Northern Ireland Irish Hare Survey 2010

Quercus
Biodiversity & Conservation Biology

NIEA Northern Ireland Environment Agency
www.ni-environment.gov.uk

Research and Development Series 11/10
A report commissioned by the Northern Ireland Environment Agency

Northern Ireland Irish Hare Survey 2010

This report was presented to NIEA in September 2010

Authors: Neil Reid, Alan Harrison & Gillian Robb
Contractor: *Quercus*
NHRP contract number: CON 2/1 (241)
Quercus Project: QU10-01

This report should be cited as follows:

Reid, N., Harrison, A.T. & Robb, G.N. (2011) *Northern Ireland Irish hare survey 2010*. Report prepared by the Natural Heritage Research Partnership, *Quercus*, Queen's University Belfast for the Northern Ireland Environment Agency. Northern Ireland Environment Agency Research and Development Series No. 11/10.

For further information on this report please contact:
Michael Meharg,
Northern Ireland Environment Agency,
Biodiversity Unit,
Klondyke Building,
Gasworks Business Park,
Lower Ormeau Rd,
Belfast.
BT7 2JA.

The opinions expressed in this report do not necessarily reflect the current opinion or policy of the Northern Ireland Environment Agency.

EXECUTIVE SUMMARY

1. The Northern Ireland Irish hare survey was undertaken during early 2010 and compared to identical surveys conducted each year since 2002 (excluding 2003). Standardised field survey methods and analytical techniques were employed to enable direct between-year comparisons.

2. Using conventional analysis and not withstanding sources of potential bias, the estimated mean density of Irish hares in Northern Ireland during early 2010 was calculated to be 4.76 hares.km^{-2} (95%CI 3.77-6.00) giving a total estimated abundance of 67,400 hares (95%CI 53,400-85,000).

3. The calculated density during 2010 was significantly higher, not only of that during 2009, but also that during years in which similar numbers of hares were observed (i.e. 2006 and 2008). Variance in hare density is a function of both the number of hares observed and their distribution relative to the transect. Whilst comparable numbers of hares were observed during multiple years in the time-series, their distribution relative to point transects was substantially different. Hares were detected closer to point transects during 2010 than other years in which comparable numbers were observed. Thus, yielding a significantly higher calculated density during 2010.

4. There was no significant temporal trend in either the total number of hares counted or the estimated mean hare density between 2002 and 2010.

5. We make the 4 recommendations for action:

    a. Retrospective re-analysis of hare survey data from 2002 to 2010 to account for various sources of potential bias. Recent developments in Distance analysis methods made by the Research Unit for Wildlife Population Assessment (RUWPA) at the University of St. Andrews, in collaboration with *Quercus* should be applied.

    b. Evaluation of Irish hare Species Action Plan targets during late 2010 should use the results of any retrospective re-analysis.

    c. Development of a long-term Irish hare monitoring programme beyond 2010.

    d. Research on the population biology of Irish hares remains necessary. There is insufficient information on basic aspects of demography such as survival and productivity. Particular attention should be given to the influence of pastoral farmland management (e.g. silage harvest) on population recruitment.

CONTENTS

INTRODUCTION

The Irish hare (*Lepus timidus hibernicus* Bell, 1837) is the only native lagomorph in Ireland (Fairley, 2001; Hamill, 2001) and is currently classified as an endemic sub-species of the mountain hare (*L. timidus* Linnaeus, 1758). Nevertheless, it differs phenotypically, behaviourally, ecologically and genetically from other mountain hares and recent research suggests it is a significant evolutionary unit of intrinsic conservation value (Hughes *et al.* 2006).

In Northern Ireland, the Irish hare is protected under the Wildlife Order (NI) 1985 and annual amendments to the Game Preservation (Special Protection for Irish Hares) Order (Northern Ireland) 2003. It is also listed on Appendix III of the Bern Convention (Anon, 1979) and Annex V(a) of the EU Habitats Directive (92/43/EEC), and was listed as an internationally important species in the first Irish Red Data Book (Whilde, 1993). Furthermore, subject to a local Northern Ireland and an All-Ireland Species Action Plan (Anon, 2000; 2005) it is one of the highest priority species for conservation action in Northern Ireland.

