All Ireland Species Action Plans

Irish Lady's-tresses
Spiranthes romanzoffiana

Pollan
Coregonus autumnalis

Hare
Lepus timidus hibernicus

Corncrake
Crex crex

AN ROINN COMHSHAOIL, OIDHREACHTA AGUS RIALTAIS ÁITIÚIL
DEPARTMENT OF THE ENVIRONMENT, HERITAGE AND LOCAL GOVERNMENT

Environment & Heritage Service
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Contents

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1. Current status

1.1. *Spiranthes romanzoffiana* Cham. (Irish Lady's-tresses) is a small orchid with cream-coloured flowers which, in Ireland, occurs in damp meadows, on lakeshores, in seasonally flooded pastures and in valley bogs. Flowering spikes are produced in summer, and plants over-winter by means of a lateral bud that develops during the growing season; in any one year the plant can exist in the flowering, vegetative or underground state (Gulliver & Gulliver, 2004). The species' ecological requirements have not been documented in Ireland. *S. romanzoffiana* is generally considered to be a native species in Ireland.

1.2. *S. romanzoffiana* is widespread and relatively frequent in North America (USA including SW Alaska, and Canada) where it occurs in a wide variety of habitat types (Brown, 2003; Catling, 1990). In Europe, the species is confined to the western fringes of Britain and Ireland, being restricted to the west of Scotland primarily on the Hebridean Islands, a single location in England – Devon, and in the north-eastern and western counties of Ireland (Preston *et al*., 2002). Although widespread throughout much of North America, *S. romanzoffiana* is highly localised in north-west Europe; it thus has an uneven Amphi-Atlantic distribution (Hultén, 1958; Heslop Harrison, 1953).

1.3. The first record of *S. romanzoffiana* in Ireland was made in 1810 by James Drummond, from near Castletown Berehaven in Co. Cork. Recent (1987-2000) records for the species from nine 10x10 km squares in the west and north of the Republic of Ireland are published in Preston *et al*. (2002) although a number of other recent records are also known (F. Horsman, (2005a) & pers. comm.; National Parks and Wildlife Service (NPWS) unpublished data; D. Lupton, unpublished data). Additional sites without recent records are mapped in Preston *et al*. (2002) and Curtis & McGough (1988). Sites are concentrated in the west around Lough Conn, Lough Cullin, Lough Corrib, Lough Allen and Lough Mask, with outlying populations in Counties Kerry and Cork to the south, and Co. Donegal to the north. In Northern Ireland the populations are concentrated around Lough Neagh with outlying populations on the northern and eastern coasts, and in Co. Fermanagh.

1.4. It is of note that there has been a loss of *S. romanzoffiana* populations from the Lough Neagh basin and from the south-west. The species has not been recorded from three of the original sites in the south-west since 1900, further seven other sites since the 1950s and from six more sites located around Lough Neagh since 1986. Conversely, previously unrecorded sites have been discovered in the west of Ireland on an annual basis since 2000, with 12 new sites in counties Galway and Mayo. The reasons for the loss of the species at many of its sites remain unclear (see sections 1.5 and 2), but have resulted in the species being identified as a priority species for conservation and research.

1.5. Notable fluctuations in the presence and size of populations, based on the number of flowering shoots, suggest that population turnover may be high. As there has been no dedicated survey of the species in Ireland, this might be influenced by variation in recording effort, though it seems that some fluctuation in populations is likely. A further problem with the Irish data is the lack of a standardised census of populations, including demographic analysis of size classes. It should be noted that plants might survive underground for up to six years (J. Roberts, cited in R. Gulliver *et al*., 2003).

1.6. Little published information exists about the genetic structure or reproductive biology of Irish populations. Seed set is rare with only one recent confirmed observation in Ireland (Lupton, 2003), although other instances of seed set from plants in Lough Neagh are discussed in Horsman (2005b). Pollination studies carried out by Wilcock (2002) found that pollen was viable, however experimental manipulation of pollen tubes failed to fertilise ovules. Limited studies suggest that there is some morphological variation between northern and southern populations in Ireland (Summerhayes, 1968; Clapham, Tutin & Moore, 1987); while these populations have been treated as separate subspecies, i.e. subsp. *stricta* (Rydb.) A. R. Clapham and subsp. *gemmipara* (Sm.) A. R. Clapham for the northern and southern plants respectively (see Sell & Murrell, 1996), it is not known whether any such variation is genetically determined. Forrest *et al.* (2004) found a genetic separation between northern and southern populations in Britain and Ireland on the basis of chloroplast microsatellites, with the northern group including Coll, Barra and Vatersay in the Hebrides, and the southern group including Colonsay (Hebrides) and Ireland. Additionally, they found that the northern group showed high levels of intrapopulation genetic diversity, suggesting that sexual reproduction and seed set has taken place. This was not found for the southern group. The genetic uniformity of the Irish populations is hypothesised to be the result of a genetic bottleneck (Forrest *et al.*, 2004; Lupton, 2003), though studies on genetic variation within and among Irish populations have been limited to date.

1.7. Given the restricted distribution of *S. romanzoffiana* in Europe, Ireland has an international responsibility to protect this species. The species is listed by the IUCN Orchid specialist Group as having 'critically low populations' in Europe (IUCN/SSC Orchid Specialist Group, 1996). The species is protected in the Republic of Ireland by the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000, under the Flora (Protection) Order, 1999, and is an Irish Red-listed species. In Northern Ireland the species is protected by Schedule 8 of the Wildlife (Northern Ireland) Order, 1985. As with all orchids, trade in *S. romanzoffiana* is controlled under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

2. Current factors causing loss or decline

2.1. Threats to the species are poorly understood as detailed information about the species' ecological requirements is lacking. Little research has been carried out to indicate why many of the populations in the south-west appear to have declined; this apparent decline may be a function of changes in land use, or simply a lack of recording, a shift in recording bias or difficulty in locating plants if surveys were conducted when the plants were not in flower.

2.2. The grazing regime pertaining to *S. romanzoffiana* sites is of critical importance to the survival of the species. Both overgrazing and undergrazing may cause a loss or decline in the species. Recently Gulliver *et al.* (2003) have suggested that the species can survive a range of grazing regimes including heavy grazing. At their most heavily grazed study site a high percentage of the monitored group of plants have above ground tissue each year (R. Gulliver, pers. comm.). However, at some sites grazing might disadvantage the species if the balance of time spent above and below ground is affected by severe defoliation (D. Lupton, pers. comm.). At all grazed sites some or all of the flowering stems are lost, reducing or eliminating the possibility of sexual reproduction. The timing of the grazing may well be a very important factor. In addition to grazing by stock, *S. romanzoffiana* can be heavily grazed by rabbits and slugs. At some sites grazing by geese may be important.

2.3. Human disturbance on lakeshores, through trampling, and development of recreational facilities may pose a significant threat to some populations. This disturbance damages flowers thereby preventing pollination and subsequent seed set, and can lead to the loss of suitable habitat for the species.

2.4. Fertiliser and herbicide use, and silage cutting in the vicinity of sites may have contributed to the species' decline.

2.5. Successive drainage programmes in the Lough Neagh basin may have resulted in a decline in populations around the margins of the lake.

2.6. Abandonment of traditional management practices, as for example the cessation of peat cutting on Brackagh Moss, Co. Armagh and Montiaghs Moss, Co. Antrim, may have resulted in the loss of *S. romanzoffiana* by allowing the sites to be colonised by rank vegetation and scrub.

2.7. Summary predictions for temperature and sea level rise as a result of global warming have been modeled by the MONARCH project (Harrison *et al.*, 2001). These models indicate a much smaller impact in Ireland than in Britain. Climate change could potentially result in changes in the species composition and diversity of grassland communities, in the composition and abundance of fungal associates, and result in water level changes at lakeshore sites. This may account for the perceived northern movement of the Irish populations, as southern populations become extinct and new populations are 'discovered' further north. As new lateral buds in *S. romanzoffiana* are produced in the summer months and develop slowly through the autumn and winter months, to produce medium-sized plants in spring and full-sized plants in summer (Gulliver & Gulliver, 2004), climate change at any season is likely to affect the species.

