Abstract: O’Meara 2014

Citation:

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The red squirrel (Sciurus vulgaris) has seen a population decline in Ireland and Britain over the last 100 years since the introduction of the North American grey squirrel (Sciurus carolinensis). The decline has been attributed to a number of factors including habitat loss and direct competition with the invasive grey squirrel. As a result, there is a growing need to monitor the distribution of both species for conservation management. Squirrels can be surveyed non-invasively using hair-tubes, and the species can be identified by microscopic identification of individual hairs. To increase the information obtained from non-invasive surveys a suite of DNA tools to identify both squirrel species from non-invasive DNA samples were developed in this study. This involved the design of real-time PCR assays designed to amplify short DNA fragments of red and grey squirrel DNA. A molecular dietary study of pine marten (Martes martes) scats using the species-specific assays to detect squirrel DNA in the pine marten diet was also conducted. Methods to determine the gender of squirrels were investigated by testing the utility of a range of Y-chromosome markers. A panel of previously published microsatellite DNA markers were screened and optimised to identify individual red squirrels. The techniques were applied to a hair-tube study in County Waterford, South East Ireland, where individual red squirrels were identified. Additional samples were collected from subpopulations throughout Ireland, and a remnant red squirrel population in mid Wales where the genetic variability of the populations were assessed using microsatellite genotyping and mitochondrial DNA sequencing. The combination of these tools can be used for non-invasive genetic monitoring and translocation projects of the red squirrel.