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An tÚdarás um Ard-Oideachas

REGIONAL RED LIST OF IRISH BEES

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THE CONSERVATION OF BEES IN IRELAND

Table of contents

INTRODUCTION 3

SECTION A: REGIONAL RED LIST OF IRISH BEES

Development process 4

National red list summary 7

Checklist of Irish bees stating their national red list status 9

Regional red list (102 species) 10

SECTION B: IUCN CONSERVATION ACTIONS TEMPLATE FILE

Conservation actions necessary for all threatened, near threatened and data deficient species 24

Summary of conservation actions required 31

SECTION C: NATIONAL PRIORITY SPECIES LIST

National priority species list 33

Methodology 34

INTRODUCTION

In 2003 the Higher Education Authority awarded funding for a three year project on the conservation of native Irish bees under their North-South programme for collaborative research. This work was undertaken by Dr. Úna Fitzpatrick and Dr. Mark Brown in the School of Natural Sciences, Trinity College Dublin and by Mr. Tomás Murray and Dr. Rob Paxton in the School of School of Biological Sciences, Queen's University Belfast.

One important element of this research has been the documentation of the conservation status of native bees in Ireland.

A three-step sequential process has been used to document the status of each of the native species, indicate the conservation action required, and highlight those species of most importance from a conservation perspective:

(1) Identification of the threatened species using internationally recognized methodology - production of an IUCN regional red list for the island of Ireland.

(2) Documentation of the total conservation actions required for the assessed group - completed IUCN conservation action authority files for threatened, near threatened and data deficient species.

(3) Conversion from the regional red list to a national list of conservation priority species

This summary report contains the Regional Red List of Irish bees, IUCN conservation actions authority files for all threatened, near threatened and data deficient species in the red list, and a list of national conservation priority species.

Thanks are expressed to the National Parks and Wildlife Service in the Republic of Ireland and the Environment and Heritage Service in Northern Ireland, who funded a workshop leading to the development of the Regional Red List of Irish bees.

Regional Red List of Irish Bees

Development process:

Prior to the HEA funded research, the only current records of Irish species were compiled by the BWARS group (Bees, Wasps and Ants Recording Society) associated with the Biological Records Centre, U.K. but they were extremely depauperate. HEA funded researchers established a whole-island database for bees (using Recorder 2002) and this currently contains all published records of bees in Ireland, catalogued specimens from the Ulster Museum, data for Ireland kindly provided by the BWARS group, and private records from a number of Ireland's other major bee experts (for a total of ~7,800 records). Fieldwork on the HEA project contributed ~3,700 new records in 2004-2005 to bring the total number of records in the database to ~ 11,500. Following the last season of fieldwork on the HEA funded project (2005) the decision was made that significant numbers of new records were unlikely to be added in the near future and the database should at that point be used to develop a regional red list of Irish Bees.

A 'Bee conservation Workshop 2005 – towards the development of a red list of Irish bees' took place on the 15-16th September 2005 in Trinity College Dublin and was jointly funded by the National Parks and Wildlife Service (Republic of Ireland) and the Environment and Heritage Service (Northern Ireland).

The aims of the workshop were to bring together everyone with experience of Irish Bees to pool knowledge and expertise; to exploit the knowledge of British and European experts and to learn from their experiences; and to agree on bee conservation priorities within Ireland. The ultimate expected outcome was the development of a regional red list of Irish Bees.

In addition to the HEA funded researchers (Úna Fitzpatrick, Tomás Murray, Rob Paxton & Mark Brown) the workshop was attended by NPWS representatives (Naomi Kingston & Martin Speight) and by Robbie MacDonald on behalf of Quercus and EHS. Björn Cederberg (Swedish species information centre) who was responsible for the red list of Swedish Hymenoptera was present, and advised on the interpretation and application of the IUCN designations. UK experts Stuart Roberts and Mike Edwards attended on behalf of BWARS (Bee, Wasp and Ant Recording Society in the UK). Staffs from both National Museums were invited, with Brian Nelson of the Ulster Museum attending. In addition, everyone else in Ireland with knowledge of Irish Bees (that the organisers were aware of) was invited and the following attended: Andrew Byrne (TCD), Jane Stout (TCD), John Breen (University of Limerick), Veronica Santorum (University of Limerick), John McMullan (representing Irish Bee Keepers), Don Cotton (Sligo Institute of Technology) and Colm Ronayne (Dublin Naturalist's Field Club).

Application of the IUCN regional criteria:

Two documents were supplied to all participants of the workshop to assist with the interpretation and application of the regional IUCN criteria. A 30-page introductory booklet was emailed to all participants prior to the meeting. It contained background information on bee research in Ireland; including a discussion on sampling effort from 1900-2005, a description of how the database was constructed by HEA researchers as well as information on the total number of known bee records in Ireland and their geographic and temporal distribution. The document also provided information on the necessary IUCN documentation: *2001 IUCN Red List Categories and Criteria: version 3.1* and the *Guidelines for the Application of IUCN Red List Criteria at Regional Levels Version 3.0*. In addition the booklet provided an explanation of the background data that would be provided on each species in order to designate it a regional IUCN status (second booklet).

A second 300-page booklet - *Bee Conservation Workshop 2005: species information* was provided to participants at the workshop. For each species it provided general background information as well as the information necessary to designate an IUCN regional red list status and is summarised below:

- Habitat and ecological requirements, conservation status and distribution data of each species in Britain (information available on the BWARS website - Bees, Wasps and Ants Recording Society)
- World distribution
- Known forage information
- Any known documented comment on the status of the species in Ireland (historical and recent)
- Published UK conservation status
- Maps showing all species records pre and post 1980 (at 10km square level)
- Date of last record
- % Decline based on 10km squares since 1980
- Data from HEA habitat surveys in 2004-5

The maps, the date of the last record and the % declines were all generated from data held in the *Recorder 2002* database developed by HEA researchers. The Irish dataset was interrogated and 1980 chosen as the point from which to assess decline as the data has a roughly equal spread of records pre and post this date. The post 1980 maps and calculations give the distribution and percentage decline over the past 25 years. Unfortunately in the majority of cases the data quality did not allow equivalent calculations be completed for the past 10 years as referred to under Criterion A in the IUCN guidelines. Criterion A was thus used rarely and with considerable care.

Using the background information stated for each species, the IUCN regional guidelines were strictly applied under the supervision of Björn Cederberg who was responsible for overseeing the Hymenoptera section of the published Swedish Red lists. One regionally determined setting was adopted – regionally extinct (RE) was defined as not recorded since 1935.

Species were not designated data deficient (DD) unless they fit one of four criteria: (a) new species recorded in 2004-2005, (b) known only from the type location, (c) taxonomic issues requiring resolution or (d) less than four known populations and not recorded since 1980 (current status simply unknown).

A checklist of Irish Bees was compiled by the authors and includes all species with published records for Ireland and/or verified reference specimens held in a museum collection (101 species). During this two-day meeting a provisional IUCN regional designation (category and criteria) was agreed for 100 of the 101 native Irish species (*Apis mellifera*, the honeybee was not considered on the day but was added to the final list as not evaluated (NE)). Following the meeting the provisional list was emailed to all participants to allow for comment. The list was then revised to account for these comments, new records which participants added during the workshop or in subsequent documents, and to correct for any errors or misinterpretations of the IUCN guidelines on the day. A revised list was compiled by HEA researchers and again circulated to all participants. This list was accepted by all on 21.2.2006.

The regional red list of Irish bees has been produced in table format. Species are listed in alphabetical order along with the accompanying information required by IUCN: scientific name, authorship of the taxon, the regional Red List Category (using the English abbreviated forms) and criteria met, the global IUCN Red List Category and Criteria, and the proportion (%) of the global population occurring within Ireland. If possible, the common name has also been included. Notes containing relevant information on the species and/or an explanation of the designation, accompany each species. Unfortunately there is no global red list of bees so it is not possible to provide this information at present (this is denoted by '-'in the table). The level of knowledge on the distribution of the species on a global scale also makes it impossible to state the % of the global population occurring in Ireland in the majority of cases. Where the proportion on another geographic scale is known (*e.g.* Atlantic Zone), this is stated in the notes.

Revisions since initial acceptance of the list by all participants on 21.2.2006:

1. *Bombus cryptarum* has recently been added to the Irish checklist following molecular studies by the authors. This species was added to the red list as data deficient in November 2006. This brings the total number of native bee species in Ireland to 102.

2. According to the Guidelines for the Application of IUCN Red List Criteria at regional levels (2003), the process should be divided into two steps. In step one, the IUCN Red List Criteria are applied to the national population resulting in a preliminary categorization. In step two, the existence and status of any conspecific populations outside the country that may affect the risk of extinction within the country are investigated and the initial categorisation uplisted or downlisted as appropriate. While this was done in the initial version, we did not formalise the method used and presented only the final designation (rather than the designation after stage one and stage two).

   In November 2006 the methodology was formalised to uplist any species that is RE, CR or EN in Britain by one category in Ireland. If a species has a high risk of extinction in Britain the potential for recolonisation of Irish populations of the species is greatly reduced, which results in an increased extinction risk in Ireland.

   In this revised version of the regional red list the first column indicates the extinction risk within Ireland (stage 1) and the second column indicates the final regional red list designation (stage 2) taking into account the overall risk of extinction given the status of populations within Britain. This subdivision is to facilitate other national assessors who may wish to have access to the stage 1 designations in Ireland when completing their own final designations.

Regional Red List summary:

Table 1: Number of native species that fall within each of the regional IUCN categories.

