Choosing the Best of Both Worlds

The Double Life of the Great Crested Newt

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Abstract

The great crested newt (*Triturus cristatus*) is dependent on two environments for its survival: the aquatic habitat necessary for breeding and development, and the terrestrial habitat required for post-breeding and juvenile activities. For a population to be able to survive in a landscape, both habitat types must be present within migration distance from each other. The overall aim of this thesis is to find and describe prerequisites of environments and landscapes that make them sufficient as habitats for the great crested newt. The purpose is also to present the results in a conservation perspective and to discuss them in relation to practical examples. In five separate studies, performed in Örebro County, south-central Sweden, the aquatic and terrestrial habitats of the species were examined. The first study examined aquatic plants in a variety of ponds and landscapes, to determine if the diversity of plant species was higher in ponds where great crested newts were present. I found that ponds with newts had a significantly higher mean number of plant species than ponds without the species. The second study focused on the question if there are chemical and physical characteristics that determine occurrence of great crested newts. The results showed that temperature and nutrient levels (nitrogen and phosphorus) were important in distinguishing between ponds with and without newts, whereas other physical variables were less important. My results also suggest that the great crested newt selects ponds with low nutrient levels for breeding, while the species may also be present in ponds with higher nutrient levels. The third study used radio-telemetry in an attempt to determine how the great crested newt moved in its terrestrial habitat and which micro-habitats it used while the focal point of study four was the landscape and if landscape composition may predict use of ponds as aquatic habitats. Combined, studies three and four suggest that management of the species should to a greater extent include terrestrial habitat, with special attention given to older, deciduous-rich forest within approximately 200 m of breeding ponds. The aim of the last study was to describe and evaluate a project concerning translocation of a great crested newt population. I point out the necessity of long-term monitoring to distinguish any possible success with respect to site sustainability and population size.

Keywords: Amphibia, Caudata, *Triturus cristatus*, aquatic and terrestrial habitat use, landscape, pondscape, indicator species, radio-telemetry, translocation

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amounts of leaf-litter and nutrient additions. Shading, especially in the south sector of the pond, causes lower temperatures and reduced pond vegetation, while leaf-litter may cause increased levels of nutrients and a lack in oxygen (Gee et al., 1997; Skelly et al., 2002; Thurgate and Pechmann, 2007). **Papers I** and **II** indicate the importance of diverse vegetation and high temperature for successful breeding of great crested newts. Consequently, it may also be important to take the terrestrial vegetation within approximately 20 meters of a pond into consideration when working with conservation measures in the aquatic habitat of the species (Sztatecsny et al., 2004).

The radio-transmitter study in **Paper III** demonstrates the importance of certain structures and micro-habitats in the terrestrial habitat of the great crested newt. Structures such as dead wood and abundant leaf litter are primarily restricted to habitats that are rare in the human influenced landscapes of today, like old-growth forest and deciduous forest (Nilsson et al., 2002; Mikusiński et al 2003; Bobiek et al., 2005). However, as a conservation measure, the availability of such structures may be enhanced in areas where the quality of the terrestrial habitat would otherwise be deficient. By supplying forest floors with litter from e.g. surrounding parks and lawns or with logs and other coarse woody debris, new micro-habitats will be created.

As shown in **Paper III**, the great crested newt prefers to use the area close to the aquatic habitat as terrestrial habitat. This tendency has also been pointed out in similar studies on the species (Dolmen, 1982; Latham and Oldham, 1996; Baker and Halliday, 1999; Oldham and Humphries, 2000; Jehle, 2000; Jehle and Arntzen, 2000; Malmgren, 2002). Movements on land expose a newt individual for potential risks, like predators and desiccation, especially since the great crested newt moves rather slowly while on land. Consequently, they ought to prefer habitats close to the breeding pond if they are available. Thus, habitat reinforcement measures in the terrestrial habitat ought to be most advantageous within approximately 200 m from a breeding pond or a potential aquatic habitat. However, to allow for changes in the surrounding landscape and to render migration between ponds and populations possible, it is necessary to have a more large scale approach.

In **Paper IV**, I investigated the terrestrial habitat surrounding great crested newt aquatic habitats on two different scales. When working with conservation of great crested newts and other pond-living organisms, it is important to consider the surrounding landscape not only as a terrestrial habitat but also as a mean for transportation between ponds and habitats. How large areas a great crested newt population utilizes depends on the quality of the terrestrial habitat and if the connectivity of the surrounding landscape allows for individuals to migrate. Landscape connectivity and, specifically, pond connectivity is