3. Current action

3.1. All of the extant *S. romanzoffiana* sites in Counties Mayo, Galway, Cork and Kerry occur in candidate Special Areas of Conservation (cSAC). Recently recorded populations in Counties Leitrim, Roscommon and Donegal lie outside protected sites. Most of the *S. romanzoffiana* populations in Northern Ireland are within Areas of Special Scientific Interest (ASSIs), with one population in County Fermanagh occurring in the Upper Lough Erne cSAC, two populations occurring in the Lough Neagh Special Protection Area (SPA) and a newly reported population (2003) occurring in the North Antrim Coast cSAC.

3.2. Site monitoring, which occurs on a three year cycle in the Republic of Ireland and six-yearly in Northern Ireland, surveys designated sites for any changes to the habitats and species therein, reports all activities that may have an impact on the habitats and species, and in doing so monitors any effects to the protected species present.

3.3. Management plans for designated sites and some agri-environment schemes highlight the presence of *S. romanzoffiana* within a site, and include prescriptions for the protection of the species.

3.4. Monitoring programmes specific to *S. romanzoffiana* are traditionally conducted on an *ad hoc* basis as and when sites are visited.

3.5. NPWS is currently funding two research projects to study various aspects of the conservation biology of *Spiranthes romanzoffiana*. The first project is investigating the ecology, distribution and reproductive biology of Irish populations of *S. romanzoffiana*. This study will assess the extent of genetic variation between and among Irish, British and North American populations. These data will assist in the production of scientifically based management plans for the species and the sites in which it occurs. The second project will look more closely at the pollination biology of the species and examine the idea that due to the rarity of the species, insufficient pollinators are attracted, resulting in reduced seed

production and thus increased rarity.

3.6. *S. romanzoffiana* is protected in the Republic of Ireland by the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000, under the Flora (Protection) Order, 1999, and is an Irish Red-listed species. The Flora (Protection) Order is regularly updated in light of the most current data available for Irish plant species. In Northern Ireland the species is protected by Schedule 8 of the Wildlife (Northern Ireland) Order, 1985.

3.7. In the Republic of Ireland, under the Wildlife (Amendment) Act, 2000, sites can be designated as Refuges for Flora, and the designation of such sites is currently under investigation.

3.8. In the Republic of Ireland, under the Wildlife (Amendment) Act, 2000, sites can be designated as Natural Heritage Areas, and the designation of such sites is currently under consideration.

4. Action plan objectives and targets

4.1. Maintain all viable populations of *S. romanzoffiana* throughout Ireland.

4.2. Restore *S. romanzoffiana* to at least five historical sites where it was previously recorded during the last 60 years, by 2025.

4.3. Achieve or maintain favourable conservation status of *S. romanzoffiana* in Ireland, by 2030.

5. Proposed actions with lead agencies

5.1. Policy and legislation

5.1.1. Ensure the conservation designation of extant sites, as appropriate, in Special Areas of Conservation, Natural Heritage Areas, Areas of Special Scientific Interest or Refuges for Flora, by 2010.
(ACTION: Environment and Heritage Service (EHS), NPWS)

5.1.2. Ensure that the species requirements are considered during reviews of relevant farming policies and agri-environment schemes.
(ACTION: EHS, NPWS, ongoing)

5.1.3. Determine the IUCN Red List threat status of *S. romanzoffiana* based on the 2001 categories and criteria, and submit this information to the IUCN Species Survival Commission, by 2007.
(ACTION: EHS, NPWS, Trinity College, Dublin (TCD))

5.2. Site safeguard and management

5.2.1. Review management prescriptions initiated by Scottish Natural Heritage (Gulliver *et al.*, 2005a; 2005b) for *S. romanzoffiana* and incorporate into plans where appropriate, by 2006.
(ACTION: EHS, NPWS)

5.2.2. Ensure that management plans for Special Areas of Conservation containing *S. romanzoffiana* include prescriptions for the species' conservation, by 2006.
(ACTION: EHS, NPWS)

5.2.3. Ensure those agri-environment schemes for sites containing *S. romanzoffiana* include prescriptions for the species' conservation, by 2007.
(ACTION: EHS, NPWS)

5.2.4. Ensure optimal site management of extant *S. romanzoffiana* populations in order to achieve favourable conservation status of the species, by 2008.
(ACTION: EHS, NPWS)

5.2.5. Restore to optimal site management at least five historical sites from where *S. romanzoffiana* was previously recorded during the last 60 years, to encourage the recovery of these 'extinct' populations, by 2020.
(ACTION: EHS, NPWS)

5.3. Species management and protection

5.3.1. Publish a management plan for the conservation of *S. romanzoffiana* incorporating the findings of recent research projects, by 2008.
(ACTION: EHS, NPWS)

5.3.2. Collect, if feasible, a seed sample from a representative number of sites across the species' range and supply to the Irish Threatened Plant Genebank for maintenance, storage and *ex situ* conservation, by 2006.
(ACTION: EHS, NPWS, TCD)

5.3.3. Ensure the maintenance of *ex situ* plants in Trinity College Botanic Gardens and in the National Botanic Gardens, Glasnevin, by 2006.
(ACTION: EHS, NPWS, TCD)

5.3.4. Determine whether a breeding programme for the species is required, based on the findings of the research projects detailed in section 3.5, and, if necessary, implement this programme, by 2006.
(ACTION: EHS, NPWS, TCD)

5.3.5. Determine if pollinator management is required based on the findings of the research projects detailed in section 3.5, and, if necessary, implement such management, by 2008.
(ACTION: EHS, NPWS, TCD)

5.4. Advisory

5.4.1. Inform all landowners of the presence of *S. romanzoffiana* on their lands, and highlight the importance of this rare orchid in the all-Ireland and European contexts, by 2006.
(ACTION: EHS, NPWS)

5.4.2. Advise landowners of potential impacts to *S. romanzoffiana* that could be caused by land management practices, e.g. time and intensity of grazing, trampling, recreation, by 2006.
(ACTION: EHS, NPWS)

5.4.3. Distribute advisory leaflets on legislation relevant to *S. romanzoffiana* to all landowners whose land supports the species, and as and whenever the legislation is updated.
(ACTION: EHS, NPWS, ongoing)

5.5. Future research and monitoring

5.5.1. Devise an appropriate monitoring scheme for the species by 2006, based on research findings.

(ACTION: EHS, NPWS)

5.5.2. Collate all available information and determine future research needs, further to section 3.5, by 2008.
(ACTION: All Parties)

5.5.3. Monitor all populations in sufficient detail to determine whether viable populations are being maintained, assess the factors causing population fluctuations, and determine the conservation status of the populations.
(ACTION: EHS, NPWS, ongoing)

5.5.4. Monitor habitat condition and management on a periodic basis to ensure that optimal site management is being achieved.
(ACTION: EHS, NPWS, ongoing)

5.6. Communications and publicity

5.6.1. Inform local authorities of the presence of *S. romanzoffiana* in their areas of responsibility and ensure that they are aware of the potential risks to the species that could be caused through inappropriate land management or development.
(ACTION: All parties, ongoing)

5.6.2. Raise awareness of the species among volunteers, botanists, professional conservation workers and researchers by means of reports, publications, field meetings and presentation of research results at conferences.
(ACTION: All Parties, ongoing)

6. Links with other action plans

Northern Ireland Habitat Action Plans

- Purple Moor-grass and rush pasture
- Fen
- Lowland raised bog
- Lowland meadow

7. References

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Pollan
Coregonus autumnalis

1. Current status

1.1. The pollan *Coregonus autumnalis* is the only member of the whitefish family found in Ireland. Four large lakes in Ireland contain the only European populations - Lough Neagh, Lower Lough Erne, Lough Ree and Lough Derg on the main stem of the Shannon system. Pollan were once present in other Irish lakes. The species is now known to be distinct from the other European coregonids *C. albula* and *C. lavaretus*. Outside Ireland, the species is called the arctic cisco and is found in arctic Canada, Russia and Alaska, where it is anadromous, (living in the sea and migrating to freshwater rivers to breed).

1.2. Lough Neagh has the only remaining abundant population of pollan, and still supports a small scale commercial fishery. Although there are no firm data on trends in abundance, catches are known to be much reduced from former levels. There has been a reduction in the size of spawners over the past decade, indicating some stress on this population. The Shannon lakes populations of pollan are down to 1% or less of total fish biomass from known former levels of at least 5% to 9%. Recent gill-net surveys (Griffiths *et al.*, 1997) captured no pollan in Lough Derg and only 15 specimens in a survey of Lough Ree. The Lower Lough Erne population of pollan is severely reduced, a major decline having occurred sometime between 1960 and 1990. Prior to 1960 an occasional commercial fishery existed, capturing significant quantities for local consumption and for baiting eel lines.