IUCN Regional Red List Category	Number of Irish species
Regionally extinct (RE)	3
Critically Endangered (CR)	6
Endangered (EN)	10
Vulnerable (VU)	14
Near threatened (NT)	12
Least Concern (LC)	38
Data deficient (DD)	16
Not evaluated (NE)	3
	102

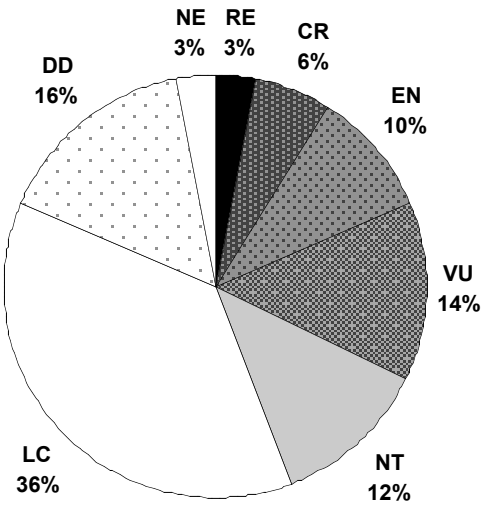

Figure 1: Percentage of the Irish bee fauna within each of the IUCN regional red list categories

Table 2: Checklist of Irish bees stating their regional red list status – 102 species

[1]See table 1 for explanation of the two letter codes.

Regional Red List of Irish Bees			
IUCN[1]		IUCN[1]	
VU	*Andrena angustior*	DD	*Coelioxys inermis*
DD	*Andrena apicata*	DD	*Colletes daviesanus*
NT	*Andrena barbilabris*	DD	*Colletes fodiens*
LC	*Andrena bicolor*	VU	*Colletes floralis*
LC	*Andrena cineraria*	NT	*Colletes similis*
LC	Andrena clarkella	LC	*Colletes succinctus*
VU	*Andrena coitana*	LC	*Halictus rubicundus*
VU	*Andrena denticulata*	NT	*Halictus tumulorum*
NT	*Andrena fucata*	EN	*Hylaeus brevicornis*
RE	*Andrena fulva*	LC	*Hylaeus communis*
VU	*Andrena fuscipes*	LC	*Hylaeus confusus*
LC	*Andrena haemorrhoa*	VU	*Hylaeus hyalinatus*
DD	*Andrena helvola*	LC	*Lasioglossum albipes*
CR	*Andrena humilis*	LC	*Lasioglossum calceatum*
LC	*Andrena lapponica*	LC	*Lasioglossum cupromicans*
CR	*Andrena marginata*	LC	*Lasioglossum fratellum*
LC	*Andrena minutula*	CR	*Lasioglossum lativentre*
VU	*Andrena nigroaenea*	LC	*Lasioglossum leucopus*
DD	*Andrena ovatula*	VU	*Lasioglossum nitidiusculum*
DD	*Andrena pilipes*	LC	*Lasioglossum punctatissimum*
VU	*Andrena praecox*	VU	*Lasioglossum rufitarse*
RE	*Andrena rosae*	DD	*Lasioglossum smeathmanellum*
VU	*Andrena semilaevis*	LC	*Lasioglossum villosulum*
LC	*Andrena scotica*	NT	*Megachile centuncularis*
DD	*Andrena stragulata*	DD	*Megachile circumcincta*
LC	*Andrena subopaca*	DD	*Megachile ligniseca*
LC	*Andrena tarsata*	NT	*Megachile maritima*
CR	*Andrena trimmerana*	LC	*Megachile versicolor*
DD	*Andrena wilkella*	NT	*Megachile willughbiella*
NE	*Apis mellifera*	CR	*Nomada argentata*
EN	*Bombus (P.) barbutellus*	LC	*Nomada fabriciana*
NT	*Bombus (P.) bohemicus*	LC	*Nomada flavoguttata*
VU	*Bombus (P.) campestris*	EN	*Nomada goodeniana*
EN	*Bombus (P.) rupestris*	LC	*Nomada leucophthalma*
LC	*Bombus (P.) sylvestris*	LC	*Nomada marshamella*
NE	*Bombus (P.) vestalis*	EN	*Nomada obtusifrons*
DD	*Bombus cryptarum*	NT	*Nomada panzeri*
EN	*Bombus distinguendus*	LC	*Nomada ruficornis*
LC	*Bombus hortorum*	LC	*Nomada rufipes*
LC	*Bombus jonellus*	RE	*Nomada sheppardana*
NT	*Bombus lapidarius*	EN	*Nomada striata*
LC	*Bombus lucorum*	NT	*Osmia aurulenta*
DD	*Bombus magnus*	NE	*Osmia rufa*
LC	*Bombus monticola*	DD	*Sphecodes crassus*
NT	*Bombus muscorum*	LC	*Sphecodes ephippius*
LC	*Bombus pascuorum*	EN	*Sphecodes ferruginatus*
LC	*Bombus pratorum*	LC	*Sphecodes geoffrellus*
VU	*Bombus ruderarius*	CR	*Sphecodes gibbus*
EN	*Bombus sylvarum*	VU	*Sphecodes hyalinatus*
LC	*Bombus terrestris*	LC	*Sphecodes monilicornis*
EN	*Coelioxys elongata*	DD	*Sphecodes pellucidus*

2006 REGIONAL RED LIST OF IRISH BEES

Taxonomic groups evaluated:

102 species of native Irish bees (Hymenoptera, Apidae). Based on a checklist compiled by the authors to include all species with published records for Ireland and/or verified reference specimens held in a museum collection.

Taxonomic standards followed:

A Check List of British Insects - Volume XI, Part 4: Hymenoptera - Kloet. G.S. and Hincks, W.D. (1978) - Royal Entomological Society London, and updates thereof.

Alford, D.V. (1975) Bumblebees. Davis-Poynter, London.

Regionally determined settings:

Regionally extinct (RE) was defined as not recorded since 1935.

Methodology used to uplist or downlist species:

Species that are regionally extinct (RE), critically endangered (CR), or endangered (EN) in Britain were uplisted by one category in Ireland.

As Britain has not produced a National Red List of bee species according to IUCN regional guidelines, Biodiversity Action Plan species (BAP) species, and species recognized as threatened in the British Insect Red Data Book (Shirt 1987) or in A review of the Scarce & Threatened Bees, Wasps and Ants of Great Britain (Falk 1991) were uplisted by one category in Ireland.

This resulted in four species being uplisted from VU to EN and one species being uplisted from NT to VU. Species designated DD in Ireland were not uplisted, regardless of their threat status in Britain.

In the red list the stage 1 designation indicates the extinction threat within Ireland and stage 2 indicates the final designation after taking into account the existence and status of any conspecific populations in Britain that may affect the relative risk of extinction.

REGIONAL RED LIST OF IRISH BEES November 2006

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
Andrena angustior (Kirby, 1802)	VU D2	**VU D2**	-	?	Rare in Ireland - known from 4 locations since 1980, one of which is within an SAC - Brittas Bay Dunes, Co. Wicklow, 20.6.2005 (U. Fitzpatrick & A. Byrne).
Andrena apicata (Smith, 1847)	DD	**DD**	-	?	There are no Irish records of this species since 1926, qualifying it as RE. It has been designated DD on the basis that it is a very early species and may be rediscovered with appropriate searches. Oligolectic on *Salix*. Threatened in other European countries: Britain (Nationally scarce b), Switzerland (VU), Germany (VU), Netherlands (VU), and Sweden (NT).
Andrena barbilabris (Kirby, 1802)	NT A3c	**NT A3c**	-	?	Ground nesting species, vulnerable to trampling and compaction pressures in dune systems. It also nests in more stoney/gravelly soils. It has declined 54% based on 10km square distribution since 1980. Future declines are expected due to habitat loss. Known from 11 locations since 1980, of which 5 are on protected sites (SAC, NNR). Threatened in other European countries: Switzerland (VU), Germany (VU), and Slovenia (VU).
Andrena bicolor (Fabricius, 1775)	LC	**LC**	-	?	Common
Andrena cineraria (Linnaeus, 1758)	LC	**LC**	-	?	Local. Not as common in Ireland as one would expect considering the abundance of hedgerows and banks (C. Ronayne). Early species. Threatened in other European countries: Switzerland (VU), and Slovenia (RE).
Andrena clarkella (Kirby, 1802)	LC	**LC**	-	?	Early spring species, and may therefore be undersampled; its parasite, *Nomada leucophthalma* shows no cause for concern. Oligolectic on *Salix*. Threatened in other European countries: Switzerland (VU), and Germany (VU).
Andrena coitana (Kirby, 1802)	VU A2bc	**VU A2bc**	-	?	Local. Known from 37 pre 1980 locations but this has been reduced to 12 from 1980 onwards. Needs a structurally diverse habitat. Recorded from 5 protected sites in 2004-5 from a variety of habitats: Bellacorrick Bog, Co. Mayo, 8.7.2004, 27.7.2004 (T. Murray); Burren National Park, Co. Clare, 8.7.2004, 4.8.2004 (U. Fitzpatrick); Pilgrim's Road Esker, Co. Offaly, 7.7.2004 (U. Fitzpatrick); Clara NNR, Co. Wicklow, 16.8.2005 (U. Fitzpatrick) & Glenasmole Valley, Co. Dublin, 28.6.2005 (U. Fitzpatrick). Threatened in other European countries: Germany (VU), Netherlands (CR) and Slovenia (EN).

