9. Creating Reptile Habitat Features

9.1. Brash and log piles

The value of brash and log piles lies in;

- creating cover,
- providing additional structure to existing habitat,
- enhancing prey availability.

On sites where vegetation structure is limited brash and log piles may be invaluable features for reptiles. In particular, the addition of brash piles to grassland habitats seems to be attractive to viviparous lizards and adders.

Brash/log piles can be created from arisings of scrub control. Piles should be placed in a sunny location and set within existing vegetation (for example, areas of long grass or long grass and scattered scrub), so that there is cover immediately surrounding, or adjacent to, the pile.

To be useful to reptiles brash does not have to be tightly compacted, as recommended for invertebrates. To provide diverse structure within a brash pile, it is recommended that the central core be compacted, while the outer layers are laid more loosely on top. Vegetation growing through the outer edges of the brash pile will provide additional cover.

Brash piles can utilise arisings from scrub and tree control to enhance habitat by increasing structural diversity (Jim Foster)

Brash piles should be maintained by adding additional material as the pile decomposes. This can be provided from ongoing tree and scrub management activity.

Log piles should contain a mixture of sizes and shapes, with some small-diameter material present. A standard log pile comprising similarly-sized timber, as results from normal forestry operations for instance, is of limited value to reptiles because the voids tend to be too large and the structure lacks complexity.

Brash and log piles should be located away from areas of high public access, to reduce the risk of disturbance, collection or arson. On sites subject to high levels of public access, the materials can be either partially buried in the ground, or anchored with wire or secured with wire stapled to the larger logs.

A log pile sited in a sunny location, providing additional structural diversity to a grassland site (Jim Foster)

9.2. Hibernation sites and basking banks

Creating hibernation sites (hibernacula) is a useful management measure either following recent habitat restoration, where such features may be absent, or where traditional hibernation sites are degrading through subsidence or excessive shade. In many cases, however, the creation of new hibernation sites may not be critical, since it is likely that the animals already have adequate overwintering quarters. Hibernation sites are also used for refuge and basking during the active season, so to refer to them as ‘hibernacula’ may be slightly misleading. However the term is used here to distinguish them from simple basking banks (see below).

Creating new basking banks is often a valuable measure, though again the value of this depends on the site: if the site is already very open with a south-facing aspect, there is probably little point in spending resources on new banks.

Reptiles have exploited human made features such as road and rail embankments or windrows in forestry plantations. They may be used for basking, refuge during the active season, or hibernation. The characteristics of such features provide pointers to help design banks and hibernation sites specifically for conservation purposes.

The body of a reptile hibernaculum can contain a range of materials. For example, cut timber, brash, inert hardcore, bricks, rocks, grubbed up tree roots or building rubble. These features can provide a convenient way of using waste materials and arisings from site management. Materials that will decompose should not be placed beneath heavy components such as bricks or rocks, to avoid the risk of collapse. Wood chippings or loose topsoil can be incorporated into the construction, to pack some of the larger cavities (reptiles can squeeze into small spaces, which may afford them protection from predators, such as mustelids or rats).

There should be access points around the edges. These are best created by ensuring that timber or rubble protrudes from the edge, creating crevices that allow reptiles to get deep inside. It is not recommended to use pipes to create access points. Reptiles appear to prefer using more 'natural' cracks and holes. Pipes are also prone to blocking or becoming dislodged with time, meaning that access is considerably limited if they are the only entrance and exit points.

There is no single perfect hibernation site, and managers should consider what fits best on their site. The key design features are;

- a sunny position,
- a well-drained site, not prone to flooding,
- orientation so that one of the long banks faces south,
- access to reptiles through openings of some sort,
- location in a patch of habitat favourable for dispersal, such as tussocky grassland,
- minimal public disturbance,
- size at least 4 m long, by 2 m wide by 1 m high, and ideally much larger.

Depending on soil conditions and hydrology, it is often preferable to dig a pit, and then place the materials partially buried inside, rather than just creating a mound on the surface. Materials to help drainage, such as slotted pipes and gravel, can be placed in the structure. However, on impermeable soils or in low-lying areas it may be safer to create an entirely above-ground structure, to reduce the risk of winter flooding.

In areas of grassland or other herbaceous vegetation, turf should be removed from the footprint of the reptile bank, so that it can used to cover the completed construction. In most cases the rapid establishment of vegetation cover on reptile banks will be important. If this cannot be achieved by use of turf, then seeding with a meadow mix may be required. It can be beneficial to plant or translocate scrub to the immediate north of the feature, as this will provide shelter and cover.