Interpretation of short-term population changes can only be made in the context of long-term time-series. Recent estimates of Irish hare population abundance demonstrate substantial interannual and multiannual variation (Reynolds, O'Mahony & Aebischer, 2006; Reid *et al*. 2007a;).

For species of conservation concern, the importance of contemporary monitoring and its direct application to management is widely recognised (Choudhury, 1999, 2002; Battersby & Greenwood; 2004). The Northern Ireland hare survey started in 2002 and has been conducted at annual intervals since 2004 (Preston *et al*. 2002; Tosh *et al*. 2004; Tosh *et al*. 2005; Hall-Aspland *et al*. 2006; Reid *et al*. 2007b; Reid *et al*. 2008; Reid *et al*. 2009). In keeping with previous survey objectives the aims of this survey were to:

- Establish the relative abundance of Irish hares in Northern Ireland during 2010.
- Ascertain relative change in hare abundance.
- Make recommendations for future research.

METHODS

Surveys were conducted during late winter (January-March) from 2002 to 2010 (excluding 2003). Eight long-line meta-transects approximately 100km in length and were originally selected to bisect a representative sample of landscape types characterised by the land classification system (Murray, McCann & Cooper, 1992) throughout all six counties in Northern Ireland and were placed on minor roads (Fig. 1). Individuals point transects were spaced approximately 200m apart on each meta-transect and were surveyed using a 2 x 10^6 candle-power spotlight from a platform on a high clearance vehicle elevating the observer's head height >2 m above ground level, i.e. above most hedgerows.

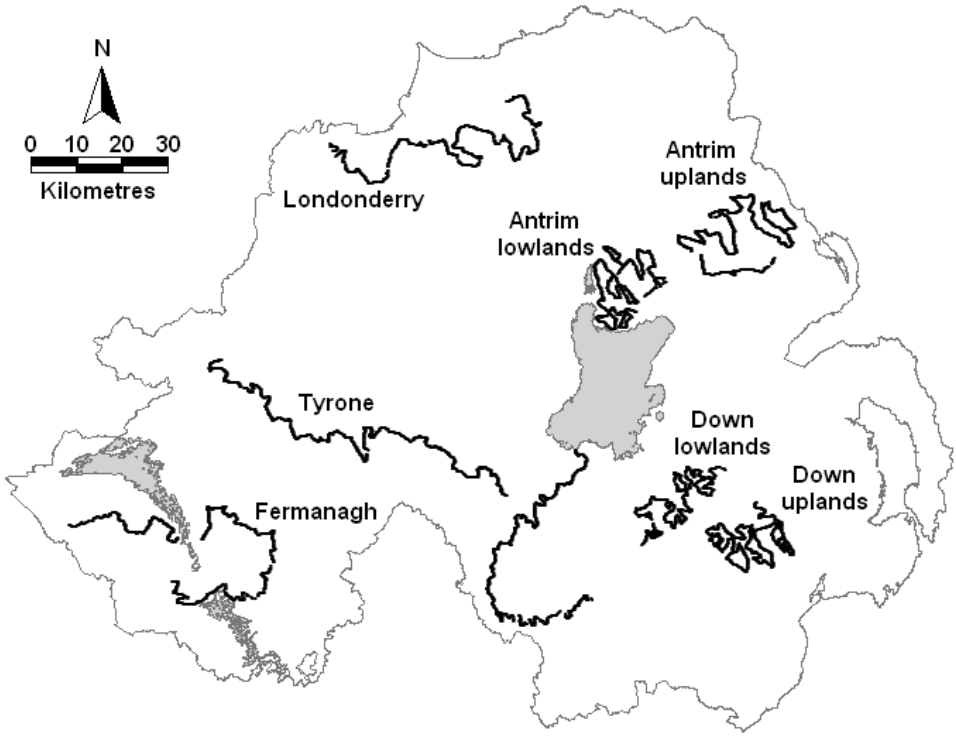

Fig. 1 *Location of meta- transects identical used in Northern Ireland hare surveys from 2002-2010 (Preston et al. 2002; Tosh et al. 2004; Tosh et al. 2005; Hall-Aspland et al. 2006; Reid et al. 2007a; Reid et al. 2007c; Reid et al. 2008: Reid et al. 2009; this study).*

The observer systematically swept the spotlight 180 degrees on both sides of the road twice, working from the area closest to the vehicle towards the horizon. Survey effort for each point transect was taken as a measure of the number of degrees within the observer's circle of vision that were visible and not obscured. For each hare detection, the survey point location (measured to the nearest 10m using a Trimble Global Positioning System), the cluster size (i.e. number of hares), the radial distance of the cluster from the survey point (measured using a laser range finder; Leica LRF 900 scan) and the bearing of the cluster from the direction of travel (measured using compass binoculars; Tasco, Offshore 54, 7x50mm) were recorded. This was repeated for each point transect along the length of each meta-transect. Surveys were not conducted until one hour after sunset.