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
Andrena denticulata (Kirby, 1802)	VU B2b(i,ii,iv)	**VU B2b(i,ii,iv)**	-	?	Known from 26 locations pre 1980 but only 11 from 1980 onwards. Four of the current populations are on protected sites: Ballyteige, Co. Wexford, 11.7.1999 (S.P.M. Roberts); The Raven, Co. Wexford, 12.7.1999 (G.R. Else); Howth Head, Co. Dublin, 15.8.2005 (A. Byrne); Blackstairs Mountains, Co. Carlow, 22.8.2005 (U. Fitzpatrick). Also found at two horticultural gardens in Co. Wicklow in 2004 - Powerscourt Gardens and Mount Usher Gardens (U. Fitzpatrick). In Britain *A. denticulata* is a species of open woodland and grasslands (M. Edwards). Oligolectic on Asteraceae and strongly associated with yellow flowers. Threatened in other European countries: Switzerland (EN), Germany (NT), and the Netherlands (EN).
Andrena fucata (Smith, 1847)	NT A3c	**NT A3c**	-	?	Recorded from a variety of habitats with records widely distributed geographically, but never common. It has declined 50% based on 10km square distribution since 1980. No single identifiable factor to account for decline. Known from 23 locations since 1980, of which 10 are on protected sites (SAC, NP, and NNR). Commonly a species of open woodland in Britain (M. Edwards). Threatened in other European countries: Slovenia (EN)
Andrena fulva (Muller in Allioni, 1776) Tawny Mining Bee	RE	**RE**	-	?	Last recorded in 1925. Only two known records, both from Co. Kilkenny: Maddockstown, 20.4.1925 (A.W. Stelfox) and near Kikenny Quarries, 1.5.1925 (R.A. Phillips). Females of this species are very obvious, being large and colorful.
Andrena fuscipes (Kirby, 1802)	VU D2	**VU D2**	-	?	Rare in Ireland, currently known from 5 locations (since 1980). Three of these populations are on SACs: Pilgrims Road Esker, Co. Offaly, 16.8.2004 (U. Fitzpatrick); Glengarriff Wood, Co. Cork, 9.8.2005 (T. Murray) and Glenasmole Valley, Co. Dublin, 16.8.2004 (U. Fitzpatrick). It is a habitat specialist on heath and is oligolectic, especially on *Calluna*. Threatened in other European countries: Switzerland (RE), Germany (NT), Slovenia (EN), and the Netherlands (VU).
Andrena haemorrhoa (Fabricius, 1781)	LC	**LC**	-	?	Common
Andrena helvola (Linnaeus, 1758)	DD	**DD**	-	?	First recorded in Ireland in 2004

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
Andrena humilis (Imhoff, 1832)	CR D1	**CR D1**	-	?	Very rare and currently known from only one population. Known from 2 historical locations Glengarriff (12-16 June 1901, J.W. Yerbury; 13.7.1924, 22.7.1924, J.N. Halbert) and Kenmare (1902, Saunders; 1903, H.K. Cuthbert). Not recorded from 1924 until 8.7.2004 when it was found at Bellacorrick Bog (SAC) in Co. Mayo (T. Murray). Oligolectic on Asteraceae, with a strong association with yellow flowers. Threatened in other European countries: Britain (Nationally scarce b), Finland (CR), Germany (NT), Sweden (EN), Norway (NT), and the Netherlands (VU).
Andrena lapponica (Zetterstedt, 1838)	LC	**LC**	-	?	Oligolectic on Bilberry. Threatened in other European countries: Germany (NT), and Slovenia (EN).
Andrena marginata (Fabricius, 1776)	CR B1+2ab(i,ii,iv)	**CR B1+2ab(i,ii,iv)**	-	?	This species is known from only one site since 1931. Historically it has been described as 'very rare' (Stelfox, 1927). The only currently known location is Furnace [Foirnis] Island, N. of Lettermullan, Co. Galway, 24.8.1992, 18.8.1999, 16.8.2000, 17.8.2000, and 18.8.2000; all at *Succisa pratensis* in rocky unimproved flower-rich pastures (C. Ronayne). Largely a species of dry calcareous grassland. Threatened in other European countries: Britain (nationally scarce a), Switzerland (EN), Finland (VU), Germany (EN), Sweden (VU), Norway (NT), and the Netherlands (RE).
Andrena minutula (Kirby, 1802)	LC	**LC**	-	?	Common. Threatened in other European countries: Finland (EN).
Andrena nigroaenea (Kirby, 1802)	VU B2ab(ii,iv)	**VU B2ab(ii,iv)**	-	?	Known from 48 pre 1980 locations but this has declined significantly to 8 from 1980 onwards. Current populations are found within a variety of habitats, one of which is on a dry heath SAC - Ardmore Head, Co. Waterford, 3.5.2005 (T. Murray).
Andrena ovatula (Kirby, 1802)	DD	**DD**	-	?	First recorded in Ireland in 2004. Threatened in other European countries: Finland (RE), and the Netherlands (VU).
Andrena pilipes s.s (Fabricius, 1781)	DD	**DD**	-	?	Most recently recorded from Skerries, Co. Dublin in 1977 (J. Breen). That site has been extensively modified and reduced and the species has not been seen since (C. Ronayne). The species was only ever recorded from two other sites: a gravel pit

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					near Wexford town, a breeding site like the Skerries site, that has been filled-in and built on (C. Ronayne); and 'St. Mullins, small glen E. of village', Co. Carlow (S7338), where adults were taken on two dates: 16/05/1935 and 09/06/1935. It is uncertain if the species can still be found in Co. Carlow. Nationally scarce b in Britain.
Andrena praecox (Scopoli, 1763)	VU B2ab(ii,iv)	**VU B2ab(ii,iv)**	-	?	Known from 20 pre 1980 locations but only 6 from 1980 onwards. Current populations are found within a variety of habitat types. Oligolectic on *Salix*. Threatened in other European countries: Switzerland (VU).
Andrena rosae (Panzer, 1801)	RE	**RE**	-	?	This species has not been recorded since 1896. Spring records of *Andrena rosae* are now recognized to be those of *A. stragulata*. This results in one known location of *A. rosae*: Borris, Co. Carlow, 19/07/1896 (P.E.Freke). Threatened in other European countries: Britain (Red data book 3), Switzerland (EN), Germany (VU), Slovenia (EN), Estonia (VU), and the Netherlands (CR).
Andrena scotica (Perkins, R.C.L., 1916)	LC	**LC**	-	?	
Andrena semilaevis (Perez, 1903)	VU B2ab(i,ii,iv)	**VU B2ab(i,ii,iv)**	-	?	Known from 29 pre 1980 locations but only 7 from 1980 onwards. Current populations are found within a variety of habitats, with one on an oak woodland SAC - Clara Wood, Co. Wicklow, 17.6.2005 (U. Fitzpatrick & A. Byrne). Threatened in other European countries: Slovenia (EN).
Andrena stragulata (Illiger, 1806)	DD	**DD**	-	?	Spring records of *Andrena rosae* are now recognized to be those of *A. stragulata*. This results in two known locations of *A. strangulata*: Tinnahinch, Co. Carlow 4.5.1925 (R.A. Phillips) and Kilcarry Bridge, Co. Carlow, 17.4.1926 (A.W. Stelfox) and 16.5.1977 (J. Breen). The species was not found at Kilcarry Bridge April-May 2004 or 2005 (U. Fitzpatrick). It has been designated DD because it has only ever been known from less than 4 locations and has not been recorded since 1980. Threatened in other European countries: Switzerland (RE) and Slovenia (EN).
Andrena subopaca (Nylander, 1848)	LC	**LC**	-	?	
Andrena tarsata (Nylander, 1848)	LC	**LC**	-	?	Local. Oligolectic on *Potentilla* species. Declining in Britain (M. Edwards). Threatened in other European countries: The Netherlands (CR), Germany (EN),

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					and Slovenia (EN).
Andrena trimmerana (Kirby, 1802)	CR D1	**CR D1**	-	?	First recorded in 1977 and known from only two east coast locations. 2km south of Lucan, Co. Dublin, 6.5.1977 (J. Breen) and Trinity College Botanic Gardens, Dublin, 7.5.2003 (J. Stout & M. Brown). Nationally scarce (b) in Britain.
Andrena wilkella (Kirby, 1802)	DD	**DD**	-	?	The recent addition of *Andrena ovatula* to the Irish list means that the Irish records of *A. wilkella* need to be re-examined to check for any *A. ovatula*, given DD until this is completed. Oligolectic on Fabaceae. Threatened in other European countries: Netherlands (VU).
Apis mellifera (Linnaeus, 1758)	NE	**NE**	-	?	The honeybee was not evaluated due to the difficulty of distinguishing native populations from those imported into Ireland by beekeepers.
Bombus (P.) barbutellus (Kirby, 1802)	EN B2ab(i,ii,iv)	**EN B2ab(i,ii,iv)**	-	?	This species has declined by 85% since 1980. It is a cuckoo bumblebee and breeds in nests of *B. hortorum*, which is widespread and abundant. Causes for decline are uncertain. *B. barbutellus* is widespread in Britain. Threatened in other European countries: Finland (VU) and The Netherlands (CR).
Bombus (P.) bohemicus (Seidl, 1837)	NT A3c	**NT A3c**	-	?	Recorded from a wide variety of habitats with records widely distributed geographically. It has declined 18% based on 10km square distribution since 1980. Cleptoparasite - the host species *Bombus lucorum* is extremely common. No single identifiable factor to account for decline.
Bombus (P.) campestris (Panzer, 1800)	VU A2bc	**VU A2bc**	-	?	This species has declined by 66% since 1980 based on 10km square distribution. It is a cleptoparasite and breeds in nests of *B. pascuorum*. Reasons for its decline are uncertain, as its host is one of the most common bumblebees in Ireland.
Bombus (P.) rupestris (Fabricius, 1793)	VU A2bc	**EN A2bc**	-	?	This species has declined by 59% since 1980 based on 10km square distribution. Like *B. distinguendus* and *B. ruderarius* its range has been greatly reduced and it is now mainly distributed in the west of Ireland. It is a cleptoparasite and breeds in nests of *B. lapidarius* (NT). *B. rupestris* is nationally scarce (b) in Britain and is endangered in the Netherlands.
Bombus (P.) sylvestris	LC	**LC**	-	?	