A reptile bank under construction. Turf has been stripped to ceate a shallow pit to receive a pile of hardcore and logs. This will be covered with the stripped turves (Lee Brady)

Hibernaculum designs for mitigation projects have met with some success (Stebbings, 2000; Showler *et al*., 2005). These designs could be used on nature conservation sites. Note, however, that the consensus now is that it is normally unnecessary to use pipes to create access holes. The design should therefore incorporate openings, continuous with voids deeper inside the structure.

Simple, south-facing basking banks can increase the opportunities for reptiles to warm up on sites that are otherwise poor in aspect or topographical variation. Banks can be created very rapidly by machine. They may be long and straight, or crescent-shaped, or sinusoidal. They should be turfed or seeded to encourage a good vegetation structure, ideally with patches of scrub, and occasional log or brash piles should be placed on top.

9.3. Grass snake egg-laying heaps

For many sites with grass snake present, creating egg-laying heaps is one of the most productive management measures. Egg-laying sites are often a limiting factor, and population declines may be traced back to their destruction or reduction in quality. If grass snakes currently only disperse through a site (as is often the case with this highly mobile species), creating an egg-laying site may encourage the snakes to form a new population centre, and spend more time there.

Semi-natural grass snake egg-laying site, a rotting hornbeam stump (ARC)

Grass snakes usually nest in heaps of decaying organic material of various kinds, where the heat of decomposition incubates the eggs. Natural nesting sites include piles of vegetation deposited by flood water or cavities within dead, rotting tree trunks and, in coastal areas, seaweed piles. More commonly, grass snakes use material provided by humans, including heaps of manure, compost, grass clippings, sawdust, garden waste or cut reeds. The material must be actively decomposing and producing heat. However, in some habitats grass snake eggs are laid where the vegetation or ground substrate itself is warmed by the sun, such as deep moss layers found on the older successional stages of heathland, or crevices in the ground. Tens of females may lay their eggs in a particularly suitable site.

An aggregation of female grass snakes on an egg-laying site comprising discarded hay bales (Tracy Farrer)

The creation of piles of organic material can, therefore, be beneficial to this species. The disposal of arisings from vegetation cutting or mowing is often a problem for habitat managers – but such waste material can be used to create grass snake egg-laying sites.

The key to a successful grass snake egg-laying heap is to ensure the material provides the necessary heat and humidity to incubate the eggs. Larger heaps of vegetation are more likely to be successful than small heaps. Heaps should be at least 1 m^3, but ideally much larger. It is also necessary to replenish existing sites with fresh material or to regularly create new egg-laying sites.

Heaps that are used by grass snakes should not be interfered with between June and September, to avoid harming the animals. Replenishing is best done in April to May or October, and normally should be done at least once every two years (though this depends on how quickly the material loses the capacity to generate heat, which can be tested easily by hand). Occasionally grass snakes (and slow-worms) also hibernate in the heaps, so they are best left undisturbed over winter.

Some grass snake egg-laying heaps have been constructed by piling vegetation (meadow cuttings) on top of a base, or framework, of brash. Whether this sort of construction improves conditions for grass snakes has not been rigorously tested. However, the brash is intended to create spaces within the heap to allow easy access to nesting females. It may also increase aeration, hence aiding decomposition of the organic material.

A large compost heap, in a sunny location with adjacent cover provided by logs and herbaceous vegetation (Paul Edgar)

Compost containers should allow access to air and grass snakes (Lee Brady)

If space allows, creating several egg-laying heaps may be beneficial. This may increase the chances of females locating a heap, while reducing the distances they have to move to do so. Multiple heaps are also likely to create a wider range of egg-laying conditions and ensure that not all of the eggs are in 'one basket'. Mass mortality of eggs may occur due to the weather (especially if it is very hot and dry), predation, severe disturbance of the site, or due to disease, fungal infection or parasites. The impact of adverse factors may be reduced if eggs are spread over a number of egg-laying heaps. Locating several egg-laying sites in both full sun and partial shade can ensure that, whatever the weather over the course of the incubation period, some eggs should hatch.

Individual females tend to return to the same egg-laying site year after year. Therefore, new heaps are best located close to existing, used ones, or at least in high quality habitat where grass snakes are known to pass through.

