

4. Habitat Requirements

Reptile habitat requirements can be summarised as:

- Warmth
- Structural complexity
- Habitat connectivity

Some of the habitat requirements of reptiles relate to factors that are intrinsic to a particular site or geographical area, such as climate, topography or soil type, and are hence beyond the control of habitat managers. However, many requirements are met by features that can be directly and strongly influenced by management. An understanding of reptile habitat requirements should assist a site manager in management planning and implementation that will favour, rather than harm, reptiles and a host of other species.

4.1. Insolation (exposure to sun)

Reptiles are ectothermic. The popular term 'cold-blooded' is inaccurate as reptile body temperatures are in fact variable. Reptiles cannot generate body heat internally, but rather use external warmth to raise their body temperatures to optimal operating levels. A great deal of reptile behaviour and ecology is determined by ectothermy.



Adders basking in early spring, in a warm pocket of open ground, sheltered by gorse (Jim Foster)

To raise their body temperatures, reptiles either bask openly in direct sunlight, or they seek warm sites under cover (in vegetation or under objects lying

on the ground) or partially exposed amidst dense vegetation (mosaic basking). The extent to which they use these different behaviours varies between species, and according to ambient temperatures. On warm days reptiles may bask in partial cover rather than in the open, or they may even avoid basking altogether and continue activity in more shaded habitats. Snakes and slow-worms may be active at night in hot summer weather. However, for most of their active periods reptiles require open, sunny habitats with low vegetation cover, where sunlight reaches ground level to provide them with the warmth they need. Direct sunlight is also important physiologically, as the ultraviolet-B this contains stimulates the production of vitamin D3 in the skin of some reptile species.

Varied topography (south-facing slopes are particularly favoured by reptiles) and a mosaic of open, sunny areas and dense cover provide the best range of basking opportunities.



South-facing slope in a warm, sheltered valley on the Devon coast. The aspect, topography and structurally diverse vegetation make this a superb reptile site (Paul Edgar)

4.2. Shelter from the elements (heat, dry weather and wind)

Thermoregulation by behavioural means not only entails seeking warm microhabitat to raise body temperatures, but also involves taking shelter from the sun to avoid fatal overheating. Shuttling between sunshine and shade allows reptiles to maintain a surprisingly high body temperature very precisely throughout much of the day. So, reptiles need vegetation cover and open areas in close proximity to each other. This is generally provided by structurally diverse habitats, or mosaics



Windbreaks provided by woodland edges and open, sunny glades can create warm microhabitats important for reptiles (Paul Edgar)

of vegetation of differing heights, ages or types. Different types of vegetation cover also provide different cooling effects. Deeper vegetation, such as scrub, grass tussocks or beds of mosses and lichens, provide cooler and more humid retreats, which allow more rapid cooling than simple shade.

Reptiles also need access to humid environments to help them to cope with extremely hot, dry weather. During such conditions they may enter a period of enforced inactivity, known as aestivation, for which they require retreats with a stable temperature and, in particular, high humidity. A structurally diverse habitat is more likely to provide these pockets of moisture. Alternatively, in such weather, reptiles may move to wetter areas than they would normally occupy. For instance, sand lizards on dry heath may migrate a short distance to a wet valley mire.

Strong winds can have a negative impact on reptile activity in several ways. Wind chill increases the time required for basking reptiles to reach their preferred body temperatures. Wind can also have a detrimental drying effect, especially on dry habitats such as heathland or chalk grassland. Finally, wind agitates vegetation, making it more difficult for reptiles to detect approaching predators. A varied topography and diverse vegetation structure create pockets of microhabitat sheltered from the wind. Trees, scrub, woodland edges and hedgerows often provide important windbreaks on reptile sites.



The close proximity of wet and dry habitats gives reptiles the opportunity to cope with very dry weather while still remaining active (Jim Foster)

4.3. Shelter during the winter

In the British Isles reptiles escape the winter cold by entering a period of hibernation or extended torpor (greatly reduced metabolic activity). Hibernation sites must be frost-free, humid (but not wet) and safe from flooding and predators.