1.3. The pollan is a regulated commercial species in Northern Ireland and is subject to a closed season in the Republic of Ireland. It is listed on Annex V of the EU Habitats Directive (92/43/EEC) and is listed in the Irish Red Data Book as Endangered.

2. Current factors causing loss or decline

2.1. Eutrophication - may act against pollan in a variety of ways. Enrichment of lakes from mesotrophic to eutrophic states tends to favour dominance of recently (1960s) introduced roach over other fish including pollan and perch. The effect of eutrophication is not a simple one - Lough Neagh, the site of the largest remaining pollan stock, has a higher trophic status than the three lakes where pollan have declined. There is a view that Lough Neagh is a special case due to its high degree of wind-driven mixing, giving it a limnology more typical of oligotrophic systems (Gibson & Stewart, 1993). Nutrient loads to the lakes containing pollan are increasing, largely due to run-off from intensive agriculture (Foy *et al.*, 2003).

2.2. Introduced species - roach are a potential competitor with pollan for zooplankton food, particularly when they occupy the same space outside the summer months. Roach are now the dominant species by biomass component of all lakes containing pollan, while they were absent as recently as 1950 (Harrod *et al.*, 2002, Maitland & Campbell, 1993, and Rosell, 1994). Roach introduction and population growth correlate with pollan decline in the Shannon lakes and Lower Lough Erne.

2.3. Introduced species - the zebra mussel *Dreissena polymorpha* was accidentally introduced into the Shannon system circa 1993/4 and has spread rapidly throughout the navigable reaches of the Shannon/Erne waterways (McCarthy & Fitzgerald, 1997, Rosell *et al.*, 2003). Within four years of introduction to the Erne system there has been a population explosion of

this non-indigenous filter-feeding bivalve which clarifies the water column by removal of algae (Maguire *et al*., 2003). The reduced phytoplankton population and altered food web (from pelagic to benthic carbon pathways) is now showing signs of affecting fish populations. Fish appear to be responding to the zebra mussel invasion as they would to reduction of trophic status, but brought about by grazing of phytoplankton by zebra mussels rather than by nutrient reduction (Rosell *et al*., 2003). The Zebra Mussels themselves cover rocky and gravelly areas, including potential pollan spawning ground. It is not yet possible to determine whether or not zebra mussel impact on pollan will be positive, negative or neutral, but they must be considered as a very real threat to the already reduced pollan population of Lough Ree, Lough Derg and Lower Lough Erne. The zebra mussel has not yet reached Lough Neagh.

2.4. Climate change - high summer temperatures already have an effect on the growth of Lough Neagh pollan. Should climate change processes cause temperatures to rise further this could pose problems for pollan (Harrod *et al*., 2001). High summer temperatures associated with calm weather and the eutrophic state of Lough Neagh cause some bottom layer de-oxygenation in Lough Neagh in most years (Gibson & Stewart, 1993). The upper thermal limits for pollan are variably estimated at around 20-22° C. Increases in winter temperature could conceivably interfere with pollan spawning behaviour. The tendency of deep water to de-oxygenate in summer stratified conditions in eutrophic lakes clearly reduces the quality of any deep cool summer refuge available to pollan. If climate change results in increased summer temperature this, along with continuing eutrophication, will exacerbate the problem.

2.5. Commercial fishing - a viable commercial fishery still exists for pollan in Lough Neagh, regulated by close season, gill net mesh size, and a legal minimum size limit. Fishing rights are owned by the Lough Neagh Fishermen's Co-operative Society. Licences to fish pollan are issued by the Fisheries Conservancy Board for Northern Ireland. In Lower Lough Erne, where the fishery ownership is vested in the state, the Northern Ireland Authorities suspended issue of commercial pollan gillnet permits in 1994, which had in any case become uneconomic**.** Commercial or semi-commercial fisheries also once existed in the Shannon lakes, and as late as 1959 fisheries legislation provided for a minimum size (20cm) and a close season to protect the spawning stock. There are no recent records of any enforcement of this legislation, presumably because pollan have become too rare to repay the effort in fishing for them. Commercial fisheries have probably not played a primary role in the decline of any pollan stock.

2.6. Commercial fishing - an uncontrolled commercial fishery can be a threat to a fish species. In the case of pollan a sustainably managed fishery, where there is a sustainable stock, could be a major conservation benefit. As pollan have little or no importance as an angler's fish, if not monitored by fishery or survey they tend to go unnoticed. Sustainable harvesting and consumption, particularly as a local speciality, can maintain a public perception of the value of a fish species. Once commercial fisheries decline to the point where they are no longer viable, the public perception of the value of pollan may disappear with the fishery. Commercial fishermen may also be a valuable store of information –almost all knowledge on the habits of pollan in Lower Lough Erne, including spawning areas, the depths at which they are found, and their semi-pelagic habit has been recorded as a result of interviews with retired netsmen (Rosell, 1997).

3. Current action

3.1. The Heritage Council in the Republic of Ireland and the Environment and Heritage Service (EHS), in Northern Ireland has jointly funded an assessment of the status and genetics of pollan in Ireland (Griffiths *et al*., 2003).

3.2. In Northern Ireland, EHS have overall responsibility for the Northern Ireland Biodiversity Strategy (NIBS) which was launched in Sept 2002 to facilitate the implementation of the UK Biodiversity Plan, which was published in 1994. Many of the recommendations listed in the NIBS are relevant to the conservation of pollan.

- Recommendation 35: Develop and implement a Eutrophication Control Strategy which may involve new legislation.
- Recommendation 37: Adopt stronger measures, including the enforcement of anti-pollution legislation, to minimise the entry of effluent and solid wastes into watercourses and wetlands.
- Recommendation 48: Review the past and current effects of introduced species and genetic material in Ireland, assess the risks of further introductions and apply the guiding principles of the Conference of Parties of the CBD.
- Recommendation 57: Contribute to the UK habitat and species action plans through the preparation and implementation of costed Northern Ireland components of these plans.
- Recommendation 59: Review the lists of Northern Ireland species of conservation concern and priority species, seek additional information and conduct further reviews of the lists as required.
- Recommendation 61: Prepare or update Irish Red Data Books where there is adequate data.
- Recommendation 63: Identify and promote the conservation of native gene pools in Northern Ireland.

3.3. The National Parks and Wildlife Service (NPWS) of the Department of Environment, Heritage and Local Government, have overall responsibility for implementation of the National Biodiversity Plan (NBP), published in 2002. Several specific actions listed in the NBP are relevant to the conservation of pollan.

- NBP action point 26: Identify species of highest conservation concern in Ireland and prepare, and periodically revise, Species Action Plans for them.
- NBP action point 28: Prepare strategies, in consultation with Northern Ireland, to control introduced species and to prevent, or minimise, future introductions of alien species which might threaten biodiversity…
- NBP action point 40: Prepare a prioritised and co-ordinated programme of inventories, surveys and research, and implement the first phase of the programme. Priority will be given to endangered or threatened habitats and species about which little is known, or which are of special conservation importance.
- NBP action point 82: Consider initiatives, which could be employed to enhance the conservation of freshwater fish species and communities including the need to designate sites for the conservation of important fish communities.
- NBP action point 83: Ensure water will be primarily stocked with indigenous species. Including reviewing the situation in regard to the translocation of fish between catchments and producing appropriate guidelines or other necessary regulations.

3.4. Pollan are covered by an existing UK Biodiversity Species Action Plan, compiled in 1995 (UK Biodiversity Group, 1995). All the action from the UK pollan Species Action Plan are incorporated into this plan.

3.5. All inland fisheries legislative responsibility relating to conservation of pollan, and ownership of the fisheries of the Erne system in Northern Ireland now rests with the Department of Culture, Arts and Leisure (DCAL). The Department of Agriculture and Rural Development (DARD) retain responsibilities for aquaculture and fish health. The Fisheries Conservancy Board continue to be the enforcement and licensing agency under inland fisheries legislation.

3.6. In 2003, DOENI (Water management unit) increased the number of waters designated under the EC Freshwater fish directive. Both Lough Neagh and Lower Lough Erne are now designated salmonid waters and must meet the relevant chemical standards.