Egg-laying heaps must be sited in sun or partial sun. If the surrounding scrub or tree cover grows up and creates substantial shading, it should be cut back. Heaps should also be connected to vegetation that provides secure cover for adult and hatchling snakes moving to or from the site. Decomposing vegetation causes local soil enrichment, so egg-laying heaps should be constructed in locations within sites where this will not create a problem.

Covering, or partially covering, a heap with a tarpaulin, or similar, weighted down to keep it in place, may help to retain heat and humidity. Such covers can also be useful in monitoring the egg-laying site. Lifting the cover may reveal a gravid female or, later, hatchlings (which measure around 17 cm long); snakes spend some time around the heap prior to egg-laying and hatchlings do not all disperse immediately. Pieces of discarded carpet or corrugated iron have also been used to the same effect. These covers should extend to the base of the heap to allow easy access to grass snakes.

Covering, or partially covering, a heap with a tarpaulin, or similar may help to retain heat and humidity (ARC)

It can take several years for grass snakes to start laying eggs in a newly created heap. To check if a heap is being used, site managers can either check around the heap in late August and September for hatchlings, or carefully dismantle the heap in October to check for egg shells, before reconstructing the heap.

Numerous, irregularly sized and shaped sand patches, scattered across sunny, south-facing heathland slopes, provide a range of egg-laying choices for sand lizards (Paul Edgar)

9.4. Sand lizard egg-laying sites

Sand lizards lay their eggs in bare, semi-compacted sand, or sandy gravels. Egg-laying sites must be;

- unshaded,
- close to dense vegetation cover (for the safety of both females and hatchlings),
- undisturbed during the incubation period.

Historically bare sand has been maintained by natural processes (e.g. disturbance by wild herbivores) and human activities (e.g. turf cutting and creation of footpaths, cart tracks etc.). Now it is a rare commodity on heathland.

Due to the scarcity of bare sand on many heathland sites, most sand lizards are forced to lay their eggs along tracks and paths. Although this source of exposed sand can be critically important, eggs here may be vulnerable to horses, mountain bikes, motorbikes and four-wheel-drive vehicles. A certain level of public access is useful in maintaining the open nature of paths across heathland. Seasonal closure to horses may reduce the risk of harm to sand lizard eggs.

Bare sand exposed by erosion on heathland can also be important for sand lizards. Care should be taken that this is not overgrown during heathland restoration programmes. Where practical, erosion features should be managed to maintain open areas.

Exposed sand of tracks can be an important egg-laying substrate, although eggs are at risk of harm from footpath traffic (Nick Moulton)

Where possible exposed sand should be managed and allowed to undergo succession from bare ground to full vegetation cover. Ideally, on heathland, new areas of bare sand should be created annually and should cover at least 5% of small sites, (a smaller proportion of larger sites may be acceptable). This is consistent with the mandatory 1-10% bare ground cover recommended within Common Standards Monitoring for lowland heath SSSIs (JNCC, 2004). Bare ground is not only vital for sand lizards but also valuable to more than half of the BAP species found on lowland heath (Webb, Drewitt and Measures, 2010).

Bare sand can be provided through the creation of fire-breaks (see *7.5. Fire control*) as long as care is taken to avoid forcing animals to cross exposed, closely-mown areas to reach the sand. Patches of sand can be created in the same way as fire-breaks, by mowing vegetation in winter and stripping topsoil and rotovating in late April to early May.

The following points should help to create good egg-laying sites for sand lizards:

- A minimum size of 1 m by 2 m is recommended.
- Only the edges of the sand patch, where lizards can remain near cover, are used for egg-laying. Hence, a long, narrow patch is far preferable to a large expanse of bare sand; long strips measuring tens of metres can work very effectively. For the same reason, several smaller patches are better than one large one,
- Sand patches should be located across a site, in sunny, south-facing areas.
- A sand patch may be flat or angled toward the sun.
- Sand patches should generally be within about 50 cm of mature heather or other suitable cover.
- Small sand patches can be dug by hand. Machinery, such as a rotovator or mini-digger, however, will be more practical on most sites.
- Sand should be dug annually preferably by digging new patches or, if that is not feasible, re-digging a third or a quarter of existing patches, to create a range of successional stages.
- Rotovation or digging should be carried out from late April to early May to avoid harming sand lizard eggs or hibernating reptiles.

Bare sand can be provided by the creation of fire-breaks. Here a sinuous strip has been dug into a mown fire-break (ARC)

Small sand patch. Note turves piled on northern side to create a sunny basking bank (Jim Foster)