Non-native marsh frog (Tim Bernhard)

8. Terrestrial Habitat

8.1. Overview

Amphibians spend some, usually most, of their time on land. The proportion of time spent in the aquatic and terrestrial habitats varies between species and environmental conditions but land habitats are important to all as seasonal habitat and as migratory routes. This section considers the terrestrial environment primarily as seasonal habitat. Migratory issues and the importance of connecting patches of habitats with areas that amphibians can travel across are considered in *9. Landscape Ecology*.

Once young amphibians leave the water after the tadpole/larval stage, most of them spend the juvenile part of their life on land. This can be the best part of two or three years before they reach sexual maturity and return to water as breeding adults. The great crested newt differs from the other species in that juveniles may spend time in the aquatic as well as the terrestrial habitat.

This young smooth newt may not return to water until it is two or three years old (ARC)

In the adult stage amphibians shuttle between aquatic and terrestrial habitats on a seasonal basis. The timing of these migrations varies between species, populations and individuals. Variation between populations is probably in response to different environmental conditions.

Fallen and cut timber left on this site has provided valuable cover for amphibians (ARC)

Over time some populations will be very productive, while others dwindle – perhaps due to local circumstances. Habitat links between the populations that allow movement of animals is essential to ensure long-term viability and to allow natural re-colonisation of areas if a species becomes extinct in any locality. Terrestrial habitats are therefore important for sustaining individual animals during part of their life cycle, for allowing movement to breeding ponds and for ensuring that animals can move between populations over time.

8.2. Terrestrial habitat requirements

Amphibian terrestrial habitat requirements are simple – they need cover to provide damp resting places and to support the invertebrate prey on which they feed. The type of habitat favoured by amphibians varies between species but in general they can find cover in most semi-natural habitats such as grassland, scrub and woodland. Woodland seems particularly favoured by the newts.

Tree stumps, mammal burrows, stone walls and the foundations and loose brickwork of old buildings may also provide places for amphibians to shelter or hibernate in.

It is important that cover is present immediately around the pond (but not shading it) because young frogs, toads and newts need damp habitat to move into as they leave the water. Adequate cover in the terrestrial habitat not only provides places to hide and somewhere to find their invertebrate food, but retained moisture prevents desiccation of small amphibians during the driest parts of the year. Most adult amphibians do not move far from the pond, so habitat immediately surrounding a breeding site is the most important.

Male and juvenile great crested newt sheltering under decomposing dead wood (ARC)

8.3. Management of terrestrial vegetation

Vegetation immediately surrounding amphibian ponds usually requires some management, as left unattended it can rapidly succeed to scrub and shade the water surface. Some shading may be beneficial, maintaining open areas within otherwise continuous beds of submerged aquatic vegetation, but in general warm, sunny ponds facilitate more rapid growth and development of amphibian eggs and tadpoles. Vegetation directly overhanging more than about a quarter of the pond surface of small ponds (approximately 20 m^2) has been found to reduce counts of great crested newt larvae (Cooke *et al.*, 1994). Management of terrestrial habitat should ensure that ponds are not overly shaded. Control of trees and scrub on the southern side of a pond is particularly important. Natterjack toad ponds should not be shaded at all (*10. Natterjack Toad*).

On intensively managed sites such as parks and gardens vegetation is likely to be controlled via existing management activity. However, ponds on nature reserves or on farm land often require measures to control vegetation.

Cutting/Mowing Repeated cutting or mowing can prevent growth of scrub and trees that may otherwise overly shade ponds. Cutting or mowing may already be part of existing management schemes to maintain mid-successional stage habitats. On informally managed sites (nature reserves, field margins on farmland etc.) cutting vegetation during winter when amphibians are inactive is the best option. Ideally the cut should be high (minimum15 cm).

If vegetation has to be cut when amphibians are active, then a high cut is unlikely to harm newts or toads. During the daytime amphibians tend to hide away in vegetation litter, or among the lower stems of herbaceous vegetation where moisture is retained. Hence, cutting vegetation is unlikely to harm great crested newts, for example, if the cut is high and carried out in dry weather. Low cuts may risk harming individual amphibians and the remaining short sward will not retain sufficient humidity and cover for amphibians during their terrestrial stages.

Care should be taken when young common frogs and toads leave the water in the summer. Mowing grassland adjacent to amphibian breeding ponds at this time risks harming newly emergent frogs and toads and should be avoided. Amenity grassland and lawns should be kept mown short immediately prior to this emergence to ensure that the amphibians are not tempted to remain among grass that may be mown shortly afterwards.