3.7. The commercial fishery for pollan in Lough Neagh continues, within the regulatory framework set and enforced by the Fisheries Conservancy Board for NI. This specifies close seasons and mesh size restrictions for gill nets restricting capture of immature fish. The University of Ulster maintains a research interest in Lough Neagh fish populations, dependent on research funding being available. Water quality is monitored in Lough Neagh by DARD scientists at two-weekly intervals throughout the year, as part of a time-series dating back to the 1970s.

3.8. DARD aquatic scientists provide a research and monitoring service to (and with the assistance of) DCAL, which includes regular monitoring of Lower Lough Erne fish stocks including pollan. DCAL have maintained the moratorium on issue of commercial pollan fishing permits in Lower Lough Erne.

3.9. A small pollan hatchery project has been carried out by personnel from a number of interested agencies in Northern Ireland namely, DCAL, EHS, DARD and the Cross Border Aquaculture Initiative (CBAIT). Ripe adult Pollan were targeted for translocation under license from their spawning grounds in November/December 2004. Eggs and milt were collected from these fish and fertilization and incubation strategies were carried out and results were recorded.

3.10. The project has achieved its two initial objectives; i.e. investigating the best fishing methods, as well as temporal and spatial considerations when obtaining pollan broodstock and also to develop on site experience within the Movanagher (DCAL) rearing facility to identify the hatchery 'bottlenecks' that are present to producing pollan fry under controlled culture conditions.

3.11. The National University of Ireland, Galway, has a strong research interest in the Shannon Lakes and in pollan in particular, and continues to monitor stocks as research opportunities arise, including targeted studies and recording by-catches in eel fisheries. Funding for research on Shannon lakes fish stocks is regularly provided by the Electricity Supply Board, as fishery owner for the lakes.

3.12. In the Republic of Ireland, the Environmental Protection Agency (EPA) has a responsibility to ensure that water quality monitoring is carried out and manages this function in co-operation with local authorities and in the Central and Regional fisheries boards. The EPA itself monitors water quality in some rivers and lakes, notably four times per year in Loughs Ree and Derg.

4. Action plan targets

4.1. Maintain the existing pollan stocks and prevent further decline in any of the populations.

4.2. Create 'back-up' stocks of all four pollan sub-populations by 2010.

4.3. Restore the Lower Lough Erne and Shannon lakes populations to demonstrably sustainable levels by 2015.

4.4. Restore pollan to sites where they have become extinct e.g. Upper Lough Erne by 2015.

5. Proposed action with lead agencies

The overall strategy for maintaining pollan stocks must be a "twin-track approach" of improving water quality to underpin the long-term survival prospects, coupled with specific targeted actions. The best means available to water managers for ensuring the future of pollan in Irish lakes, is to reduce nutrient inputs and control eutrophication. Climate change *per se* may be beyond local control, and, once present, introduced species such as roach and zebra mussels are practically impossible to control. However, the dominating effects of alien species on native aquatic biodoversity, and even some impacts of climate change, may be minimised if enrichment is abated and the lakes move towards their original trophic state.

5.1. Policy and legislation

5.1.1. Ensure that River Basin Management Plans developed under the requirements of the Water Framework Directive fully address the requirements of pollan.
(Action: EHS, DEHLG, DCMNR, DARD, DAF etc.)

5.1.2. Ensure that EU Habitats Directive is fully implemented to address the requirements of pollan (Upper Lough Erne, Lough Ree and part of Lough Derg are designated as SACs.)
(ACTION: EHS, DEHLG, DCMNR)

5.1.3 Seek to achieve and enforce an appropriate level of fishery protection in areas occupied by this species.
(ACTION: DCAL, Fisheries Conservancy Board, DCMNR)

5.2. Site safeguard and management

5.2.1. Seek to reduce the trophic status of Lough Neagh, Lough Erne, Lough Ree and Lough Derg.
(ACTION: EHS, DEHLG, DCMNR)

5.2.2. Consider the protection of pollan habitat on Lower Lough Erne through ASSI notification.
(ACTION: EHS)

5.2.3. Continue cross-departmental and cross-border action to try to prevent the spread of zebra mussel to Lough Neagh.
(ACTION: EHS, DARD, DCAL, DRD & NWPS)

5.2.4. Ensure that any major projects, such as the construction or restoration of canals and navigation systems, take into consideration the effects they will have in moving fish and other aquatic organisms between waterways before deciding whether or not to proceed.
(ACTION: EHS, DEHLG)

5.3. Species management and protection

5.3.1. By 2006 undertake a translocation programme to a back-up site for Lough Neagh pollan.
(ACTION: DCAL, DARD, EHS)

5.3.2. By 2009 establish aquaculture and stocking methods to allow "reservoir" stocks of all four sub-populations of pollan to be created.
(ACTION: EHS, DARD, NPWS, DCAL, DCMNR)

5.3.3. By 2010, transfer Shannon and Erne stock to selected recipient sites which will act as reservoir sites.
(ACTION: DARD, EHS, NPWS, DCAL, DCMNR)

5.3.4. By 2015 restore a sustainable pollan population to Upper Lough Erne.
(ACTION: EHS, DARD, DCAL)

5.4. Advisory

5.4.1. Review the role of the existing Pollan Steering Group and ensure that all key stakeholders are involved in future meetings.
(ACTION: EHS, DARD, DCAL, DAF, DCMNR, DEHLG)

5.4.2. Continue to pass information gathered during survey and monitoring to the appropriate biological records centre so that it can be incorporated in a national database and contribute to the maintenance of an up-to-date Red List.
(ACTION: EHS, NPWS)

5.5. Future research and monitoring

5.5.1. Continue genetic investigations to provide a better understanding of each of the populations present in the four lakes and their interrelationships.
(ACTION: EHS, DARD, DCAL, DCMNR, NPWS, DAF)

5.5.2. Initiate hydroacoustic population monitoring in the two Shannon lakes by 2006.
(ACTION: DCMNR, NPWS)

5.5.3. Continue hydroacoustic population monitoring in Lough Erne and initiate monitoring in Lough Neagh by 2006.
(ACTION: EHS, DARD, DCAL.)

5.5.4. Continue regular water quality monitoring in all four lakes.
(ACTION: EHS, DEHLG)

5.5.5. By 2006 initiate a programme of experimental aquaculture and stocking to establish "reservoir" stocks for each lake population.
(ACTION: EHS, DARD, DCAL, NPWS, DCMNR, DAF)

5.5.6. Survey to identify the spawning grounds of the remaining pollan in Lower Lough Erne and provide more quantitative assessments of the Lough Erne stock.
(ACTION: EHS, DARD, DCAL)

5.5.7. Seek the co-operation of Lough Neagh Fishermen's Co-operative Society in monitoring the population changes through commercial fishery data.
(ACTION: EHS, DARD, DCAL)

5.6. Communications and publicity

5.6.1. Inform local authorities and statutory agencies of the presence of Pollan in their areas of responsibility and ensure that they are aware of the potential risks to Pollan that could be caused through inappropriate land management or development.
(ACTION: EHS, NPWS)

5.6.2. Encourage managers in Aquariums, Country Parks, to actively promote pollan, within their displays. Not only are they are a very unique Irish species and they will also make excellent aquarium displays because of their spectacular shoaling behaviour.
(ACTION: EHS, DEHLG)

5.6.3. Publicise information on pollan and its conservation requirements to generate public interest. Continue with regular press articles in key areas providing information to local communities on the importance of pollan.
(ACTION: EHS, DCAL, DARD, DEHLG)

6. Links with other action plans

Northern Ireland Habitat Action Plans

- Mesotropic lakes
- Eutrophic Standing Waters

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Irish Hare
Lepus timidus hibernicus

1. Current status

1.1. The Irish hare is considered to be a sub-species of *Lepus timidus* (L.) and is endemic to Ireland. It is found in many different habitats including unimproved, semi-improved and improved grassland, upland habitats such as heather-dominated heaths and bogs and in coastal habitats including sand-dunes and even on the sea shore. They also tend to occur on modified grassland habitats such as golf courses and airfields (Fairley, 2001; Dingerkus & Montgomery, 1997).