Hare density and abundance was estimated using Distance v6.0 release 2 software (Thomas *et al.* 2009). The sample point was taken as the unit for variance estimation with right truncation applied to the upper 10% of sightings. Estimates were stratified by county using three commonly used detection functions constructed at the global level, including uniform cosine, half-normal cosine and hazard-rate simple polynomial (Buckland *et al.* 2004), The parsimony of each model was evaluated using Akaike's Information Criterion (AIC) with the best model selected on the basis of the lowest AIC value. The Northern Ireland Environment Agency (NIEA) requested that the analytical procedure applied was identical to that of the standard Northern Ireland hare survey method used by Tosh *et al.* (2005), Hall-Aspland *et al.* (2006), Reid *et al*. (2007b), Reid *et al*. (2008), and Reid *et al*. (2009) to ensure direct comparability of results.

RESULTS

A total of 170 Irish hares were detected on 8 meta-transects during 2010 (Table 1). No European hares (*Lepus europaeus*) were detected during this survey.

The total number of hares counted was substantially higher during 2010 than 2009 but comparable to the numbers observed during 2006 and 2008 (Fig. 2). Intuitively, it might be expected that the calculated density should, therefore, have been higher during 2010 than 2009 but similar to that during 2006 and 2008. This was not the case. Using the standard Northern Ireland hare survey methodology and not withstanding sources of potential bias, the estimated mean density of Irish hares in Northern Ireland during early 2010 was calculated to be 4.76 hares.km^{-2} (95%CI 3.77-6.00) giving a total estimated abundance of 67,400 hares (95%CI 53,400-85,000; Table 2).

The calculated density during 2010 was significantly higher, not only of that during 2009, but also that of 2006 and 2008 (Fig. 3). Variance in hare density is a function of both the number of hares observed and their distribution relative to point transects. Whilst similar numbers of hares were observed during 2006, 2008 and 2010, their distribution relative to point transects was substantially different (Fig. 4). Hares were observed closer to the point transects during 2010 than either 2006 or 2008, thus yielding a significantly higher calculated density more comparable to that of 2004 than any other year.

There was no significant temporal trend in either the total number of hares counted or estimated mean hare densities between 2002 and 2010 (Figs. 2 & 3).

Table 1 *Total numbers of Irish hares observed in each county during Northern Ireland hare surveys from 2002 to 2010 (Preston et al. 2002; Tosh et al. 2004; Tosh et al. 2005; Hall-Aspland et al. 2006; Reid et al. 2007a; Reid et al. 2008; Reid et al. 2009; this study).*

County	Year									
	2002†	2002*	2003	2004	2005	2006	2007	2008	2009	2010
Antrim	134	41	-	120	126	79	137	77	28	97
Armagh	17	7	-	59	41	17	19	28	22	23
Down	63	23	-	67	29	29	32	41	13	22
Fermanagh	14	5	-	60	80	46	44	22	17	21
Londonderry	7	3	-	34	9	3	4	3	6	2
Tyrone	4	2	-	33	29	14	11	16	12	5
Total	**239**	**81**	**-**	**373**	**314**	**188**	**247**	**187**	**98**	**170**

†*During 2002, the number of hares recorded was sufficiently low to warrant repeating each transect to gather enough detections to meet the minimum requirements of Distance analysis (total distance driven = 2,281km).*
**From 2004-2010, each transect was surveyed only once (total distance surveyed each year = 843km). Consequently, the numbers of hares recorded during 2002 have been calibrated for comparability with subsequent years. Note these figures differ slightly from those in Reid et al. 2009 due to previous error.*

