006, all GCN captured in the ACA were moved to the Bothlin Burn and Garnqueen Hill zones of the GNR. The belly pattern of an adult GCN is as unique as a fingerprint and can be used to identify individuals (Oldham & Humphries, 2000). During translocation, the belly patterns of all adult GCN were photographed and morphometric data collected (size and weight).
A total of 1,012 adult GCN were captured and moved to the GNR alongside 2,800 smooth newts, 2,705 palmate newts, 1,500 frogs and 3,168 toads. Eggs, larvae and metamorphs of all species were also translocated.

Post translocation monitoring
HEL continued to monitor peak adult counts using torchlight surveys of the breeding ponds. The University of Glasgow got involved in 2005 to 2009 with a more in-depth monitoring brief looking at key aspects including population sizes, structure and assessment of the suitability of newly created habitat to support amphibian populations.

By 2009, the results of the translocation were promising. Torchlight surveys indicated that the peak breeding GCN adult count in the receptor site was double the peak count in the donor site. This was supported by the results of a mark-recapture study undertaken, comparing post-translocation population size with the known number of adults translocated. Recruitment to the breeding population was occurring, but an examination of the juvenile life-stages highlighted possible future problems, with decreased production and survival of larvae and metamorphs (McNeill, 2010). Further study is required to ascertain whether this was a natural fluctuation or of greater concern, linked to the translocation. However this type of monitoring is not part of the on-going management/surveying plan.

The provision of good quality aquatic and terrestrial habitat of a quantity comparable to that being lost is critical to the on-going success of the translocation. For a review on what is considered 'good' habitat, see McNeill (2010). There has been a significant reduction in available terrestrial habitat when comparing the original Industrial Site (86Ha) to that made available for the GNR (29Ha), although only a proportion of the Industrial site could be considered to have been 'newt-friendly'. However, the GNR has a considerably larger area of good terrestrial habitat if compared directly with the ACA (10Ha).
There was an increase in the number of ponds created as part of the GNR but an overall decrease in pond surface area. This was avoidable, the result of a number of ponds dug that were below the recommended size threshold for GCN suitability described as 100 m^2 minimum (English Nature, 2001) and 250 m^2 as the optimum (Gent & Gibson, 2003). The entire Railway Junction zone was of sub-optimal size.

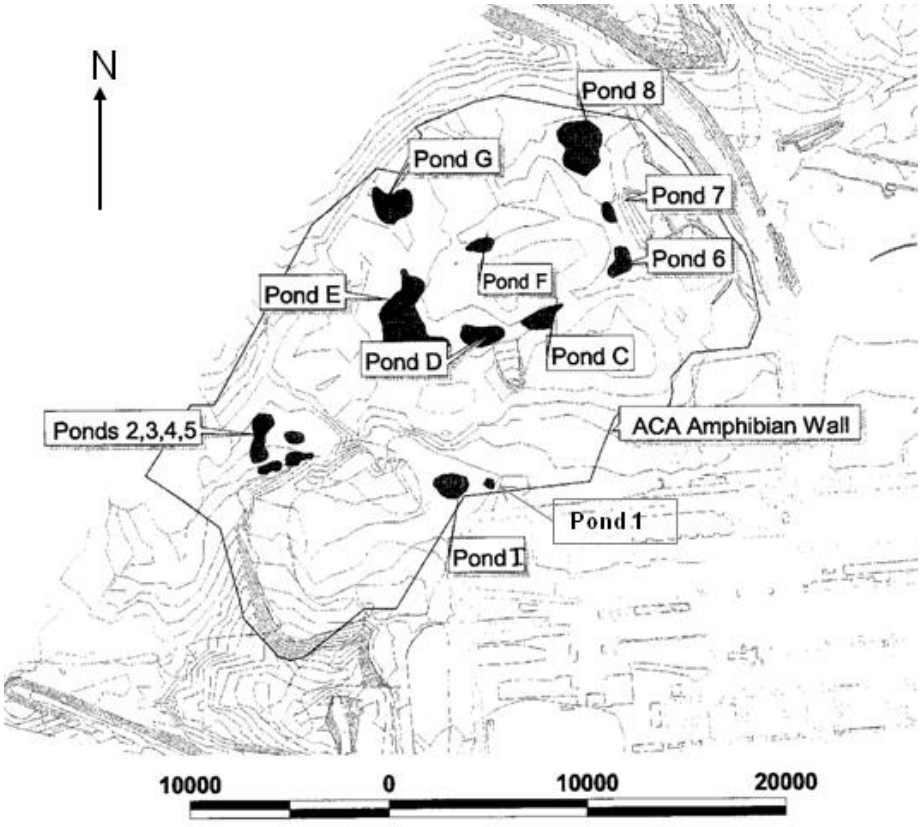

Fig. 1. Amphibian Conservation Area (ACA). Includes six of the seven original ponds, labelled C,D,E,F,G,I. Pond L is not shown on this map. The eight newly created ponds are also shown, labelled 1-8. Map reproduced with permission from Ironside Farrer. Modified to show the location of Pond 1.