1.2. Historically, the Irish hare was widespread and common throughout Ireland, though populations are thought to have undergone a substantial decline in the last 15-25 years. A day-time survey carried out in 1994/1995 indicated that the Northern Ireland population although widespread may have been as low as 8,250, occurring at low densities of around 1-2 per km^2 (Dingerkus, 1997). Population levels may have fallen to critical levels in some areas. Evidence from game bag records suggest that densities in at least some areas were much higher in the last century (Dingerkus & Montgomery, 2002).

1.3. A night-time survey carried out in 2002 estimated the Northern Irish hare population to be between 7,000 and 25,200, indicating that hare numbers had not changed significantly since the previous survey (Preston *et al.*, 2002).

1.4. Repeat night-time surveys were undertaken in spring 2004 and spring 2005. In 2004, the population was estimated as being between 59,700 and 86,900 (5.1 hares per km^2) and between 35,000 and 54,400 (3.1 hares per km^2) in 2005. It is concluded from these results that the hare population decreased between 2004 and 2005, but remains higher than 2002 (Tosh *et al.*, 2005).

1.5. In the Republic of Ireland, anecdotal evidence supports the impression of a decline in Irish hare populations in the past couple of decades. However, until a comprehensive survey is carried out, it is impossible to draw any conclusions.

1.6. There are believed to be small populations of the brown hare *Lepus europaeus* (L.) in the northern half of Ireland, having been widely introduced throughout Ireland in the nineteenth century. This species is known to have declined throughout Europe and is the subject of a UK Species Action Plan in Great Britain. However, due to its recent introduction to Ireland, it is not regarded as a species of particular conservation importance. The impacts of brown hare populations, if any, on the endemic Irish hare are unknown.

1.7. The Irish hare is a quarry species and has limited protection under domestic legislation. In January 2004, following public consultation, the Northern Ireland Environment Minister introduced a 12 month ban on the taking, selling or killing of Irish hares under the Game Preservation Act (Northern Ireland) 1928. A second ban, covering January 2005 to March 2005 was also introduced.

1.8. *Lepus timidus* is listed under Annex V (a) of the EU Directive 92/43/EEC (Habitats Directive). This Annex lists animal and plant species of Community interest whose taking in the wild and exploitation may be subject to management measures.

1.9. In the Irish Red Data book the Irish hare is listed as internationally important (Whilde, 1993).

2. Current factors causing loss or decline

Threats to this species are generally poorly understood, but the following factors are thought to have a negative effect on hare populations (in no particular order).

2.1. Loss of refuge areas for daytime lie-up sites, particularly rushes and good quality hedgerows (Dingerkus, 1997, Tapper & Barnes, 1986)

2.2. Habitat change and changes in farming practice, such as conversion of species-rich grassland to ryegrass (*Lolium* spp.) and clover mixes (Dingerkus, 1997), the switch from spring to winter cereals and the change from hay to silage making.

2.3. Habitat fragmentation (Dingerkus, 1997)

2.4. Increased levels of disturbance due mainly to high livestock stocking densities on farms, increased use of farm machinery, peat cutting machines and disturbance by cats and dogs (Smith *et al.,* 2005; Dingerkus, 1997; Jeffrey, 1997; Pielowski, 1976).

2.5. Increased mortality resulting from highly efficient mechanised harvesting of agricultural crops. (Dingerkus, 1997).

2.6. Increased levels of predation on leverets (Dingerkus, 1997).

2.7. Illegal taking of hares (Dingerkus, 1997).

2.8. Unsustainable taking of hares for sporting purposes.

2.9. Direct grazing competition with sheep in upland areas.

3. Current action

3.1. Research carried out between 1994 and 1997 by The Queen's University of Belfast examined the distribution of the Irish hare in Northern Ireland, as well as some aspects of the ecology of the species. The results indicated that the Irish hare is widely distributed especially in areas with semi-natural grassland, heath or bog, although at generally low densities (about 1 per km^2) and there was evidence of a reduction in both population and range.

3.2. Three surveys have been recently carried out in Northern Ireland (2002, 2004, 2005) using similar methodologies. For the two most recent surveys, the methodology has been refined in order to enhance their ability to detect population trends (Tosh *et al.*, 2005).

3.3. Research carried out at University College Dublin on the genetics of the species in Ireland (Hamill, 2001) has been followed up by ongoing research at Queen's University of Belfast. This is providing useful information on population structure of the Irish hare as well as indicating the relationship between the Irish hare and other *Lepus* taxa.

3.4. A PhD study into the ecology and conservation of the Irish hare and the species' response to agricultural change was commissioned by EHS in 2003.

3.5. Research is being carried at Aberdeen University into aspects of the Scottish mountain hare *Lepus timidus scoticus*, and at Uppsala University, Sweden on the genetics of both *Lepus timidus* and *Lepus europaeus* (Thulin *et al.*, 1997). Genetic research in Iberia has shed light on post ice-age dispersal of *Lepus timidus* through the region.

3.6. Various aspects of brown hare ecology are being studied at Bristol University and at the Game Conservancy Trust as well as in several centres in mainland Europe (e.g. Vaughan *et al.*, 2003).

3.7. Voluntary agri-environment schemes, such as the Rural Environment Protection Scheme (REPS) in the Republic of Ireland, and the Environmentally Sensitive Areas (ESAs) and Countryside Management (CMS) Schemes in Northern Ireland can make an important contribution to the maintenance and enhancement of suitable hare habitat. Approximately 40,000 farmers in the Republic of Ireland are participants in REPS and this figure is expected to rise to 59,000 by 2006. In Northern Ireland, 7,000 farms are participating in agri-environment schemes.

3.8. Closed (or park) hare coursing has undergone significant changes in terms of regulation and compliance. Hare mortality appears to have fallen as dogs are now muzzled. Licences stipulate that hares caught for coursing must be returned to their place of capture. There are 92 registered coursing clubs in the Republic of Ireland and two in Northern Ireland, all affiliated to the Irish Coursing Club. Radio tracking of hares released following coursing in Northern Ireland has provided some information on the dispersal and longevity of hares after release.

3.9. A Statutory Hare Reserve was established on the North Slob in Co. Wexford in 1989.

3.10. A conference and a research seminar were held in autumn 2003, focusing on the Irish hare and sharing up to date research into both Irish and brown hares.

4. Action plan targets

4.1. Maintain the existing range of Irish hares in Ireland.

4.2. Demonstrate a population increase by 2010.

4.3. Maintain and increase the area and quality of suitable hare habitat.

5. Proposed action with lead agencies

The provision of refuge areas, adequate and varied food supply and freedom from disturbance are essential if Irish hare numbers are to be maintained at present levels. If hare numbers are to be increased then habitat improvements must also be a priority. Further research is required in order to improve the current understanding of threats to hares and habitat use by hares. Monitoring of hare numbers is also required.

A range of Government Departments are likely to be involved in the delivery of this action plan. The principal drivers will be Environment and Heritage Service (EHS) in Northern Ireland and National Parks and Wildlife Service (NPWS) in the Republic of Ireland. Both Agriculture Departments (Department of Agriculture and Rural Development (DARD) in Northern Ireland and Department of Agriculture and Food (DAF) in the Republic of Ireland) have a role to play in terms of managing the farmed countryside especially through agri-environment schemes. Other Departments and Agencies will have differing roles, such as

provision of grant-aid for research projects, sensitive management of state-owned land and development of policy towards species protection.