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
(Lepeletier, 1833)					
Bombus (P.) vestalis (Geoffroy in Fourcroy, 1785)	NE	**NE**	-	?	Last record 19.4.1926, near Bagenalstown, Co. Carlow (A.W. Stelfox). Taxonomic issues, possible misidentification. The original three records need to be located and checked.
Bombus cryptarum (Fabricius, 1775)	DD	**DD**	-	-	*Bombus cryptarum* was added to the Irish checklist by the authors in 2006 following molecular studies. Morphological identification and taxonomic confusion with *B. lucorum* and *B. magnus,* from which it has not previously been distinguished. Further molecular work necessary to determine precise extent and status of *B. magnus* and *B. cryptarum* within Ireland.
Bombus distinguendus (Morawitz, 1869) Great yellow bumblebee	VU A2bc	**EN A2bc**	-	?	UK BAP (Biodiversity Action Plan) species and in general decline across central Europe. In Ireland it has been forced to the margin of its range and is now found predominantly along the western coast. Locale is coastal dunes and unimproved grasslands, both in decline. Recorded on 5 SACs in 2004-5 (2 sand-dunes, 2 machair and 1 dry calcareous grassland site, T. Murray). Threatened in other European countries: Britain (Red data book 1), Switzerland (RE), Germany (EN), the Netherlands (CR), Sweden (NT) and Estonia (NT).
Bombus hortorum (Linnaeus, 1761) Garden bumblebee	LC	**LC**	-	?	Common
Bombus jonellus (Kirby, 1802)	LC	**LC**	-	?	Common. Threatened in other European countries: Germany (VU), and The Netherlands (VU).
Bombus lapidarius (Linnaeus, 1758) Red-tailed bumblebee	NT A3c	**NT A3c**	-	?	Locale is coastal dunes and unimproved grasslands, both in decline; bee is near absent from agricultural areas (V. Santorum). Future declines expected due to habitat loss.
Bombus lucorum (Linnaeus, 1761) White-tailed bumblebee	LC	**LC**	-	?	Extremely common
Bombus magnus (Vogt, 1911)	DD	**DD**	-	?	Identification and taxonomic confusion with *B. lucorum*, and also with *B. cryptarum* Taxonomic work necessary. Molecular studies are currently underway in QUB/TCD. Threatened in other European countries: Germany (DD), and

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					The Netherlands (EN).
Bombus monticola (Smith, 1849)	LC	**LC**	-	?	First recorded in Wicklow in 1974 (M. Speight) and appears to be spreading. Now widespread in north Wicklow and known as far south as the Blackstairs mountains in Co. Carlow (U. Fitzpatrick & A. Byrne). Also known from Counties Derry and Antrim. A molecular study is underway in TCD to determine the origin of the Antrim and Wicklow populations through comparison with Scottish and Welsh material. Moorland species, close association with the flowers of *Vaccinium*. This species is declining in Britain and is currently in an SRP (species recovery programme, English Nature).
Bombus muscorum (Linnaeus, 1758)	NT A3c	**NT A3c**	-	?	Locale is dunes and damp areas with moss/streams, in decline. In the past this was a species often associated with hay meadows. Future declines expected due to habitat loss. This species is declining in Britain and is currently in an SRP (species recovery programme, English Nature). Threatened in other European countries: Switzerland (NT), Finland (NT), Germany (EN), Sweden (NT), Moldova (NT), Estonia (VU), and the Netherlands (EN).
Bombus muscorum var. *allenellus* (Stelfox, 1933)	VU D2	**VU D2**	-	100	Restricted to the Aran Islands. Morphologically distinct. Molecular research currently taking place in TCD to determine if distinct species status is more appropriate.
Bombus pascuorum (Scopoli, 1763) Common carder bumblebee	LC	**LC**	-	?	Extremely common
Bombus pratorum (Linnaeus, 1761) Early-nesting bumblebee	LC	**LC**	-	?	First recorded in Ireland in 1947 and now common throughout
Bombus ruderarius (Mueller, 1776) Red-shanked carder bumblebee	VU A2bc	**VU A2bc**	-	?	This species has declined by 69% since 1980 based on 10km square distribution. It is commonly a species of flower rich grasslands, which are in decline. Currently known populations are predominantly in the west of Ireland. Has declined in Britain where it is currently in an SRP (species recovery programme, English Nature). Threatened in other European countries: Germany (VU), and

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					the Netherlands (VU).
Bombus sylvarum (Linnaeus, 1761) Shrill carder bumblebee	VU B2ab(ii,iii)	**EN B2ab(ii,iii)**	-	?	UK BAP species. Commonly a species of extensive flower rich grasslands, which are in decline. With the exception of the Burren *B. sylvarum* is now known from only a small number of isolated populations in the southern part of Ireland. Threatened in other European countries: Switzerland (VU), and Germany (NT).
Bombus terrestris (Linnaeus, 1758) Buff-tailed bumblebee	LC	**LC**	-	?	Common
Coelioxys elongata (Lepeletier, 1841)	EN B2ab(i,ii,iv)	**EN B2ab(i,ii,iv)**	-	?	Cleptoparasite of *Megachile* species. This species has only been confirmed from two distinct locations since 1926; Raven Point 1.7.1999, 12.7.1999 (C. Ronayne); Curracloe Dunes 14.7.1999 (C. Ronayne); The Raven Nature Reserve, 14.7.1999 (C. Ronayne), 13.7.2005 (U. Fitzpatrick & A. Byrne) all within a small area in Co. Wexord & The Bog of Allen Visitor Centre, Co. Offaly, 8.9.2004 (B. Pinchen). Threatened in other European countries: Finland (EN), and the Netherlands (EN).
Coelioxys inermis (Kirby, 1802)	DD	**DD**	-	?	This species has been designated DD because of the very small number of confirmed locations and in recognition of the taxonomic difficulties in distinguishing it from *C. elongata*. Threatened in other European countries: Switzerland (VU), Finland (NT), and the Netherlands (EN).
Colletes daviesanus (Smith, F., 1846)	DD	**DD**	-	?	This species is known from only two locations, Rosslare, Co. Wexord 26.6.1922 (A.W. Stelfox) and Killard Point, Co. Down 20.7.1970 (C. Reid). It has not been recorded from either location since and may never have been fully established in Ireland? It has been designated DD because it has only ever been known from less than 4 locations and has not been recorded since 1980. Oligolectic on Asteraceae.
Colletes floralis (Eversmann, 1852)	NT A3c	**VU A3c**	-	?	Habitat specific to sand dunes. In the Atlantic zone, Ireland has 90% of the population. Given the threat to Irish sand dunes, future declines are expected due to habitat loss. Globally Irish populations are extremely important. Known from 29 locations since 1980, of which 10 are within protected sites. UK BAP species. Threatened in other European countries: Finland (NT), and Switzerland (NT).
Colletes fodiens (Geoffroy in Fourcroy, 1785)	DD	**DD**	-	?	First recorded in Ireland in 2004. Oligolectic on Asteraceae. Threatened in

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					other European countries: Switzerland (VU), Germany (VU), Sweden (NT) and Slovenia (VU).
Colletes similis (Schenck, 1853)	NT B2b(iii)	**NT B2b(iii)**	-	?	Habitat specific to sand dunes. Given the threat to Irish sand dunes, future declines are expected due to habitat loss. Distribution restricted to coastal sites in the E and SE. Known from 14 locations since 1980, of which 5 are on protected sites. Oligolectic on Asteraceae. Threatened in other European countries: Switzerland (VU), and Germany (VU).
Colletes succinctus (Linnaeus, 1758)	LC	**LC**	-	?	Local. Habitat specific. Associated with heaths and heathy woodland. Oligolectic, associated with the flowers of heaths, especially *Calluna*. Threatened in other European countries: Switzerland (EN), Germany (NT), and Slovenia (EN).
Halictus rubicundus (Christ, 1791)	LC	**LC**	-	?	Extremely common
Halictus tumulorum (Linnaeus, 1758)	NT A3c	**NT A3c**	-	?	Records widely distributed geographically, but never common. It has declined by more than 50% since 1980 based on 10km square distribution. No single identifiable factor to account for decline. Currently known from 16 locations within a range of habitats, of which 7 are on protected sites (SAC, NNR and NP).
Hylaeus brevicornis (Nylander, 1852)	EN B2ab(ii,iv)	**EN B2ab(ii,iv)**	-	?	Known from 26 pre 1980 locations but has declined and is known from only 5 locations since then. Currently known populations are in a wide variety of habitats, one of which is within an oak woodland SAC - Clara Wood, Co. Wicklow 30.6.2000 (C. Ronayne). Dead stem nesting.
Hylaeus communis (Nylander, 1852)	LC	**LC**	-	?	
Hylaeus confusus (Nylander, 1852)	LC	**LC**	-	?	
Hylaeus hyalinatus (Smith, 1842)	VU D2	**VU D2**	-	?	Rare in Ireland, currently known from 3 locations (since 1980). One of these is within an SAC - Ballyteige Burrow, Co. Wexford, 11.7.1999 (C. Ronayne, G.R. Else, S.P.M. Roberts). It is commonly found in Britain, especially in coastal situations (M. Edwards).
Lasioglossum albipes (Fabricius, 1781)	LC	**LC**	-	?	Common
	LC	**LC**			Common