Grazing is an increasingly common means of conservation management with a great deal of promise for ponds. Livestock with a liking for water can be used to maintain relatively open ponds and prevent domination by tall, emergent species such as reedmace and reed. Cattle, particularly Highland cattle, and konik ponies are potentially suitable grazing species.

Livestock access to ponds does create some risk of harming the habitat and wildlife by removing useful vegetation, trampling and eutrophication of the water. Stocking density should be maintained at levels such that the beneficial effects of maintaining ponds with diverse vegetation structures greatly outweigh any temporary harm. There is no simple formula to calculate the ideal stocking density so it is important to incorporate flexibility into grazing management, changing stock numbers to achieve the desired vegetation composition and structure. In practice, relatively low stocking densities are likely to yield the desired results (0.2-0.3 head of cattle per hectare have been applied to sites managed for amphibians).

If necessary ponds can be part-fenced to prevent livestock access to some of the perimeter.

Low intensity grazing by these Highland cattle maintains a relatively open vegetation structure around this pond (ARC)

8.4. Hibernation sites

During winter amphibians seek damp (but not saturated) places sheltered from freezing. They may burrow into loose soil or squeeze into gaps and cavities underground, sometimes using the foundations or cellars of old buildings.

Purpose-built hibernation sites, or hibernacula, are sometimes created for amphibia particularly within development mitigation work. They generally comprise mounds of timber or other material covered by turf to provide damp, sheltered habitat. Intuitively, such structures are likely to be beneficial to amphibians although their benefits are rarely tested. Limited investigations indicate that they are used by amphibians, at least in low numbers (Neave and Moffat, 2007; Latham and Knowles, 2008).

Within high quality terrestrial habitat it is likely that amphibians will be able to find suitable hibernation sites without needing specially provided structures. The value of purpose-built structures on such sites is questionable especially if the artificial hibernacula are small and hence represent only a miniscule proportion of the potential hibernation habitat on site.

Artificial hibernacula may be beneficial on sites where natural vegetation cover is sparse, for example on newly restored sites or in otherwise formally managed

settings such as gardens and parks. In other cases site management would be better focused on the maintenance of extensive favourable terrestrial habitats which should provide an abundance of hibernation sites without the need for specially created hibernacula.

In spite of the questionable ecological value of specially constructed hibernation sites, they can be a convenient way of utilising spoil and arisings from pond creation and habitat management.

Hibernacula should be located:

- Close to a breeding site (within 250 m maximum).
- In an area unlikely to flood.
- Within habitat likely to be used by amphibians.
- In an area with minimal disturbance.

To construct a hibernaculum:

- Remove the turf from the footprint of the hibernaculum and set aside.
- On well-drained soil excavate to a depth of approximately 50 cm and set aside spoil (this is unnecessary on poorly drained soils).
- Fill the footprint or pit with core material. Materials likely to retain moisture are preferable, such as cut timber, brash and grubbed up tree roots. Other material such as inert hardcore, bricks, rocks, and building rubble may also be used. Materials that will decompose should not be placed beneath heavy components such as bricks or rocks, to reduce the risk of collapse.
- Pack the larger spaces within the core materials with wood chippings, loose topsoil or spoil.
- Cover the hibernaculum with the turves removed from the footprint.
- Take care not to create structures that might attract rodents, such as piles of rubble with many entrance holes.

There has been no rigorous investigation of the optimum size of hibernacula, but larger hibernacula are probably more useful than small constructions because they contain a variety of different microhabitats and are more likely to maintain stable conditions. A suggested minimum size is 4 m long by 2 m wide by 1 m deep.

8.5. Dispersal from ponds

The distances that amphibians cover when dispersing from ponds is considered in *9. Landscape Ecology*. Frogs and toads can migrate up to one or two km from a pond whereas newts usually migrate shorter distances of several hundred metres. Habitat in close proximity to a pond is therefore more important than distant habitat.

8.6. Literature

Cooke, S.D. Cooke, A.S. and Sparks, T.H. (1994). Effects of scrub cover of ponds on great crested newts' breeding performance. Pp. 71-74 in Proceedings: Conservation and management of great crested newts. Eds. Gent, T. and Bray, B. English Nature, Peterborough.

Latham, D. and Knowles, M. (2008). Assessing the use of artificial hibernacula by great crested newts *Triturus cristatus* and other amphibians for habitat enhancement, Northumberland, England. Conservation Evidence 5, 74-79.

Neave, D.W. and Moffat, C. (2007). Evidence of amphibian occupation of artificial hibernacula. The Herpetological Bulletin 99, 20-22.

Strijbosch, H. (1980). Habitat selection by amphibians during their terrestrial phase. British Journal of Herpetology 6(3), 93-98.