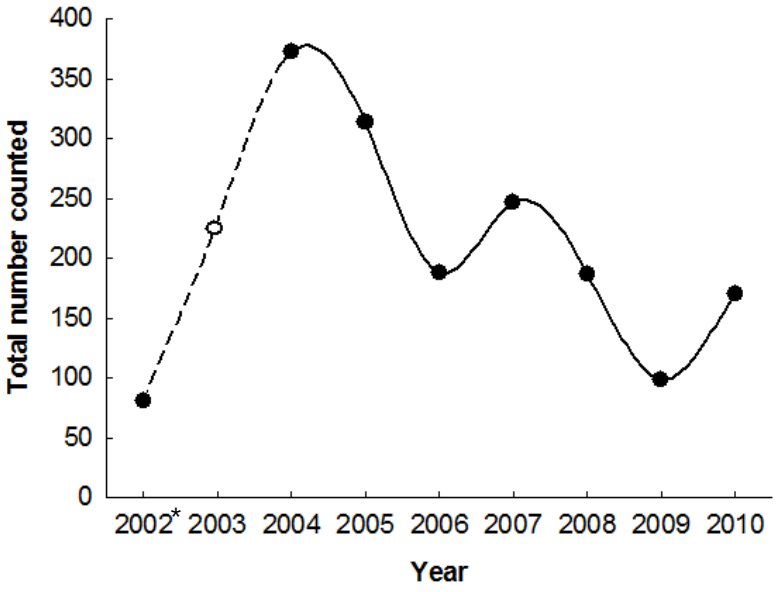

Fig. 2 *Temporal trend in the total number of Irish hares observed during Northern Ireland Irish hare surveys from 2002 to 2010 (Preston et al. 2002; Tosh et al. 2004; Tosh et al. 2005; Hall-Aspland et al. 2006; Reid et al. 2007a; Reid et al. 2008; Reid et al. 2009; this study). *Total numbers during 2002 have been calibrated for the distance driven (see Table 1) for comparability and the line through 2003 was interpolated.*

Table 2 *Calculated Irish hare density and abundance in each county during 2010 using a standard survey methodology and conventional Distance Analysis.*

County	Estimated mean density hare/km^2 (95% CI)	Estimated abundance Numbers (95% CI)
Antrim	10.36 (8.22 - 13.07)	32,500 (25,800 - 41,000)
Armagh	9.69 (7.68 - 12.23)	12,900 (10,200 - 16,200)
Down	2.42 (1.92 - 3.05)	6,000 (4,800 - 7,600)
Fermanagh	5.85 (4.64 - 7.38)	10,800 (8,600 - 13,600)
Londonderry	0.78 (0.62 - 0.98)	1,600 (1,300 - 2,100)
Tyrone	1.10 (0.87 - 1.38)	3,600 (2,800 - 4,500)
Global	**4.76 (3.77 - 6.00)**	**67,400 (53,400 - 85,000)**