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
Lasioglossum calceatum (Scopoli, 1763)			-	?	
Lasioglossum cupromicans (Perez, 1903)	LC	**LC**	-	?	
Lasioglossum fratellum (Perez, 1903)	LC	**LC**	-	?	
Lasioglossum lativentre (Schenck, 1853)	CR B1+2ab(i,ii,iv)	**CR B1+2ab(i,ii,iv)**	-	?	One currently known population. This species was known from 12 locations pre 1978 at which point it was not recorded again until 5.8.2005 when it was found at Kilcarry Bridge in Co. Carlow (U. Fitzpatrick & A. Byrne). Threatened in other European countries: Switzerland (VU), Germany (VU), Sweden (NT) and the Netherlands (EN).
Lasioglossum leucopus (Kirby, 1802)	LC	**LC**	-	?	
Lasioglossum nitidiusculum (Kirby, 1802)	VU B2ab(ii,iv)	**VU B2ab(ii,iv)**	-	?	Known from 42 pre 1980 locations but this has greatly declined to 7 from 1980 onwards. Two of the current populations (since 1980) are on SACs - Ardmore Head, Co. Waterford, 3.5.2005 (T. Murray) and a site within the Blackstairs Mountains, Co. Carlow, 22.8.2005 (U. Fitzpatrick & A. Byrne). In Britain *L. nitidisculum* is scarce, although widespread (M. Edwards). Threatened in other European countries: Finland (VU), Germany (NT), and the Netherlands (EN).
Lasioglossum punctatissimum (Schenck, 1853)	LC	**LC**	-	?	
Lasioglossum rufitarse (Zetterstedt, 1838)	VU D2	**VU D2**	-	?	Rare in Ireland, currently known from 3 locations (since 1980). This species was first recorded in Ireland on 30.5.1975 at Ards Forest Park, Co. Donegal (M. Speight). It was found within the Slieve Bloom SAC, Co. Laois on 5.8.2004 (U. Fitzpatrick).
Lasioglossum smeathmanellum (Kirby, 1802)	DD	**DD**	-	?	Identification issues with *L. cupromicans*, old museum specimens need to be rechecked
Lasioglossum villosulum (Kirby, 1802)	LC	**LC**	-	?	Common. Near threatened in Finland.
Megachile centuncularis (Linnaeus, 1758)	NT D2	**NT D2**	-	?	Known from ‹ 10 locations in total with declines observed since 1980. Four currently known populations from a variety of habitat types. Threatened in other

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					European countries: Finland (CR), and the Netherlands (VU).
Megachile circumcincta (Kirby, 1802)	DD	**DD**	-	?	First recorded in Ireland in 2004. Threatened in other European countries: Finland (NT), and the Netherlands (EN).
Megachile ligniseca (Kirby, 1802)	DD	**DD**	-	?	First record for Ireland in 1979. Known only from the type location - Baltimore, Co. Cork (M. Adey). Threatened in other European countries: Switzerland (VU), Germany (VU), and the Netherlands (EN).
Megachile maritima (Kirby, 1802)	NT B1+2b(iii)	**NT B1+2b(iii)**	-	?	Habitat specific to coastal sites. As a ground nesting species it is particularly vulnerable to trampling and compaction pressures even in relatively intact dune systems. Future declines expected due to habitat loss. Distribution is restricted to coastal sites in the SE of the country. Known from 7 locations since 1980, of which 4 are on protected sites (SAC, NNR). Threatened in other European countries: Switzerland (VU), Germany (VU), and the Netherlands (EN).
Megachile versicolor (Smith, F., 1844)	LC	**LC**	-	?	Variety endemic to Ireland and Isle of Mann.
Megachile willughbiella (Kirby, 1802)	NT D2	**NT D2**	-	?	Known from ‹ 10 locations in total and some declines observed since 1980. Of interest due to the 2 colour forms, one of which is unique to Ireland. There are 6 currently known populations (since 1980) from a variety of habitats, two of which were found on dry calcareous grassland SACs in 2004.
Nomada argentata (Herrich-Schaeffer, 1839)	CR B1+2ab(i,ii,iv)	**CR B1+2ab(i,ii,iv)**	-	?	Known from only one site since 1935 - Furnace [Foirnis] Island, N. of Lettermullan, Co. Galway, 24.8.1992, 18.8.1999, 16.8.2000, 17.8.2000, 18.8.2000; all at *Succisa pratensis* in rocky unimproved flower-rich pastures (C. Ronayne). This species is a cleptoparasite of *Andrena marginata*, which is also critically endangered in Ireland. Threatened in other European countries: Britain (Red Data Book 3), Switzerland (EN), Germany (EN), Sweden (CR), Norway (NT), Slovenia (EN), and the Netherlands (RE).
Nomada fabriciana (Linnaeus, 1767)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Andrena bicolor* (LC), *A. angustior* (VU)
Nomada flavoguttata (Kirby, 1802)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Andrena*

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					minutula (LC), *A. subopaca* (LC), *A. semilaevis* (VU)
Nomada goodeniana (Kirby, 1802)	EN B2ab(ii,iv)	**EN B2ab(ii,iv)**	-	?	Cleptoparasite which parasitises several *Andrena* species. Known from 23 pre 1980 locations but has declined to only 4 from 1980 onwards. Currently known populations are in a variety of habitats, two of which are within SACs, Ardmore Head, Co. Waterford, 3.5.2005 (T. Murray) and Glenasmole Valley, Co. Dublin, 15.5.2005 (U. Fitzpatrick). Threatened in other European countries: Finland (VU), and the Netherlands (VU).
Nomada leucophthalma (Kirby, 1802)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Andrena clarkella* (LC), *A. apicata* (DD). Threatened in other European countries: Switzerland (VU), Germany (VU), and The Netherlands (VU).
Nomada marshamella (Kirby, 1802)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Andrena scotica* (LC), *A. trimmerana* (CR), *A. nigroaenea* (VU). Threatened in other European countries: Finland (VU).
Nomada obtusifrons (Nylander, 1848)	EN B2ab(ii,iv)	**EN B2ab(ii,iv)**	-	?	Cleptoparasite. Known from 16 populations pre 1980 but reduced to 8 from 1980 onwards. In Britain this species has undergone a marked decline in line with its host *Andrena coitana (*M. Edwards). *A. coitana* is VU in Ireland. Found on 2 dry calcareous grassland SACs in 2004 (U. Fitzpatrick & T. Murray). Threatened in other European countries: Switzerland (RE), Finland (VU), Germany (EN), Sweden (NT), Slovenia (EN), and the Netherlands (RE).
Nomada panzeri (Lepeletier, 1841)	NT A3c	**NT A3c**	-	?	Records widely distributed geographically, but never common. No single identifiable factor to account for decline. 14 currently known locations (since 1980). Found on 3 dry heath SACs and 4 protected woodland sites (SAC, NNR) in 2005 (U. Fitzpatrick & T. Murray). Threatened in other European countries: Germany (EN), and Slovenia (EN).
Nomada ruficornis (Linnaeus, 1758)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Andrena haemorrhoa* (LC).
Nomada rufipes (Fabricius, 1793)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Andrena fuscipes* (VU), *A. denticulata* (VU). Threatened in other European countries: Switzerland (VU), Germany (NT), and Slovenia (EN).
Nomada sheppardana (Kirby, 1802)	RE	**RE**	-	?	Known only from its type location, Lucan, Co. Dublin, 27.7.1902 (H.K. Cuthbert).

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					Threatened in other European countries: Germany (VU).
Nomada striata (Fabricius, 1793)	EN B2ab(ii,iv)	**EN B2ab(ii,iv)**	-	?	Known from 17 pre 1980 locations but only 4 from 1980 onwards. Cleptoparasite of *A. wilkella* (DD). The four known populations are from a variety of habitats but all are on SACs: Ballyteige Burrow, Co. Wexford, 11.6.1999 (C. Ronayne); Clara Vale Wood, Co. Wicklow, 5.6.1998, 30.6.2001 (C. Ronayne); Glenasmole Valley, Co. Dublin, 15.5.2005 (U. Fitzpatrick) and Glengarriff wood, Co. Cork, 12.6.2005 (T. Murray). Threatened in other European countries: The Netherlands (EN).
Osmia aurulenta (Panzer, 1799)	NT B2b(iii)	**NT B2b(iii)**	-	?	Habitat specific to coastal sites. As a surface nesting species it is particularly vulnerable to trampling and compaction pressures even in relatively intact dune systems. Future declines expected due to habitat loss. Distribution is restricted to coastal sites in the E and SE of the country. 11 known locations since 1980, of which 5 are on protected sites. Threatened in other European countries: Sweden (NT), Norway (NT), and the Netherlands (VU).
Osmia rufa (Linnaeus, 1758) Red Mason Bee	NE	**NE**	-	?	*Osmia rufa* was first recorded in Ireland on 7.5.2003 at St Anne's Park in Dublin (J. Stout & M. Brown). It can be bought in Britain as 'a pollination pet for the garden' (Oxford Bee Company) and is a probable deliberate introduction to Ireland.
Sphecodes crassus (Thomson, 1870)	DD	**DD**	-	?	First recorded in Ireland in 2004. Cleptoparasite. Known hosts: *Lasioglossum punctatissimum* (LC), *L. nitidiusculum* (VU). Nationally scarce b in Britain.
Sphecodes ephippius (Linnaeus, 1767)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Halictus tumulorum* (LC). Threatened in other European countries: The Netherlands (VU).
Sphecodes ferruginatus (von Hagens, 1882)	VU D2	**EN B2ab(ii,iv)**	-	?	Cleptoparasite. Rare in Ireland, currently known from 3 locations (since 1980), two of which are dry calcareous grassland SACs surveyed in 2004. Monawilkin, Co. Fermanagh, 14.8.2004 (T. Murray) and Pilgrim's Road Esker, Co. Offaly, 16.8.2004 (U. Fitzpatrick). Known hosts: *Lasioglossum albipes* (LC), *L. calceatum* (LC). Threatened in other European

