



Distribution of released pet turtles in the UK: a citizen science survey

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Verification Process

The verification process involved the use of photographic evidence submitted by citizen science participants to the survey on an online digital platform. These photos were collated and checked by the research lead (SS) and additional verification provided by a chelonian specialist, Paul Eversfield (British Herpetological Society Trustee). Scientific literature and additional experienced members of the project team were also consulted in identification, where necessary (Vamberger et al., 2020). Most photographs submitted, provided initial verification of individual turtle presence prior to identification. This was confirmation that it was a turtle being observed, although one photo submitted showed a misidentified discarded inanimate object. Further to presence confirmation, identification as to species/subspecies was assessed. If the participant could not identify or match the turtle to the image key provided, the 'other' option could be selected. If a specific species identification could not be made through this process, they were classified as 'other'. In certain cases, a sub-category could be assigned due to various characteristics only shown in certain groups i.e. map turtle serrated scutes. This enabled a shortlisting process to remove other species due to a lack of certain identifiers. These broader categories may include multiple species i.e. 'Map turtle' includes Ouachita turtles (*Graptemys ouachitensis*) and False map turtles (*G. pseudogeographica*). Similarly, 'Pond turtle' includes the European pond turtle (*Emys orbicularis*), Chinese pond turtle or Reeves' turtle (*Mauremys reevesii*) and Spanish pond turtle (*M. leprosa*). The 'cooter turtle' category includes river cooters (*P. concinna*), Florida red-bellied cooters (*P. nelsoni*), Peninsula cooters (*P. peninsularis*) and coastal plain cooters (*P. floridana*). Invasive alien species listed on the EU IAS Regulations include *T. s. elegans*, *T. s. scripta* and *T. s. troostii*. 'Unverified' individuals could not be checked due to lack of evidence (no photograph submitted or individual not visible in the photograph). Where participants had provided a number of individuals present and only a few could be verified (seen in the photograph), the individuals that were not visible were categorised as 'unverified' and assigned to the species the participant submitted. For example, the observer submits a sighting of two red-eared sliders, one red-eared slider is visible in the photograph so consider a verified red-eared slider and the other individual is assigned an 'unverified red-eared slider'. This does not discount the presence of the unverified turtle as this is included in the unverified data count. The observer may have seen this individual but due to it not being photographed, it could not be included in the verified

dataset. Verified and unverified reports have therefore been included to show the maximum number of turtles suggested as present compared to those that were verified and accompanied by evidence. Assuming the photos were taken at the location provided in the survey and not at another location or falsified submission. The project verifiers used markings, head shape and body shape so as not to rely solely on markings that may fade with age (seen in melanistic individuals). *T. scripta* ssp. markings have been documented in various individuals as darkening in pigmentation (McCoy, 1968; Lovich et al., 1990; Hays and McBee, 2009) due to both genetics and ontogenetic development. Particularly noted in male red-eared sliders, post orbital 'red ear' markings may disappear as they age but this is not the only determining factor. The shell, skin and pupils may also darken making it more difficult to identify these species unless other characteristic indicators allow. Due to similarities between *Pseudemys* spp. and *Trachemys* spp., an umbrella category was used to group individuals with these characteristics, if other morphological indicators could not aid identification e.g. head shape (Ernst and Lovich, 2009). As further experience and identification skills were gained, over the study period, the photos were checked again from previous years to ensure that consistency was maintained throughout. Although a small number from earlier years were amended, these checks over the duration were important for standardisation and accuracy. We recognise species and sex categorisation of individuals has been executed to the extent possible without removing, handling and further testing for higher accuracy.