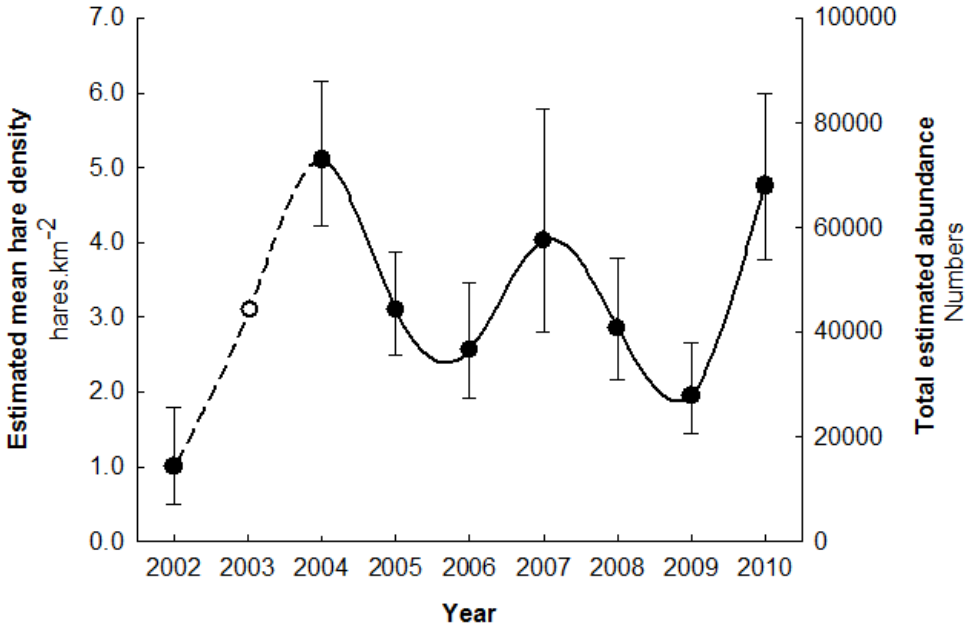

Fig. 3 *Temporal trend in the calculated mean density and abundance ± 95% confidence limits during Northern Ireland Irish hare surveys from 2002 to 2010 (Preston et al. 2002; Tosh et al. 2004; Tosh et al. 2005; Hall-Aspland et al. 2006; Reid et al. 2007a; Reid et al. 2008; Reid et al. 2009; this study).*

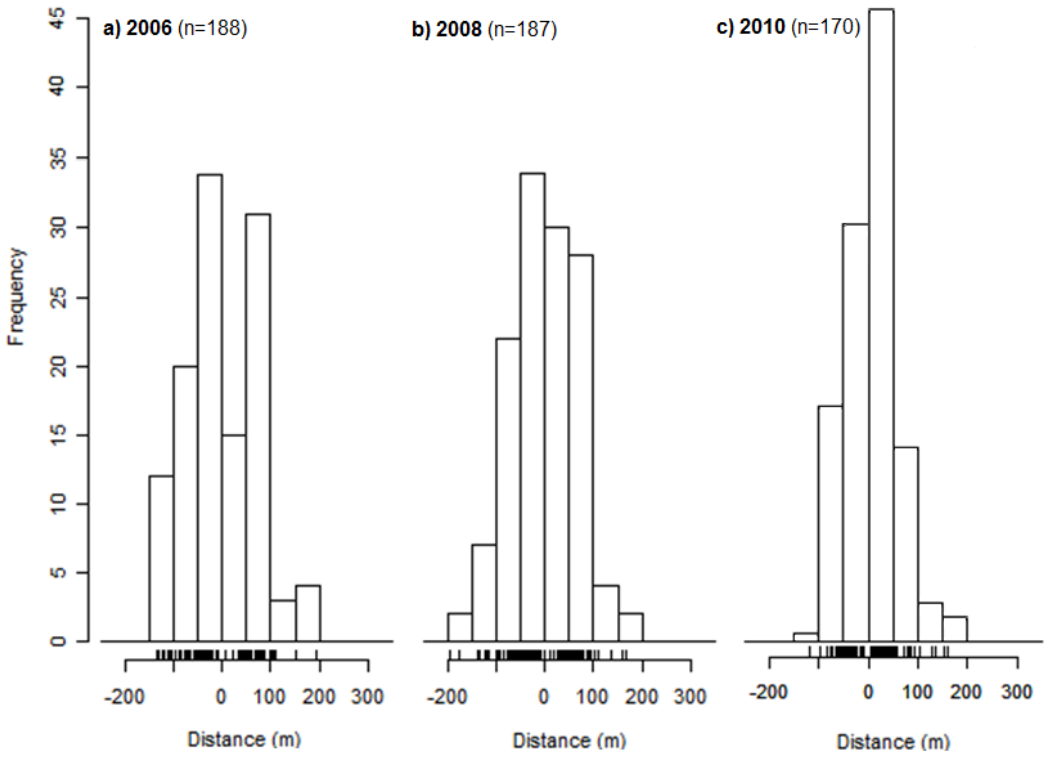

Fig. 4 *Frequency distribution of the perpendicular distances at which hare clusters were detected relative to the point transect (i.e. road) during* **a)** *2006,* **b)** *2008 and* **c)** *2010. Zero indicates the location of the point transect, negative values represent the left-hand side of the road and positive values represent the right-hand side of the road. Note that each of the three years had comparable numbers of hares observed (given in parentheses) but the mean distance was significantly shorter during 2010 (i.e. more hares closer to the road).*

DISCUSSION

It was a stipulation of this contract that the survey protocol and analytical methods should be identical to those of previous surveys (Tosh *et al.,* 2005; Hall-Aspland *et al.* 2006; Reid *et al*. 2007b; Reid *et al*. 2008; Reid *et al*. 2009).