Taxon name	Red List Category (stage 1)	**Final Red List Category (stage 2)**	Global Red List Category	Proportion (%) of global population	Notes
					countries: Britain (Nationally scarce b), Finland (NT), and the Netherlands (VU).
Sphecodes geoffrellus (Kirby, 1802)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Lasioglossum leucopus* (LC), *L. nitidusculum* (VU).
Sphecodes gibbus (Linnaeus, 1758)	CR D1	**CR D1**	-	?	Cleptoparasite. Known from only 2 east coast locations. Ballyteigue Burrows, Co. Wexford 10-12 August 1950 (R.C. Farris) where it has not been found since. It is currently known from only one population at Lagan meadows, Co Down, 12.5.04 (R. Paxton). Known hosts: *Halictus rubicundus* (LC).
Sphecodes hyalinatus (von Hagens, 1882)	VU B2ab(ii,iv)	**VU B2ab(ii,iv)**	-	?	Cleptoparasite. Known from 12 pre 1980 locations but only 4 from 1980 onwards. Of these four, 3 are dry calcareous grassland SACs/NP surveyed in 2004. Gortnandarragh, Co. Galway, 31.7.2004 (T. Murray); Monawilkin, Co. Fermanagh, 14.8.2004 (T. Murray) and the Burren National Park, Co. Clare, 4.8.2004 (U. Fitzpatrick & A. Byrne). Known hosts: *Lasioglossum fratellum* (LC).
Sphecodes monilicornis (Kirby, 1802)	LC	**LC**	-	?	Cleptoparasite. Known hosts: *Lasioglossum calceatum* (LC), *L.albipes* (LC).
Sphecodes pellucidus (Smith, F., 1845)	DD	**DD**	-	?	Known from only one location -Murlough, Co. Down 9.6.1973 (A.G. Irwin). Probable host is *Andrena barbilabris,* which has been designated as NT. This species is not known outside its type location despite east coast sand dunes being relatively well surveyed in recent years. More specific searches of *A. barbilabris* sites necessary - designated DD until this is completed. Threatened in other European countries: Switzerland (VU).

Reassessment of this list is recommended in 2016

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IUCN Conservation Actions Authority File

In order to ensure global uniformity when describing what conservation measures are in place or are needed, the IUCN have developed a set of standard terms (Authority File) for documenting taxa on the IUCN Red List:

http://www.iucnredlist.org/info/conservation_actions

This hierarchical classification of conservation actions allows assessors to indicate the conservation actions or measures that are in place and/or that are needed for each taxon. The selection should be for those actions which are most needed and which could realistically be achieved in approximately the next five years.

IUCN Conservation Actions Authority File (Version 1.0) for threatened, near threatened and data deficient species in the regional red list of Irish bees

Taxon name	Regional Red List Category	Conservation Action in place:	Conservation Action Needed:	Details
CRITICALLY ENDANGERED				
Andrena humilis (Imhoff, 1832)	CR D1	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Andrena marginata (Fabricius, 1776)	CR B1+2ab(i,ii,iv)	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Andrena trimmerana (Kirby, 1802)	CR D1	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Lasioglossum lativentre (Schenck, 1853)	CR B1+2ab(i,ii,iv)	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Nomada argentata (Herrich-Schaeffer, 1839)	CR B1+2ab(i,ii,iv)	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Sphecodes gibbus (Linnaeus, 1758)	CR D1	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations

Taxon name	Regional Red List Category	Conservation Action in place:	Conservation Action Needed:	Details
ENDANGERED				
Bombus (P.) barbutellus (Kirby, 1802)	EN B2ab(i,ii,iv)	0. None	**3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology	Expert surveys required to accurately assess current extent. Ecological studies necessary to determine why this species has declined despite its host being widespread.
Bombus distinguendus (Morawitz, 1869) Great yellow bumblebee	EN A2bc	0. None	**1. Policy-based actions** 1.1.1 Development of a management plan **3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology 3.9 Trends/Monitoring **4. Habitat and site-based actions** 4.1 Maintenance/Conservation 4.4.3 Management of protected areas 4.4.4 Expansion of protected areas	This species is in decline across Europe. It is a BAP species in the UK, although there are no currently known populations in Northern Ireland. A cross-border management plan for the needs to be developed immediately to protect the Irish populations and prevent its extinction. Habitat loss and subsequent isolation are a primary cause of decline.
Bombus (P.) rupestris (Fabricius, 1793)	EN A2bc	0. None	**3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology	Expert surveys required to accurately assess current extent. Ecological studies necessary to determine habitat requirements and the host-parasite ecology.
Bombus sylvarum (Linnaeus, 1761) Shrill carder bumblebee	EN B2ab(ii,iii)	0. None	**1. Policy-based actions** 1.1.1 Development of a management plan **3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology 3.9 Trends/Monitoring **4. Habitat and site-based actions** 4.1 Maintenance/Conservation 4.4.3 Management of protected areas 4.4.4 Expansion of protected areas	This species is in decline in Northern Europe. It is a BAP species in the UK (there are no recorded populations from Northern Ireland). A management plan needs to be developed immediately to protect the Irish populations and prevent further declines. Habitat loss and subsequent isolation are a primary cause of declines.
Coelioxys elongata (Lepeletier, 1841)	EN B2ab(i,ii,iv)	0. None	**3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements and host-parasite ecology.
Hylaeus brevicornis (Nylander, 1852)	EN B2ab(ii,iv)	0. None	**3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements

Taxon name	Regional Red List Category	Conservation Action in place:	Conservation Action Needed:	Details
Nomada goodeniana (Kirby, 1802)	EN B2ab(ii,iv)	0. None	**3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements and host-parasite ecology.
Nomada obtusifrons (Nylander, 1848)	EN B2ab(ii,iv)	0. None	**3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements and host-parasite ecology.
Nomada striata (Fabricius, 1793)	EN B2ab(ii,iv)	0. None	**3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements and host-parasite ecology.
Sphecodes ferruginatus (von Hagens, 1882)	EN B2ab(ii,iv)	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements and host-parasite ecology.
VULNERABLE				
Andrena angustior (Kirby, 1802)	VU D2	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Andrena coitana (Kirby, 1802)	VU A2bc	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Andrena denticulata (Kirby, 1802)	VU B2b(i,ii,iv)	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Andrena fuscipes (Kirby, 1802)	VU D2	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Andrena nigroaenea (Kirby, 1802)	VU B2ab(ii,iv)	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Andrena praecox (Scopoli, 1763)	VU B2ab(ii,iv)	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Andrena semilaevis (Perez, 1903)	VU B2ab(i,ii,iv)	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Bombus (P.) campestris (Panzer, 1800)	VU A2bc	0. None	**3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology	Expert surveys required to accurately assess current extent. Ecological studies necessary to determine why this species has declined despite its host being extremely common.

Taxon name	Regional Red List Category	Conservation Action in place:	Conservation Action Needed:	Details
Bombus muscorum var *allenellus* (Stelfox, 1933)	VU D2	0. None	**2. Communication and Education** 2.2 Awareness **3. Research Actions** 3.1 Taxonomy 3.3 Biology and Ecology **4. Habitat and site-based actions** 4.1 Maintenance/Conservation 4.5 Community-based initiatives	Restricted to the Aran Islands. Morphologically distinct. Molecular research currently taking place in TCD to determine if distinct species status is more appropriate. Reassessment under regional guidelines necessary if this is the case. Little is known on ecology of this variety. It is entirely dependent on the maintenance of flower rich grasslands on the islands. Islanders should be made aware of its unique nature. Ideal candidate for a community based conservation initiative.
Bombus ruderarius (Mueller, 1776) Red-shanked carder bumblebee	VU A2bc	0. None	**1. Policy-based actions** 1.1.1 Development of a management plan **3. Research Actions** 3.2 Population numbers and range 3.3 Biology and Ecology 3.9 Trends/Monitoring **4. Habitat and site-based actions** 4.1 Maintenance/Conservation 4.4.3 Management of protected areas 4.4.4 Expansion of protected areas	This species is in decline in the British Isles. A cross-border management plan needs to be developed to protect the Irish populations and prevent further declines. Habitat loss and subsequent isolation are a primary cause of decline.
Colletes floralis (Eversmann, 1852)	VU A3c	0. None	**1. Policy-based actions** 1.1.1 Development of a management plan **3. Research Actions** 3.9 Trends/Monitoring **4. Habitat and site-based actions** 4.1 Maintenance/Conservation 4.4.3 Management of protected areas	This species is in severe decline in northern Europe with Ireland holding up to 90% of remaining populations in the Atlantic zone. A species action plan for *C. floralis* in Northern Ireland was published in March 2006. An immediate cross-border management plan is vital to protect existing populations. It is specific to sand dunes. This habitat needs to be managed to ensure that these globally important populations are sustainable.
Hylaeus hyalinatus (Smith, 1842)	VU D2	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Lasioglossum nitidiusculum (Kirby, 1802)	VU B2ab(ii,iv)	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Lasioglossum rufitarse (Zetterstedt, 1838)	VU D2	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements

Taxon name	Regional Red List Category	Conservation Action in place:	Conservation Action Needed:	Details
Sphecodes hyalinatus (von Hagens, 1882)	VU B2ab(ii,iv)	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements and host-parasite ecology.
NEAR THREATENED				
Andrena barbilabris (Kirby, 1802)	NT A3c	0. None	**Habitat and site-based actions** 4.4.3 Management of protected areas	Found in sandy areas, particularly coastal dunes. Quality network of dunes with early forage sources (*Salix repens*) necessary.
Andrena fucata (Smith, 1847)	NT A3c	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Bombus (P.) bohemicus (Seidl, 1837)	NT A3c	0. None	**3. Research Actions** 3.3 Biology and Ecology	Studies necessary to determine habitat requirements and host-parasite ecology
Bombus lapidarius (Linnaeus, 1758) Red-tailed bumblebee	NT A3c	0. None	**3. Research Actions** 3.9 Trends/Monitoring	This species is showing some evidence of declines and needs to be monitored. Urban environments are a potentially important habitat that could be exploited.
Bombus muscorum (Linnaeus, 1758)	NT A3c	0. None	**3. Research Actions** 3.9 Trends/Monitoring	This species is declining across Europe and is beginning to show evidence of decline in Ireland. It needs to be closely monitored to minimise future population loss. Urban environments are a potentially important habitat that could be exploited.
Colletes similis (Schenck, 1853)	NT B2b(iii)	0. None	**Habitat and site-based actions** 4.4.3 Management of protected areas	Habitat specific to sand dunes, restricted to the east and south-east of the country. Quality network of sand dunes needs to be maintained.
Halictus tumulorum (Linnaeus, 1758)	NT A3c	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Megachile centuncularis (Linnaeus, 1758)	NT D2	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Megachile maritima (Kirby, 1802)	NT B1+2b(iii)	0. None	**Habitat and site-based actions** 4.4.3 Management of protected areas	Habitat specific to sand dunes, restricted to southeast of the country. Quality network of sand dunes needs to be maintained.

Taxon name	Regional Red List Category	Conservation Action in place:	Conservation Action Needed:	Details
Megachile willughbiella (Kirby, 1802)	NT D2	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements
Nomada panzeri (Lepeletier, 1841)	NT A3c	0. None	**3. Research Actions** 3.3 Biology and Ecology	Ecological studies necessary to determine habitat requirements and host-parasite ecology.
Osmia aurulenta (Panzer, 1799)	NT B2b(iii)	0. None	**Habitat and site-based actions** 4.4.3 Management of protected areas	Habitat specific to sand dunes, restricted to the southeast of the country. Quality network of sand dunes needs to be maintained.
DATA DEFICIENT				
Andrena apicata (Smith, 1847)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Andrena helvola (Linnaeus, 1758)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	New record in 2004. Survey appropriate habitats to determine the precise extent.
Andrena ovatula (Kirby, 1802)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	New record in 2004. Survey appropriate habitats to determine the precise extent.
Andrena pilipes s.s (Fabricius, 1781)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Andrena stragulata (Illiger, 1806)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Andrena wilkella (Kirby, 1802)	DD	0. None	**3. Research actions** 3.1 Taxonomy	Potential taxonomic confusion with *A. ovatula*, which was added to the Irish checklist in 2004. Need to check museum specimens of *A. wilkella* for possible *A. ovatula* and then reassess *A. wilkella* under IUCN regional guidelines.
Bombus cryptarum (Fabricius, 1775)	DD	0. None	**3. Research actions** 3.1 Taxonomy	Identification and taxonomic confusion with *B. lucorum*, and *B. magnus.* Field studies linked to molecular analysis needed to determine precise distribution and abundance in Ireland.

Taxon name	Regional Red List Category	Conservation Action in place:	Conservation Action Needed:	Details
Bombus magnus (Vogt, 1911)	DD	0. None	**3. Research actions** 3.1 Taxonomy	Identification and taxonomic confusion with *B. lucorum*, and *B. cryptarum.* Field studies linked to molecular analysis needed to determine precise distribution and abundance in Ireland.
Coelioxys inermis (Kirby, 1802)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Colletes daviesanus (Smith, F., 1846)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Colletes fodiens (Geoffroy in Fourcroy, 1785)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	New record in 2004. Survey appropriate habitats to determine the precise extent.
Lasioglossum smeathmanellum (Kirby, 1802)	DD	0. None	**3. Research actions** 3.1 Taxonomy	Identification issues with *L. cupromicans*. Old museum specimens need to be rechecked and then *L. smeathmanellum* reassessed under the IUCN regional guidelines.
Megachile circumcincta (Kirby, 1802)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	New record in 2004. Survey appropriate habitats to determine the precise extent.
Megachile ligniseca (Kirby, 1802)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations
Sphecodes crassus (Thomson, 1870)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	New record in 2004. Survey appropriate habitats to determine the precise extent.
Sphecodes pellucidus (Smith, F., 1845)	DD	0. None	**3. Research actions** 3.2: Population numbers and range	Survey appropriate habitats to determine the number of remaining populations

IUCN Conservation Actions Authority File (Version 1.0) for threatened, near threatened and data deficient species in the regional red list of Irish bees (2006)

Summary of the action required

More than half of the bumblebee species and 45% of the solitary bee species in Ireland are showing evidence of decline. Clearly action cannot be taken on each of these individual species but there are a number of broad initiatives that could be undertaken:

1. Research actions: 3.2 - population numbers and range

There are 13 native species that simply require immediate surveys in appropriate habitats to determine the number of remaining populations. All 6 critically endangered species are currently known from one population each. Surveys are necessary to more accurately determine their precise extent and if management plans can/should be constructed for these species. Seven species were designated data deficient (DD) because their current extent is simply not known. Appropriate surveys need to be carried out for these species so that they can be properly assessed under the IUCN regional guidelines.

2. Research actions: 3.1 - taxonomy

Four species require taxonomic research before being reassessed under the IUCN regional guidelines.

3. Research actions: 3.3 - biology and ecology

Unfortunately little is known on the habitat or ecological requirements of the majority of bee species in Ireland, which means that implementing habitat and site-based action for those species known to be in decline is extremely difficult. More than 30 species fall into this decline category, making habitat and ecological studies on each unrealistic. Eleven of these species are kleptoparasites who use the nest and food reserves of their host species. Currently there is no data on the precise species being used as hosts, much less on host-parasite ecology, for the majority of the kleptoparasites in Ireland, despite this information being essential if they are to be protected. It is recommended that habitat and ecological surveys be carried out on the kleoptoparasitic genera in Ireland:

1. *Coelioxys* species (2) and their hosts within the *Megachile* genus
2. *Sphecodes* species (8) and their hosts within the *Lasioglossum, Halictus* and *Andrena* genera.
3. *Nomada* species (12) and their hosts within the *Andrena* genus.
4. *Bombus* (subgenus Psithyrus) species (6) and their true *Bombus* hosts

This approach is likely to be the most efficient way to deal with the general lack of information on the habitat and ecological requirements of solitary bees in Ireland as well as on host parasite ecology. Despite many being threatened across Europe, little research has been carried out at the European level on kleptoparasitic species and their hosts, making this information potentially valuable on a broader international scale.

4. Research actions: multidisciplinary studies

Four threatened bumblebee species and one variety (*Bombus distinguendus, B. sylvarum, B. ruderarius, B. muscorum* and *B. muscorum* var. *allenellus*) are ideal candidates for multi-disciplinary studies. This should include:

1. Surveys within various habitats to accurately determine the number of remaining populations, current abundance, and to critically assess the influence of habitat type on structuring species communities.
2. Monitoring of currently known populations to determine trends with a longer-term aim of data collection for a population viability analysis.
3. Ecological studies to accurately determine the nesting and foraging requirements of the species and to identify specific plant-pollinator relationships.
4. Conservation genetic studies to determine population structure and levels of inbreeding.

Bombus distinguendus, *B. ruderarius* and *B. sylvarum* are all in severe decline in Ireland and elsewhere in Europe. *Bombus muscorum* is beginning to show evidence of decline in Ireland and is already severely threatened in many European countries, making immediate research vital if the Irish populations are to avoid a similar fate. *Bombus muscorum* var. *allenellus* is a variety unique to the Aran Islands, making it ideal for an educational awareness and the development of a community-based conservation initiative. There is no evidence that it is declining on the islands but little is known on its precise extent, abundance or ecology. It is dependent on the maintenance of flower-rich grasslands for its continued survival.

5. Policy based actions

Four species require immediate management plans to safeguard remaining populations: *Bombus distinguendus*, *Bombus ruderarius*, *Bombus sylvarum* and *Colletes floralis*. All four species are in decline elsewhere in Europe. *Colletes floralis* is of utmost importance as Ireland currently has up to 90% of the remaining populations in the Atlantic Zone. A species action plan for the small number of *C. floralis* populations in Northern Ireland was published by EHS in March 2006. A cross-border management plan is vital if existing populations are to be protected. Given the extent of the declines of the three *Bombus* species, and the international importance of *C. floralis*; immediate management plans are recommended for all four species based on current knowledge, with these being reviewed and updated as further necessary research is completed.