5.1. Policy and legislation

5.1.1. Take account of the requirements of Irish hares when reviewing or developing agri-environment schemes and environmental cross-compliance measures linked to agricultural subsidies. Particular consideration should be given to reducing stocking levels, varying sward composition and encouraging good hedgerow management.
(ACTION: DARD, DAF)

5.1.2. Consider the requirements of the Irish hare in the implementation of agri-environment and environmental cross-compliance programmes.
(ACTION: DARD, DAF, Teagasc)

5.1.3. Review and if necessary, increase the level of protection given to the Irish hare in the Wildlife (NI) Order 1985 and the Wildlife Act 1976.
(ACTION: EHS, DOE, NPWS, DEHLG)

5.2. Site safeguard and management

5.2.1. Ensure that state and semi-state-owned lands are managed, where appropriate, with a view to conservation of Irish hares.
(ACTION: All Government departments, local authorities and state-sponsored bodies)

5.2.2. Establish hare sanctuaries and/or hare reserves at suitable locations.
(ACTION: EHS, Water Service, DARD, MOD, Prison Service, NPWS)

5.3. Species management and protection

5.3.1. Seek to develop a strategy for the conservation and monitoring of the Irish hare (possibly as part of a wider UK mammal strategy or on an all-Ireland basis).
(ACTION: EHS, JNCC, NPWS, DEHLG)

5.4. Advisory

5.4.1. By 2007, prepare and distribute publications containing information and management advice about hares. Distribute to landowners / land managers, farmers, golf courses, airports and other known hare localities.
(ACTION: EHS, DARD, NPWS, DAF, Teagasc)

5.4.2. Ensure that relevant staff in DARD, Teagasc and NPWS are sufficiently trained and informed to advise on management for the Irish hare.
(ACTION: DARD, Teagasc, NPWS)

5.4.3. Ensure that relevant information on Irish hares is included in REPS farm advisory talks, by 2007.
(ACTION: NPWS)

5.5. Future research and monitoring

5.5.1. Promote general research into the biology, ecology and population dynamics of the Irish hare.
(ACTION: EHS, DARD, NPWS)

5.5.2. Conduct a base-line survey to determine the current population of the Irish hare in the Republic of Ireland, by 2007.
(ACTION: NPWS, EHS)

5.5.3. Repeat surveys throughout Ireland at intervals of 3-5 years until 2015 to calibrate other less-detailed surveys and to measure the success of the action plan.
(ACTION: EHS, NPWS)

5.5.4. Carry out repeatable monitoring surveys at regular intervals to determine population and range change throughout Ireland.
(ACTION: EHS, NPWS)

5.5.5. Establish the status of the brown hare in Ireland and investigate its impact on Irish hare populations, by 2007.
(ACTION: EHS, NPWS)

5.5.6. Investigate the relative importance of hares in terms of economic damage to crops, to assist farmers and foresters to make informed choices in hare management.
(ACTION: DARD, DAF, Forest Service (NI), Forest Service (RoI))

5.5.7. Conduct research into possible effects of hare coursing and beagling on the population dynamics of the Irish hare.
(ACTION: Bord na gCon, DAST, NPWS, EHS)

5.5.8. Ensure that information gathered in surveys is passed to national biological recording centres.
(ACTION: EHS, NPWS)

5.6. Communication and publicity

5.6.1. Inform local authorities and statutory agencies of the presence of Irish hare in their areas of responsibility and ensure that they are aware of the potential risks to Irish hare that could be caused through inappropriate land management or development.
(ACTION: EHS, NPWS)

5.6.2. Ensure that the conservation needs of the Irish hare are publicised and use salient points as examples of how land management practices can benefit hare populations.
(ACTION: EHS, NPWS, DARD, DAF)

5.6.3. Encourage public participation in appropriate survey work and encourage the reporting of incidental sightings to relevant bodies. By 2007, produce leaflets so that the public can easily tell the difference between Irish hares, brown hares and rabbits.
(ACTION: EHS, NPWS)

6. Links with other action plans

Northern Ireland Habitat Action Plans

- Lowland meadow
- Purple moorgrass and rush pasture
- Coastal and floodplain grazing marsh
- Species-rich hedgerows
- Lowland wood-pasture and parkland
- Upland heathland
- Lowland heathland
- Lowland Raised Bog
- Blanket Bog

Northern Ireland Species Action Plans

- Curlew

All-Ireland Species Action Plans

- Corncrake

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Corncrake
Crex crex

1. Current status

1.1. The corncrake *Crex crex* is the most terrestrial member of the Rallidae family. Secretive and rarely seen, their best-known characteristic is the song of the male – a distinctive rasping "crake crake", which is heard only on the breeding grounds. These extend from Ireland to Asiatic Russia in the northern hemisphere. They winter in southern and eastern Africa, migrating northwards to arrive on their breeding grounds from early April onwards, departing again in August and September.

1.2. They require at all times the cover of tall vegetation and are strongly associated with meadows which are harvested annually, where they nest and feed. Annual cutting creates a sward with an open structure, which is easy for the birds to move through (Green *et al.*, 1997a), but harvesting means they must find alternative cover adjacent to meadows late in the season. Farming therefore plays a key role in the establishment, maintenance and conservation of corncrake habitat.

1.3. In Ireland and Britain, adults arrive on the breeding grounds usually before meadow grass is tall enough to conceal them and so they seek cover in stands of early growing tall vegetation, such as nettles, umbellifers and reed canary grass (Cadbury, 1980). Depending on the prevailing climate and grassland management regime of the area, first nests may be located in this vegetation, as meadow grass may still be too short by early May. Alternatively, as soon as meadow grass is tall enough (greater than about 20cm in height), they move into meadows to breed. Corncrakes are double brooded, with a peak of first hatching in early June and of second hatching in late July (Tyler, 1996). The young are led away from the nest within 24 hours and are independent after about 2 weeks, but do not fledge until they are five weeks old. (Cramp & Simmons, 1980). The consequence of this breeding schedule is that nests and females accompanying broods are present in meadows from early May until mid August and some flightless young are still present until mid September or later.

1.4. The global population is estimated at 1.7 – 3 million pairs (Schaffer & Green, 2001). (As females are generally silent, the singing male is taken to represent a pair). Over 1.5 million of these pairs are in Russia and the Ukraine. The European population is estimated at 92,000-233,000 (Crockford *et al.*, 1996). In eastern Europe, populations of more than 25,000 are found in Belarus, Latvia, and Poland whilst in western Europe, populations of more than 1,000 pairs are found in Germany and France (Schäffer & Green, 2001) and Scotland (Royal Society for the Protection of Birds (RSPB), unpublished data). In 2005, 164 singing males were recorded in Ireland (BirdWatch Ireland (BWI), unpublished data).

1.5. Corncrake is the only breeding bird in Ireland which is listed on the 2005 International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (BirdLife International, 2005). This is due to population and range declines of more than 50% in the last 25 years across significant parts of its range. Despite the confirmation in the last 10 years of large populations in Russia, it remains listed as Near Threatened, due to the likelihood of further rapid declines in the event of changes in agriculture, particularly in Eastern Europe and Russia. It also appears on Annex 1 of the European Community (EC) Council Directive on the Conservation of Wild Birds (79/409/EEC), more commonly known as Birds Directive, and on Appendix II of the Bern Convention. It is protected under Schedule 1 of the Wildlife (Northern Ireland) Order 1985 and under the Wildlife Acts of 1976 and 2000 in the Republic of Ireland. It is listed in the Irish Red Data Book (Whilde, 1992) and appears in

the Red List of both Birds of Conservation Concern in Ireland (Newton *et al.*, 2000) and Birds of Conservation Concern in the UK, Channel Islands and Isle of Man (Gregory *et al.*, 2002).

1.6. It was once a widespread and familiar summer migrant in Ireland (Holloway, 1996), but by 1988 the population had fallen to just 903-930 singing males and was largely restricted to four areas, Co. Fermanagh in Northern Ireland and three core areas in the Republic of Ireland, north Donegal, west Connacht, particularly Co. Mayo, and the Shannon Callows (Mayes & Stowe, 1989). By 1994, they had disappeared as a regular breeding species from Fermanagh and records outside the three remaining core areas are sporadic, though 1 or 2 males have regularly been recorded on the Dingle peninsula and on Rathlin Island. By 2005, the Irish population stood at 162 in the core areas, with a further 2/3 in Northern Ireland and 2 in the Republic of Ireland.

1.7. On average, corncrake numbers fell by between 20 and 50% over the last 10 years in 22 European countries, though more severe declines were likely to have taken place before then. For example in France there was a population decline of around 40% between 1984–1992 and in the Netherlands of 75% since the early 1980s. In western Ukraine more than 60% of the population has disappeared since 1976 (Crockford *et al.*, 1996).

2. Current factors causing loss or decline

2.1. There is conclusive evidence to show that declines in corncrake populations are primarily linked to changes in agricultural practice on the breeding grounds. (Green & Williams, 1994; Green & Rayment, 1996). As the grass harvest corresponds closely to the timing of breeding, nests are often destroyed and young killed during mowing. These losses have increased and gradually become unsustainable as a result of changes in grassland management.