Variance in hare density is a function of both the number of hares observed and their distribution relative to point transects. For example, the total numbers of hares observed during 2006, 2008 and 2010 was fairly similar; 188, 187 and 170 hares respectively (Table 1). However, estimated mean densities each year were not the same; 2.57 (1.91-3.46), 2.86 (2.16-3.79) and 4.76 (3.77-6.00) hares/km^2 (95%CI) respectively (Fig. 3). The apparent disparity between counts and density is produced by the fact that hares were recorded substantially closer to point transects during 2010 than either 2006 or 2008 thus yielding a significantly higher calculated density.

There was no significant temporal trend in either the total number of hares counted (Fig. 2) or estimated mean hare densities between 2002 and 2010 (Fig. 3). However, both measures of abundance demonstrated substantial between-year variation consisted with past observations of significant interannual variance in Irish hare populations (Reynolds, O'Mahony & Aebischer, 2006; Reid *et al*. 2007a). Hare populations elsewhere are characterised by substantial interannual and multiannual fluctuations (Elton & Nicholson, 1942; Keith, 1963; Krebs *et al*. 1986; Keith, 1990; Ranta *et al*. 1997; Krebs *et al*. 2001). Interpretation of trends within short-term time-series should, therefore, be avoided (Tosh *et al.,* 2005; Hall-Aspland *et al.* 2006; Reid *et al*. 2007b; Reid *et al*. 2008; Reid *et al*. 2009). Furthermore, a paucity of data on basic Irish hare ecology, including the impact of hunting and grassland management makes temporal change in abundance difficult to interpret.

Previous research has demonstrated that surveys of hares conducted from roads do not conform to the assumptions of distance-sampling with biased estimates the likely outcome (Marques & Borchers, 2006; Paxton, Marques & Borchers, 2007; Reid *et al*. 2007a; Reid *et al*. 2007c; Marques et al. *in press*). Regardless of potential sources of negative bias, standardised methods enable comparison of relative abundance between years. Collaborative research undertaken by RUWPA at the University of St.

Andrews and *Quercus*, has yielded novel and innovative methods to deal with problems such as the non-random placement of transects, consistent angular sampling bias and the non-uniform distribution of animal detections (Marques & Borchers, 2006; Paxton, Marques & Borchers, 2007; Reid *et al*. 2007a; Reid *et al*. 2007c; Marques et al. *in press*). We advocate retrospective re-analysis of hare survey data from 2002 to 2010 using custom Distance analysis techniques, similar to those applied to the Northern Ireland Irish hare survey 2007 (Paxton, Marques & Borchers, 2007; Reid *et al*. 2007c). This may lead to more accurate estimates of mean density and abundance and more realistic estimates of precision. Evaluation of the Irish hare Species Action Plan targets should utilise any retrospective analysis.

RECOMMENDATIONS

We make the 4 recommendations for action:

1. Retrospective re-analysis of hare survey data from 2002 to 2010 to account for various sources of potential bias. Improvements in Distance analysis methods made by the Research Unit for Wildlife Population Assessment (RUWPA) at the University of St. Andrews, in collaboration with *Quercus* may enable the accuracy and precision to be refined.

2. Evaluation of Irish hare Species Action Plan targets during late 2010 using the results of any retrospective re-analysis.

3. Development of a long-term Irish hare monitoring programme beyond 2010.

4. Research on the population biology of Irish hares remains necessary. There is insufficient information on basic aspects of demography such as survival and productivity. Particular attention should be given to the influence of pastoral farmland management (e.g. silage harvest) on population recruitment.

ACKNOWLEDGEMENTS

This project was funded by the Natural Heritage Research Partnership (NHRP) between *Quercus*, Queen's University Belfast and the Northern Ireland Environment Agency (NIEA). Thanks to Declan Looney who acted as Client Officer.

REFERENCES

Anonymous (1979) *Convention on the conservation of European wildlife and natural habitats*. Bern Convention. Council of Europe, Strasbourg.

Anonymous (2000) *Biodiversity in Northern Ireland: Species Action Plans - Irish Hare, Chough & Curlew.* Environment and Heritage Service NI. pp 6-9, Department of Environment. Belfast. UK.

Anonymous (2005) *All Ireland Species Action Plans: Irish Lady's-tresses (Spiranthes romanzoffiana), Pollan (Coregonus autumnalis), Irish hare (Lepus timidus hibernicus), and Corncrake (Crex crex).*

Battersby, J. & Greenwood, J.J.D. (2004) Monitoring terrestrial mammals in the UK: past, present and future, using lessons from the bird world. *Mammal Review*, **34**: 3-29.

