The Glasgow Naturalist (2024) Volume 28, Part 2, 89-90

https://doi.org/10.37208/tgn28215

Coastal Treasures of the Eastern Solway: a *Species on the Edge* project

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Species on the Edge is a consortium of seven conservation charities led by NatureScot, all of whom are dedicated to safeguarding a future for 37 of the rarest and most vulnerable species associated with Scotland's coastal and island habitats. With support from the National Lottery Heritage Fund, the partnership will deliver a national programme of works intended to mitigate the negative effects of environmental change and provide benefits for both local communities and wildlife. An underlying objective of this approach is to explore new ways of partnership working within the conservation sector while at the same time empowering communities to play a more active role in helping to protect their local environment.

There are nine species projects in total spread across seven project areas throughout Scotland. As area lead for the Solway Coast project area, Amphibian and Reptile Conservation (ARC) are proud to present Coastal Treasures of the Eastern Solway - a project through which we aim to engage with and empower local communities and landowners to help conserve Scotland's rarest amphibian, the natterjack toad (*Epidalea calamita*) (Fig. 1).

Fig. 1. Natterjack toad (*Epidalea calamita*). (Photo: Ben Andrew)

Most extant populations of natterjack toads in the United Kingdom are closely associated with coastal environments such as dune slack, sandy heath and upper salt marsh (or "merse"). In Scotland, the toad's range is restricted to the vice counties of Dumfriesshire and Kirkcudbrightshire and extends from Powfoot in the east of the region to Mersehead in the west; the population at Mersehead is the result of a translocation from neighbouring Gillfoot Bay about 25 years ago (ARC, 2018). The species was once considered to be locally abundant in some areas. However, since the late 1970s, the local population has declined dramatically and the species' distribution is estimated to have declined by more than half in the last century.

The natterjack toad is often referred to as a pioneer species, in reference to its proclivity for early successional or so-called "dynamic" habitat characterised by a lack of vegetation and abundance of loose substrate. Natterjack toads prefer to breed in ephemeral water bodies, meaning those that either dry up in late summer or become inundated with tidal water over winter, only to be replenished by rainwater the following spring. It is generally thought that they evolved this life history strategy to avoid competition from other amphibian species (e.g. the common toad *Bufo bufo*) and help reduce predator burden from aquatic predators, such as fish, during their developmental stages (Banks & Beebee, 1988). Such a novel life-history strategy, however, makes the species vulnerable to habitat loss as a result of agricultural intensification and afforestation, as well as from natural processes such as ecological succession. Phenomena such as seasonal drought and sea-level rise can also have disastrous effects on breeding success due to the premature desiccation or salination of breeding ponds.

In response to this plight, and through the concerted efforts of ARC staff and volunteers via the Coastal Treasures of the Eastern Solway project, we have endeavoured to conduct a rigorous population and habitat assessment of the species throughout its range in Scotland. The results will provide a robust baseline against which to make informed recommendations for appropriate habitat interventions. Working closely with landowners and custodians of the environment, we will co-design and implement a range of long-term, sustainable land management solutions, such as low-intensity rotational grazing, for the benefit of the natterjack toad and other wetland species, such as wading birds and the tadpole shrimp (*Triops cancriformis*).

The tadpole shrimp is of particular importance, as it is only known to occur in two locations in the U.K. - the New Forest in Hampshire and the Solway Coast. Similar to the natterjack toad, it too has adapted to breed in ephemeral waters, albeit those that occur within a slightly different hydroperiod from those typically preferred by the natterjack toad. Unlike the natterjack toad, however, tadpole shrimp eggs are able to enter a state of diapause that can last in excess of 25 years, during which they are able to withstand freezing temperatures and prolonged periods of drought while

awaiting the optimum conditions for development (Rogacki & Brysiewicz, 2021). The species was thought to have become extinct from the Solway during the middle of the 20th century. However, it was subsequently rediscovered at Caerlaverock around 2010. In an attempt to safeguard this enigmatic yet vulnerable species, the *Species on the Edge* partnership is overseeing efforts to reintroduce tadpole shrimp to their historic range at RSPB Mersehead by way of the translocation of eggs reared in captivity from sediment collected at Caerlaverock.

Through a diverse programme of multi-sensory activity, *Species on the Edge* will endeavour to raise awareness of the various threats to biodiversity, as well as to provide bespoke training opportunities through which to grow capacity for local participation in practical conservation and species monitoring, all of which is intended to engender a sense of community ownership with regards to the project and ensure a lasting legacy.

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