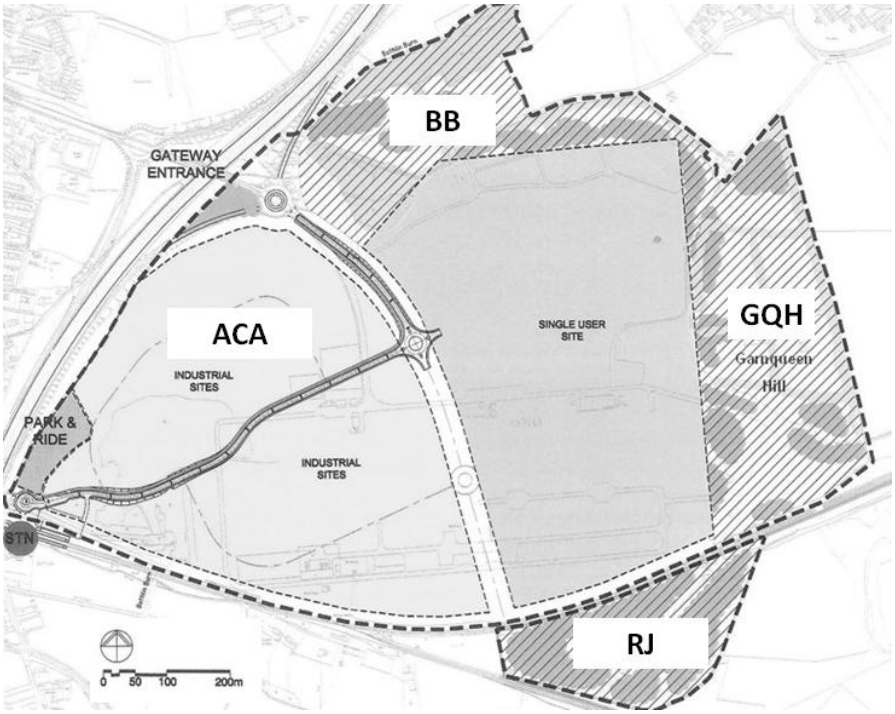

Fig. 2. Map of the Gartcosh Industrial Site. The locations of the donor Amphibian Conservation Area (ACA) and the newly created Gartcosh Nature Reserve are shown. The reserve by line hatchings, with labels showing the position of the three zones Bothlin Burn (BB), Garnqueen Hill (GQH) and Railway Junction (RJ). Modified from a map provided by Scottish Enterprise.

Habitat quality was determined using a combination of measures including the GCN Habitat Suitability Index (Oldham *et al*. 2000), aquatic macrophyte sampling, macroinvertebrate analyses (Biggs *et al*., 1998) and interpretation of terrestrial records provided by Ironside Farrer who undertook the habitat creation works. Analyses indicated that the GNR habitat was of good quality, capable of supporting the GCN population (McNeill, 2010). Notably, the Habitat Suitability Index scored the GNR higher than the ACA (McNeill, 2010). This is based on ten metrics incorporating data from both the aquatic and terrestrial habitat. The higher the score, the more suitable a habitat is for GCN occupation.

The GNR was fragmented for its initial years due to the provision of ring fencing around each of the individual zones (McNeill, 2010). Dispersal throughout the site remains problematic, with limited migration corridors. Of particular concern is the Railway Junction zone as only 56 adults were originally translocated there, below the minimum viable breeding population size described as 40 females (Halley *et al*., 1996) or minimum of 100 adults (Shaffer, 1981; Griffiths and Williams, 2000; 2001). Gartcosh remains isolated within a fragmented landscape. This was not as a result of the translocation. The nearest known population is in Drumcavel Quarry, outwith the range of natural migration and separated by a motorway. The lack of immigration is a threat to the long term viability of the Gartcosh population.

CONCLUSIONS

The story so far at Gartcosh is one of short-term success with further study required to ascertain whether the population will be self-sustaining in the long-term. The monitoring brief post-2009 is not comprehensive enough to provide the required long term data, consisting primarily of peak breeding adult counts. While this provides useful information on annual population fluctuations, it does not detail crucial information relating to population size, survival and recruitment.

There is considerable development pressure in the area around Gartcosh. This development has the potential to impact directly on the Gartcosh Nature Reserve, but also more widely on potential movement of newts through the wider countryside. It is important that the consideration of any development proposals in the area take the great crested newt population at Gartcosh into account and that they are designed to minimise impacts and even promote free movement of the population.

The decision to relocate to the GNR instead of protecting the newts *in-situ* was taken because of the economic imperative to develop the ACA along with the rest of the Industrial Site. The development of the site has been relatively slow but is now gathering speed. Great crested newts may still be present in some areas of the site due for development and it is essential that their presence is considered as part of this work.

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