Bell, T. (1837) *History of British Quadrupeds, including the cetacea*. 1st ed. pp 341. London. UK.

Buckland, S.T., D.R. Anderson, K.P. Burnham, J.L. Laake, D.L. Borchers & L. Thomas (2004) *Advanced Distance Sampling*. Oxford University Press. UK.

Choudhury, A. U. (1999) Status and Conservation of the Asian Elephant *Elephas maximus* in north-eastern India. *Mammal Review*, **29**(3), 141-173.

Choudhury, A. U. (2002) Distribution and conservation of the Gaur *Bos gaurus* in the Indian Subcontinent. *Mammal Review*, **32**, 199–226.

Dingerkus, S.K. & Montgomery, W.I. (2002) A review of the status and decline in abundance of the Irish hare (*Lepus timidus hibernicus*) in Northern Ireland. *Mammal Review*, **32**, 1-11.

Elton, C. S. & Nicholson, M. (1942). The ten-year cycle in numbers of the lynx in Canada. *Journal of Animal Ecology*, **11**: 215-244.

EEC 43/92 (1992) Directive on the Conservation of Natural Habitats of Wild Fauna and Flora. *Official Journal of the European Union L*, **206**, 7

Fairley, J. (2001) *A basket of weasels*. Privately published, Belfast. UK.

Game Preservation (Special Protection for Irish Hares) Order (Northern Ireland) 2003. Statutory Rule 2003 No. 114. Government Printer for Northern Ireland. ISBN 0337964181.

Hall-Aspland, S., Sweeney, O., Tosh, D., Preston., P., Montgomery, W.I. & McDonald, R.A. (2006) *Northern Ireland Irish hare survey 2006.* Report prepared by Quercus for the Environment and Heritage Service (DOE, N.I.). UK.

Hamill, R. (2001) *A study of the genetic structure and phylogeography of Lepus timidus L. subspecies in Europe using microsatellite DNA and mtDNA*. Unpublished PhD thesis, University College Dublin. Ireland.

Hughes, M., Montgomery, W.I. & Prodöhl, P. (2006) *Population genetic structure and systematics of the Irish Hare.* Report prepared by Quercus for the Environment and Heritage Service (DOE, N.I.). UK.

Keith, L. B. (1963) *Wildlife's Ten-Year Cycle*. Univ. of Wisconsin Press, Madison.

Keith, L. B. (1990) Dynamics of snowshoe hare populations. *Current Mammalogy,* **2**: 119–195.

Krebs, C.J., Gilbert, B.S., Boutin, S., Sinclair, A.R.E., and Smith, J.N.M. (1986) Population biology of snowshoe hares. I. Demography of food-supplemented populations in the southern Yukon. *Journal of Animal Ecology*,**55**: 963–982.

Krebs, C. J., Boonstra, R., Boutin, S. & Sinclair, A. R. E. (2001) What drives the 10-year cycle of snowshoe hares? *Bioscience*, **51**, 25–35.

Langbein, J., Hutchings, M.R., Harris, S., Stoate, C., Tapper, S.C. & Wray, S. (1999) Techniques for assessing the abundance of brown hares *Lepus europaeus*. *Mammal Review*, **29**, 93-116.

Linnaeus, C. (1758) *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* 10th edn. Stockholm. Sweden.

Marques, T.A. & Borchers D.L. (2006) *Report on the Estimation of Irish Hare Density from the 2006 Survey.* Unpublished report. CREEM

Marques, T. A. Buckland, S. T. Borchers, D. L., Tosh, D. & McDonald, R.A. (in press) Point transect sampling along linear features. *Biometrics,* doi/10.1111/j.1541-0420.2009.01381.x/abstract

Murray, R., McCann, T. & Cooper, A. (1992) *A land classification and landscape ecological study of Northern Ireland*. University of Ulster, Coleraine. UK.

O'Mahony, D. & Montgomery, W.I. (2001) *The distribution, abundance and habitat use of the Irish hare (Lepus timidus hibernicus) in upland and lowland areas of Co. Antrim and Co. Down, Northern Ireland*. Report prepared by Queen's University Belfast for the Environment and Heritage Service (DOE, N.I.). UK.