2.2. Drainage of damp ground, increased fertiliser applications, reseeding with more productive grasses and the use of bigger, more efficient machinery, have all led to earlier average mowing dates and a shorter harvest period across much of the corncrake's range (Tyler *et al.*, 1998). In some areas, multiple cuts are a feature of grassland management. A mean first mowing date of 10th August, i.e., after the peak of hatching of second broods, is now known to be essential for their conservation (Green *et al.*, 1997a), together with an extended mowing season, which leaves at least some cover into September. In countries which have experienced rapid declines, these conditions are rare. For example, in Ireland, first cuts of silage usually take place in May or June and hay is normally harvested in June or July. As mowing machinery has become more advanced, the harvest is also now completed over a shorter period of time. Lack of suitable breeding habitat is sufficient to account for population declines across the range, the severity of which can be linked to the degree of agricultural intensification experienced within a particular country (Green & Rayment, 1996).

2.3. The conventional practice of mowing fields from the outer edge towards the middle traps birds in an ever-decreasing patch of grass, from which they are reluctant to attempt escape, as this would involve crossing open ground to the nearest cover. They are thus often killed when the last swards are cut (Tyler *et al.*, 1998)

2.4. More intensive grassland management has also led to habitat fragmentation. Corncrakes prefer species rich, unimproved or semi-improved meadows, as improved grasses become too dense for birds to penetrate easily. It has been suggested that 150ha of relatively contiguous suitable meadow in sympathetic management is ideally required to sustain a viable population. Such blocks of habitat are rare in Ireland outside the core corncrake areas.

2.5. In addition to lack of cover in meadows at the start of the season, corncrakes are also often faced with a similar lack of cover after harvesting. Second brood chicks and females, who are the last to leave the breeding grounds in September, may therefore be vulnerable to predation at this time, if the cover available to them is inadequate or fragmented.

2.6. In some areas, other factors such as development pressure, abandonment of farmland or changes in grassland management regimes may have reduced the amount of suitable grassland available and this in turn may have affected corncrake populations.

3. Current action

3.1. The Corncrake Grant Scheme was first introduced in Northern Ireland by Environment and Heritage Service (EHS) in Co. Fermanagh in 1990. It provided farmers with an incentive to delay mowing and cut fields from the centre out. However, because of an already fragmented population and insufficient knowledge of the breeding ecology, the scheme was unable to prevent their disappearance by 1994 as a regular breeding species in Fermanagh. Further research led to a revised scheme in 1994 with a later mowing date and provision for early and late cover refuges. EHS continue to fund this scheme, which is available throughout Northern Ireland and is administered by RSPB. Since 1994, there have generally been one or two singing males confirmed at various locations each year, including Rathlin Island, where they have occurred in three years, with breeding confirmed in 1997.

3.2. In the Republic of Ireland, the Corncrake Grant Scheme was first introduced in Co. Donegal in 1992 and in the Shannon Callows in 1993, but the revised scheme was implemented in all three core areas (Co. Donegal, west Connacht and the Shannon Callows) from 1994 onwards, administered by BWI. Until 2001, Dúchas, (now National Parks and Wildlife Service (NPWS) of the Department of Environment, Heritage and Local Government) funded two thirds of the Scheme, the remainder being met by the RSPB. Since 2002, full costs have been met by NPWS.

3.3. In the Republic of Ireland, three corncrake fieldworkers and a Project Officer are deployed in the core areas to census the population annually and to administer and monitor compliance of the Corncrake Grant Scheme. RSPB funded these posts until 2001, when funding was taken over by NPWS.

3.4. In the Republic of Ireland, three sites have been designated as Special Protection Areas (SPAs) for corncrake under the Birds Directive - the Shannon Callows and the Donegal Islands of Tory and Inishbofin.

3.5. A further 4 sites in the Republic of Ireland (Malin Head, Fanad Head Peninsula, and Falcarragh to Min an Chladaigh in Co. Donegal and parts of the Mullet in Co. Mayo) are listed as Important Bird Areas (IBAs) by BirdLife International (Hunt *et al.*, 2000), as they regularly hold internationally important concentrations of corncrake.

3.6. Following a reform of the European Common Agricultural Policy (CAP), 2005 saw member states decoupling agricultural payments from production. The consequences of this for corncrake conservation are uncertain, but it may lead to changes in mowing and grazing regimes, which may in turn affect corncrake populations.

3.7. In the Republic of Ireland, there is a voluntary agri-environment scheme, the Rural Environment Protection Scheme (REPS). Since June 2004, a revised REPS, with a supplementary payment for the implementation of a corncrake friendly management prescription in the Shannon Callows SPA, has been implemented.

3.8. NPWS is presently launching a farm plan scheme for farmers who do not wish to join REPS. Like REPS, this will take the form of a 5-year contract. The NPWS scheme will be available in 2006. The Corncrake Grant Scheme will be available as an alternative in 2006 only, after which farmers will have to choose between REPS and the NPWS scheme. Discussions are ongoing between the Department of Agriculture and Food, (DAF), NPWS, the Irish Farmers Association (IFA) and the Irish Creamery and Milk Suppliers Association (ICMSA) and BWI on agreed prescriptions and remuneration for corncrake management on farms.

3.9. In the Republic of Ireland, almost 25 ha of land on the Shannon Callows is in conservation ownership, 21.5 ha of which was purchased by BWI with funding from NPWS. BWI, in partnership with Teagasc, with support funding from the EU LIFE Nature programme, has been managing a project centred on the Termoncarragh Lake SPA on the Mullet peninsula for the restoration of land for four species listed on Annex I of the Birds Directive, these being corncrake, rednecked phalarope, barnacle goose and Greenland white-fronted goose. To date 10.64 ha of land has been purchased as a corncrake reserve and pro-active management agreements with local farmers for the duration of the project (until November 2005) on a further 46 ha have been administered. In 2003, three singing male corncrakes were recorded on the Shannon Callows reserve and one at the Termoncarragh project on the Mullet. In 2004, three singing male territories were recorded within the Termoncarragh project area, with one in 2005.

3.10. The UK Biodiversity Action Plan for Corncrake includes a target of re-establishing populations in parts of the bird's former range. This has led to a pilot re-introduction programme in England, which if successful, may provide opportunities in the future. It has also led to the establishment of Recovery Areas, which are areas close to existing centres of population or where small numbers still regularly occur and which are regarded as priorities for restorative management. In these areas, suitable land is purchased or leased and managed for corncrakes. In Northern Ireland, the RSPB, with funding from EHS, is establishing a Recovery Area on Rathlin Island, with at present 13ha under sympathetic management. Singing males have been confirmed on the island in 1997, 1998 and 2004, with breeding confirmed in 1997.

3.11. In Northern Ireland, the potential for the two agri-environment schemes, Environmentally Sensitive Areas (ESAs) and the Countryside Management Scheme (CMS), to contribute to positive management in present and possible future Recovery Areas is being explored.

3.12. Annual monitoring of the populations has been carried out in Donegal and the Shannon Callows since 1992 and in West Connacht since 1994. The Fermanagh population was monitored annually between 1990 and 1994, the year in which corncrake ceased to occur as a regular breeding species.

3.13. Since 1988, a National Corncrake Census has been carried out by RSPB and BWI every five years in Britain and Ireland respectively, with assistance from Government. The exception has been 2003 when there was no national census in Ireland outside the core areas.

3.14. NPWS funded a 3 year research programme to investigate the continued decline of the corncrake population in the Shannon Callows, despite the operation and high uptake of the Corncrake Grant Scheme there since 1994. As this Scheme has led to population increases elsewhere in Ireland and in Scotland, further study of the Shannon Callows population was considered necessary. The results showed that the specific nature of land ownership and mowing patterns, together with changes in mowing regimes had reduced the effectiveness of the existing conservation measures. Revised measures for the Corncrake Grant Scheme specific to the Shannon Callows were therefore devised and incorporated into conservation land management schemes.

3.15. In 2001, BWI and RSPB jointly produced "A Strategy for Corncrake Conservation in Ireland 2001-2010" (Copland & Donaghy, 2001). It proposed the establishment of Recovery Areas and set out 2010 population targets for the three core areas in the Republic of Ireland (a total of 310 singing males) and Rathlin Island in Northern Ireland (10 calling males). With some modification, these provide the basis for the biological targets set out in the current Plan.

3.16. Further to the Strategy, BWI, with funding from NPWS, carried out the "Islands Feasibility Study" (Barron, 2001), which aimed to identify suitable Recovery Areas on the islands off the west coast. On the basis of a review of a range of agricultural, economic and biological factors, four islands were identified as potential Recovery Areas in the Republic of Ireland: Inishmeane and Gola in Donegal, and Inishbofin and Omey in Galway. As discussed above, in Northern Ireland, efforts are currently focused on Rathlin Island.