Hibernation usually takes place underground, or less often within above-ground structures. Typical sites include: burrows dug by other species such as rabbits, or by the reptiles themselves (in the case of sand lizards), rotted tree stumps and root holes,

chalk fissures, large grass tussocks, ant-hills, old walls and building foundations, piles of rubble and other debris and under large logs and fallen trees. Hibernation sites almost always have a south-facing aspect, and are normally in full or partial sun.

Sand lizards, grass snakes, adders and, to a lesser extent, smooth snakes, usually make seasonal movements to hibernation sites. The other species do not travel so far and so their hibernation sites roughly correspond to the areas used during the active season.

Reptiles may hibernate singly or, in particularly suitable retreats, communally. Adders in particular tend to use communal hibernation dens, or hibernacula, with as many as several dozen snakes using an especially suitable site. They may share this with other reptile species. Communal hibernacula are critical features for reptiles in many habitats, especially because the adults of species such as the adder are very faithful to a particular site.

Inadvertent damage to a single, large hibernaculum by habitat management, especially when heavy machinery is being used, can cause severe harm to a local reptile population and may have disastrous consequences on a small site. Even removal of vegetation cover from a hibernaculum can increase exposure to predation when reptiles emerge in spring.

Fortunately, due to their specific characteristics and due to the propensity of reptiles to bask shortly after emergence from hibernation, it is possible to identify hibernation sites during springtime surveys. It should, however, also be noted that some are not readily identifiable based on physical characteristics alone. For example reptiles may return to the root system of a particular tree, which to our eyes may appear indistinct from many other nearby trees.



Small-scale topographic variations such as gullies and ditches provide valuable shelter from windy conditions (Paul Edgar)

Reptile hibernation sites



Root systems of gorse/birch clumps (Paul Edgar)



Rocky crevices on moorland (Paul Edgar)



Rabbit warren on dry bank (Jim Foster)



Brash windrow in woodland (John Baker)



Rotting tree stumps and roots (Paul Edgar)



Purple moor-grass tussocks (Paul Edgar)



Compost/rubbish heap (Jonathan Bramley)



Building rubble (Jim Foster)

4.4. Food

All British reptiles consume animal prey. Hence, habitat that supports these prey species is essential to maintaining reptile populations.

Reptile prey	
Legged lizards	Insects and other invertebrates such as spiders.
Slow-worm	Soft-bodied invertebrates such as slugs and worms.
Smooth snake	Reptiles and small mammals.
Grass snake	Amphibians and fish.
Adder	Mainly small mammals, occasionally lizards.

4.5. Shelter from predators

Most predatory birds and mammals take reptiles, given the opportunity and a suitable size advantage. Hence reptiles need the cover of vegetation, which must be near to basking sites, to allow escape from predators (as well as thermoregulation). A mosaic of open basking areas and vegetation cover is provided by a diverse vegetation structure.



Adder basking in gorse, which provides excellent protection from predators (Tony Blunden)

Thorny or prickly plants such as gorse and bramble can provide particularly good refuge from predators. The low growing dwarf gorse and western gorse appear to be particularly important on heathland in this regard. The sunny edges of bramble patches also provide basking sites with a refuge from predators nearby.

4.6. Breeding habitat

Breeding, in this section, encompasses courtship, mating, egg-laying, incubation and birth. The ready availability of potential mates is important, and they are more likely to be found where structurally diverse habitats encourage high population densities. Courting rituals and mating often occupy the attention of reptiles to the exclusion of everything else, so secluded areas close to, or under, secure cover are essential.



Viviparous lizards mating. Reptiles need cover for all breeding activities (Fred Holmes)

Egg-laying reptiles have the most specific requirements for breeding sites (see 9. *Creating Reptile Habitat Features*). The sand lizard lays its eggs in bare ground. Semi-compacted sand is almost always used as it has good thermal properties and drains well while remaining humid only a few centimetres below the surface. Sites chosen for egg-laying are almost always in an exposed, sunny location, just far enough from nearby vegetation to avoid roots and shading, but not so far (usually <30 cm) that the female has to cross a large expanse of open ground. Small sand patches, of about 10-50 m² or so, or the semi-compacted sandy edges of paths, tracks and fire-breaks are, therefore, most often selected.