Paxton, C.G.M., Marques, T.A. & Borchers, D.R. (2007) *Report on Estimation of Irish Hare Density from the 2007 Survey with Revised Estimates for the 2006 Survey.* Unpublished report. CREEM

Preston, J., Prodöhl, P., Portig, A & Montgomery, W.I. (2003) *The Northern Ireland Irish Hare Lepus timidus hibernicus Survey 2002.* Report prepared by Queen's University of Belfast for the Environment and Heritage Service (DOE, N.I.). UK.

Ranta, E., Lindstrom, J., Kaitala, V., Kokko, H., Linden, L. & Helle, E. (1997) Solar activity and hare dynamics: a crosscontinential comparison. *American Naturalist*, **149**, 765-775.

Reid, N., Ruddock, M., Barratt, I., Robb, G.N. & Montgomery, W.I. (2008) *Northern Ireland Irish hare survey 2008.* Report prepared by Quercus for the Environment and Heritage Service (DOE, N.I.). UK.

Reid, N., Sweeney, O., Wilson, C., Preston, S.J., & Montgomery, W.I. (2007a) *Northern Ireland Irish hare survey 2007.* Report prepared by Quercus for the Environment and Heritage Service (DOE, N.I.). UK.

Reid, N., Dingerkus, K., Montgomery, W.I., Marnell, F., Jeffrey, R., Lynn, D., Kingston, N. & McDonald, R.A. (2007b) *Status of hares in Ireland: Hare Survey of Ireland 2006/07.* In Marnell, F. and Kingston, N. (eds) Irish Wildlife Manuals, No. 30. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. ISSN 1393 6670.

Reid, N., Sweeney, O., Wilson, C., Preston, S.J., Montgomery, W.I. & McDonald, R.A. (2007c) *Developments in hare survey methodology - as applied to the NI Irish hare survey 2007.* Report prepared by Quercus for the Environment and Heritage Service (DOE, N.I.). UK.

Reid, N., Harrison, A.T. & Robb, G.N. (2008) *Northern Ireland Irish hare survey 2009*. Report prepared by the Natural Heritage Research Partnership, *Quercus* for the Northern Ireland Environment Agency. Northern Ireland Environment Agency Research and Development Series No. 09/04.

Reynolds, J.C., O'Mahony, D.O. & Aebischer, N.J. (2006) Implications of 'cyclical' population dynamics for the conservation of the Irish hare (*Lepus timidus hibernicus*). *Journal of Zoology*, **270**(3); 408-413.

Thomas, L., Laake, J.L., Rexstad, E., Strindberg, S., Marques, F.F.C., Buckland, S.T., Borchers, D.L., Anderson, D.R., Burnham, K.P., Burt, M.L., Hedley, S.L., Pollard, J.H., Bishop, J.R.B. and Marques, T.A. (2009). Distance 6.0. Release "2". Research Unit for Wildlife Population Assessment, University of St. Andrews, UK. http://www.ruwpa.st-and.ac.uk/distance/

Tosh, D., Towers, R., Preston, J., Portig, A., McDonald, R.A. & Montgomery, W.I. (2004) *Northern Ireland Irish hare survey 2004.* Report prepared by Quercus for the Environment and Heritage Service (DOE, N.I.). UK.

Tosh, D., Brown, S., Preston, J., Montgomery, W.I., Reid, N., Marques, T.A., Borchers, D.L., Buckland, S.T. & McDonald, R.A. (2005) *Northern Ireland Irish hare survey 2005.* Report prepared by Quercus for the Environment and Heritage Service (DOE, N.I.). UK.

Whilde, A. (1993) *Threatened mammals, birds, amphibians and fish in Ireland. Irish Red Data Book II*: *Vertebrates*. HMSO, Belfast. UK.

Wildlife Order (Northern Ireland) 1985. Statutory Rule 1985 No. 171. Government Printer for Northern Ireland.

ISSN 1751-7796 (Online)

Northern Ireland Environment Agency
Klondyke Building
Cromac Avenue
Gasworks Business Park
Belfast BT7 2JA
T. 0845 302 0008

Our aim is to protect, conserve and promote the natural and built environment for the benefit of present and future generations.

www.ni-environment.gov.uk

An Agency within the Department of the Environment
www.doeni.gov.uk

INVESTOR IN PEOPLE