4. Action plan targets

4.1. Maintain the existing number and range of corncrakes in Ireland.

4.2. Maintain corncrake population in the three core areas in the Republic of Ireland at or above 2003 levels (133 singing males).

4.3. By 2010, increase the populations of the three core areas to 150 in Donegal, 50 in West Connacht and 60 in the Shannon Callows.

4.4. By 2010 establish a population of 7 singing males on Rathlin Island.

4.5. By 2015, re-establish breeding populations in other parts of its former range, in suitable areas in both Northern Ireland and the Republic of Ireland.

5. Proposed action with lead agencies

A range of Government Departments are likely to be involved in the delivery of the above objectives. Along with EHS and NPWS, the Department of Agriculture and Rural Development in Northern Ireland (DARD) and the Department of Agriculture and Food (DAF) in the Republic of Ireland will have a key role through agri-environment measures. Also in the Republic of Ireland, the Department of Community, Rural and Gaeltacht Affairs, (DCRGA) which promotes sustainable development of Gaeltacht and island communities, is a potential contributor to corncrake conservation through its policies and funding.

5.1. Policy and legislation

5.1.1. Continue funding of BWI to deploy a Project Officer and corncrake fieldworkers in the core areas, to census populations, administer schemes as agreed and carry out other conservation measures for as long as necessary.
(ACTION: NPWS, DAF)

5.1.2. By 2006, put in place the NPWS scheme, with the Corncrake Grant Scheme for one year as a back-up.
(ACTION: NPWS)

5.1.3. Ensure that a mechanism exists to pay for corncrake friendly management outside the three core areas in the Republic of Ireland.
(ACTION: NPWS)

5.1.4. By 2006 update the management prescriptions of the Corncrake Grant Scheme, REPS and the NPWS Scheme as they operate on the Shannon Callows, based on the findings of the Research Project (Section 3.4.2). Revised prescriptions should be applied to other areas where applicable or necessary.
(ACTION: NPWS, DAF, EHS, DARD).

5.1.5. Periodically review the rates of payment of schemes in the Republic of Ireland to ensure optimal uptake.
(ACTION: NPWS)

5.1.6. Continue the operation of the RSPB-administered Corncrake Grant Scheme throughout Northern Ireland.
(ACTION: EHS)

5.1.7. By 2008, initiate the establishment of Recovery Areas on the four most suitable west coast islands as identified in the Islands Feasibility Study, namely Inishmeane and Gola in Donegal, and Inishbofin and Omey in Galway.
(ACTION: NPWS (consult DCRGA))

5.1.8. By 2008, carry out similar Feasibility Studies throughout Ireland to identify other Recovery Areas. This could include existing areas of grassland outside the core areas, and/or suitable areas of publicly owned land, where mechanisms to carry out suitable management already exist or could easily be introduced.
(ACTION: NPWS, EHS)

5.1.9. By 2008, undertake an analysis of agricultural, social and economic factors influencing the management of agricultural land in corncrake areas as the impacts of the CAP reform begin to emerge. Make recommendations as required.
(ACTION: NPWS, DAF, EHS, DARD)

5.1.10. By 2006 agree corncrake prescriptions for REPS farms in the Republic of Ireland.
(ACTION: NPWS, DAF)

5.1.11. By 2006, agree and implement a mechanism for compliance monitoring of all corncrake schemes in the Republic of Ireland.
(ACTION: NPWS, DAF)

5.1.12. By 2007, if there is to be a review of agri-environment schemes under the new Rural Development Programme (2007 – 2013) in Northern Ireland, consider the introduction of a Corncrake Option to the Antrim Coast and Glens and Rathlin ESA, targeted at areas on Rathlin.
(ACTION: DARD)

5.1.13. By 2010, consider other ways in which agri-environment schemes may contribute to the establishment of other Recovery Areas throughout Ireland.
(ACTION: NPWS, DAF, EHS, DARD)

5.2. Site safeguard

5.2.1. By the end of 2006, produce Conservation Plans for SPAs with corncrakes.
(ACTION: NPWS)

5.2.2. By 2008, secure favourable management of all suitable land in corncrake SPAs.
(ACTION: NPWS, consult DCRGA)

5.2.3. By 2006, publish Management Plans for the four IBAs in Donegal and Mayo, which regularly hold internationally important numbers of singing male corncrakes.
(ACTION: NPWS)

5.2.4. By 2006, in SPAs and the above four IBAs, consult with County Councils and DCRGA in the Republic of Ireland on how to protect corncrake habitat from the affects of cumulative development.
(ACTION: NPWS)

5.2.5. Continue to pursue opportunities for land purchase/leasing at key sites to extend existing reserves and Recovery Areas and establish new ones.
(ACTION: NPWS, EHS)

5.3. Species management and protection

5.3.1. From 2006, trial mammalian predator control programmes where such predation is considered a problem and where action is likely to be effective.
(ACTION: NPWS)

5.4. Advisory

5.4.1. By 2006, revise and update advisory leaflets for farmers participating in the Corncrake Grant Scheme in all key areas.
(ACTION: NPWS, EHS)

5.4.2. Use corncrake sites to trial grassland management techniques and use as demonstration sites where feasible.
(ACTION: NPWS, EHS)

5.4.3. By 2007, provide advice on corncrake-friendly management techniques to agricultural colleges to aid their inclusion in land management courses.
(ACTION: NPWS, DAF, EHS, DARD)

5.4.4. Advise landowners of risks to corncrake from predation by domestic cats.
(ACTION: NPWS, EHS)

5.5. Future research and monitoring

5.5.1. Continue to monitor populations in the core areas each year, following standard methodology.
(ACTION: NPWS, EHS)

5.5.2. Monitor habitat condition and management at key sites on a periodic basis. Implement habitat restoration programmes if required.
(ACTION: NPWS, EHS)

5.5.3. On the basis of census results, consider further research into breeding success at key sites such as Inishbofin, Co Donegal, where the population is fluctuating.
(ACTION: NPWS)

5.5.4. By 2009, review the effectiveness of any predator control programmes and undertake further action where necessary.
(ACTION: NPWS, EHS)

5.5.5. Continue to assess economic, technical and agronomic aspects of modifying grassland management in corncrake areas where appropriate.
(ACTION: NPWS, DAF, EHS, DARD)

5.5.6. By 2010, pending the results of an RSPB re-introduction programme in England, consider the potential for a re-introduction programme on Rathlin in Northern Ireland, and other suitable recovery areas in the Republic of Ireland, should natural re-colonisation not occur.
(ACTION: EHS, NPWS)

5.5.7. Provide information annually to BirdLife International on the status of the corncrake in Ireland to contribute to maintenance of an up-to-date global red list.
(ACTION: NPWS, EHS)

5.6. Communications and publicity

5.6.1. Inform local authorities and statutory agencies of the presence of corncrake in their areas of responsibility and ensure that they are aware of the potential risks to corncrake that could be caused through inappropriate land management or development.
(ACTION: EHS, NPWS)

5.6.2. By 2006, establish an All Ireland Steering Group to facilitate the implementation of the policy and land management proposals outlined in this plan.
(ACTION: NPWS, EHS)

5.6.3. Continue with regular media articles in key areas, providing information to local communities on the occurrence and importance of corncrakes in the area.
(ACTION: NPWS, EHS)

5.6.4. By 2006, provide information for visitors on the occurrence and importance of corncrake populations and how disturbance to nesting birds can be avoided.
(ACTION: NPWS, EHS)

5.6.5. By 2007, provide information to Local Authorities in Northern Ireland and County Councils in the Republic of Ireland and local communities on the potential benefits for the local economy of "green tourism" projects based on the occurrence of corncrakes in the area.
(ACTION: NPWS, EHS)

5.6.6. By 2006 establish the production of a regular (annual or bi-annual) All Ireland Corncrake Newsletter for dissemination to landowners and the general public, with information on census results, progress on conservation projects and reserve management etc.
(ACTION: NPWS, EHS).

6. Links with other action plans

Northern Ireland Habitat Action Plans

- Purple moor-grass and rush pasture
- Coastal and floodplain grazing marsh
- Lowland meadow

Northern Ireland Species Action Plans

- Irish hare

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