Grass snakes need access to decomposing material in which they lay their eggs. Sites include manure heaps, compost heaps, grass clippings, sawdust, cut reed and, in coastal areas, seaweed heaps.

4.7. Space and habitat connectivity

Reptiles require sufficiently large areas of habitat to support viable populations in the long term. The relatively short distances over which they can disperse mean that they are dependent either on large areas of continuous habitat, or closely spaced patches, ideally linked by favourable intervening terrain. The periodic movement of individual animals between local populations effectively combines them into a larger metapopulation, increasing effective population size and viability. This is essential to support genetic diversity in the long term, avoiding the ill-effects of inbreeding. It also reduces the risk of populations becoming extinct due to locally catastrophic events, such as fire.

Habitat connectivity is important not only at a landscape level, but also within a site. Reptile distribution within most habitats is generally not uniform. Sites should, therefore, be managed so as to enhance the connectivity of habitat patches favoured by reptiles.

4.8. Habitats providing favourable conditions for reptiles

The sand lizard and smooth snake have stringent demands for particularly warm sites and, for the former, open sand. This confines these species to heathland and, in the case of the sand lizard, also dunes. However, the key reptile requirements of a structurally diverse habitat, providing a mix of open areas close to vegetation cover, are provided by a much wider range of habitats. The actual plant species present are less important than the physical conditions they create. Therefore the more diverse the vegetation structure, the more suitable it is for reptiles. In any given area, a fine-scale, intricate mosaic of vegetation supports a greater number of features favourable to reptiles than habitats with a uniform structure.



Ideal reptile habitat; heathland with diverse vegetation structure on a south facing slope with varied topography (Paul Edgar)

Reptile habitats

- Heathland
- Moorland
- Grasslands
- Scrub
- Woodland (clearings and edge)
- Wetlands
- Sand dune
- Hard and soft cliffs
- Vegetated shingle
- Coastal lagoon
- Farmland
- Brownfield sites
- Gardens and allotments
- Parks and grounds
- Churchyards
- Mineral sites
- Road and rail embankments
- River and sea walls

4.9. Habitat interfaces

The interfaces between habitats are also important to reptiles. These transitional zones, or ecotones, generally contain a great diversity of plant species and habitat structure, and hence a range of microhabitats and microclimates favoured by reptiles and many other species. Examples favourable to reptiles include:

- Sunny woodland edge.
- Grassland-scrub interfaces.
- Interfaces within grassland of varying sward heights.



Interfaces between different habitat types are important to reptiles, for example the transitional zone between this footpath and adjacent woodland (Jim Foster)



Whilst this grazed field offers little value for reptiles, the edges are excellent habitat because of the ecotone from tree to shrub, to herb layer. Bramble and tussocky grasses have been managed to form a margin which provides connectivity through otherwise poor habitat (Jim Foster)



Strimmed pathways maintain interfaces between short sward and tall vegetation at Grimbridge Lagoon reserve for reptiles (ARC)

4.10. Habitat succession

Reptiles occupy dynamic, successional habitats and their requirements may be met only in certain stages. Some species tolerate a wider range of successional stages than others. Viviparous lizards, for example, are much less restricted in this regard than sand lizards. The crucial point, however, is that the best reptile habitats do not stay suitable without natural succession being interrupted in some way. Most habitats revert to woodland, the natural climax vegetation of much of the British Isles (although some good reptile habitats, such as heathland and sand dune, may form the natural climax vegetation on poor soils or in exposed locations). In the absence of natural factors, intervention in the form of management is necessary to maintain all successional stages of a habitat and the specialised wildlife that each supports.

Examples of favourable reptile habitat



Moorland (Jim Foster)



Rough grassland and bramble (Paul Edgar)



Chalk grassland and scrub (Tony Blunden)



Open woodland, sunny glades and woodland edge (Nigel Hand)



Pond supporting amphibians, set in terrestrial habitats with diverse vegetation structure (ideal for grass snakes) (Jim Foster)



Sea wall (Paul Edgar)