6. Habitat and site based actions

Research needs to feed into this section but it can currently be stated that:

The continued survival of the coastal species- *Andrena barbilabris* (NT), *Osmia aurulenta* (NT), *Colletes similis* (NT), *Megachile maritime* (NT) and *Colletes floralis* (VU) is dependent on the presence of a network of flower rich dunes that are managed to maintain the integrity of the dune system.

B. muscorum var. *allenellus* (VU) is unique to the Aran Islands and is dependent on the maintained presence of extensive tracts of flower-rich grassland on the islands.

B. distinguendus (EN), *B. ruderarius* (VU) and *B. sylvarum* (EN) are all associated with flower rich unimproved or coastal grasslands and require a linked network of correctly managed sites. This network should initially be built around existing populations and subsequently expanded to reduce the current levels of isolation being experienced by the remaining populations through habitat loss and fragmentation.

CONSERVATION PRIORITY LIST:

IRISH BEES

	Taxon name	Regional Red List Category
1	*Andrena coitana*	VU
2	*Andrena fuscipes*	VU
3	*Andrena humilis*	CR
4	*Andrena marginata*	CR
5	*Andrena trimmerana*	CR
6	*Bombus barbutellus*	EN
7	*Bombus distinguendus*	EN
8	*Bombus ruderarius*	VU
9	*Bombus rupestris*	EN
10	*Bombus sylvarum*	EN
11	*Coelioxys elongata*	EN
12	*Colletes floralis*	VU
13	*Lasioglossum nitidisculum*	VU
14	*Nomada argentata*	CR
15	*Nomada goodeniana*	EN
16	*Nomada obtusifrons*	EN
17	*Sphecodes ferruginatus*	EN

Explanation

A World Conservation Union (IUCN) national red list is an objective assessment of extinction risk and is not the same as a national list of conservation priority species. Unfortunately a tendency still exists to assume that Red List categories represent a hierarchical list of priorities for conservation action.

We develop and apply a simple eight-step priority setting process for the conservation of bees in Ireland. Our model is based on the regional extinction risk (regional red list) but also considers the global significance of the national population, the conservation status at global, continental and regional levels, key biological, economic, and societal factors, and is compatible with existing national conservation agreements and legislation.

Within Ireland almost one third of the bee fauna is threatened (30 species) but application of our methodology results in a reduced list of 17 species on the national priority species list. The priority species list should strongly influence prioritisation of conservation actions at national levels, but action should not be exclusive to these species, nor will all species on this list necessarily require immediate action.

Our method was applied to bees but has been developed as a transparent and reproducible process that can be used across a range of taxonomic groups.

Methodology

Figure 1 outlines the conservation matrix or integrated three-step process we propose for the conservation of taxonomic groups at the national level. It includes the eight-step method used for conversion from the regional red list of Irish bees to a national list of conservation priority species.

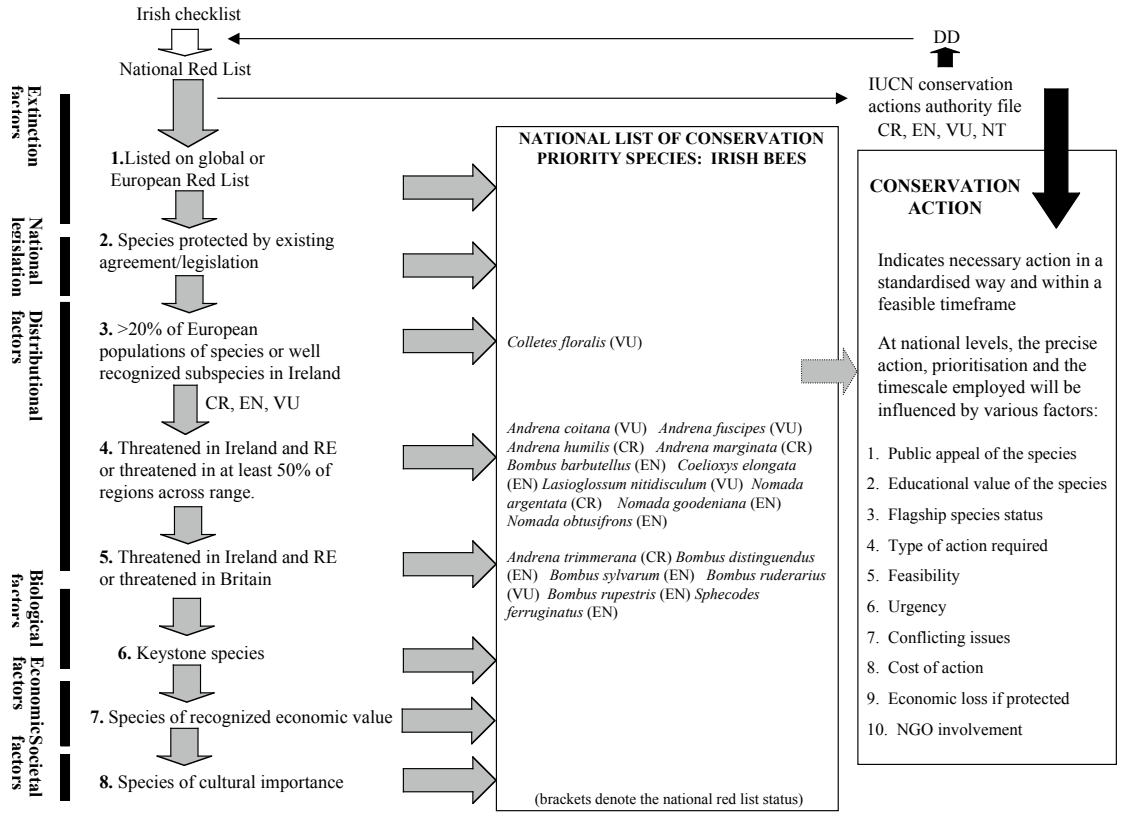

Figure 1: Conversion from a regional red list to a national list of priority species

Step 1: Global or European conservation status

Neither a global nor a European red list is available for bees.

Step 2: Species protected by existing national agreement or legislation

None of the Irish bee species are protected by existing national agreement or legislation.

Step 3: International importance

Step 3 recognises species that are of international importance. This has been defined as those species for which the Irish populations contribute a significant proportion ($>^1/_5$) of the European total.

Step 4: European conservation status

As is the case with many groups, there is no global or European Red List of bees. We use an alternative method of assessing the European conservation status in the interim period until such information is published. We divided Europe into five geographic regions: British Isles, Scandinavia, Western and Central mainland Europe, Eastern Europe, and the Mediterranean and considered the conservation status of each species within each region. Species that are threatened (critically endangered [CR], endangered [EN], or vulnerable [VU]) in Ireland and regionally extinct or threatened in at least 50% of the other regions across their range were included on the national priority species list. For species distributed across Europe, this means that only those regionally extinct or threatened in two other regions were included. Regionally extinct or threatened in at least one country within each region would qualify a species for inclusion as threatened in that region.

In the case of bees, 11 countries in Europe have produced national red lists based on IUCN criteria (1994, 2001): Estonia, Finland, Ireland, Latvia, Lithuania, Moldova, the Netherlands, Norway, Slovenia, Sweden and Switzerland, and an additional two countries have produced nationally equivalent lists: Germany, United Kingdom. Ten species are threatened in Ireland and regionally extinct or threatened in at least 50% of the regions across their range. *Nomada argentata* (CR) and *Nomada obtusifrons* (EN) are also threatened in Western and Central mainland Europe, Eastern Europe, and Scandinavia. *Andrena humilis* (CR), *Andrena marginata* (CR), *Bombus barbutellus* (EN), *Coelioxys elonagata* (EN), *Nomada goodeniana* (EN) and *Lasioglossum nitidiusculum* (VU) are also threatened in Western and Central mainland Europe and Scandinavia. *Andrena coitana* (VU) and *Andrena fuscipes* (VU) are also threatened in Western and Central mainland Europe and Eastern Europe.

Step 5: Conservation status within the British Isles

Step 5 recognises species that are threatened within both Britain and Ireland. Smaller geographic regions such as Britain and Ireland will have a degree of isolation from other regions in Europe and we argue that recognizing species threatened within

distinct geographic regions is prudent, regardless of whether they are threatened across a continent as a whole because it will maintain variation within different sections of the overall gene pool.

Britain does not have a national red list of bee species based on IUCN regional guidelines. Species were regarded as threatened or near threatened in Britain if they are recognized as such in the *British Insect Red Data Book* (Shirt 1987) or in *A review of the Scarce & Threatened Bees, Wasps and Ants of Great Britain* (Falk 1991). Biodiversity Action Plan species (BAP) were also regarded as threatened. Six species are threatened in both Ireland and Britain and transferred directly to the national priority species list under this criterion. An additional three species are threatened in both Ireland and Britain but were transferred to the national priority species list in the previous step (step 4).

Step 6: Keystone species

Under this step all threatened species on the national red list that are known or suspected to be keystone species were transferred to the priority species list. We define a keystone species as a species whose loss is likely to trigger other secondary extinctions (e.g., specific plant-pollinator interactions). None of the bee species in Ireland are known or suspected to be keystone species.

Step 7: Species of recognized economic value

Step 7 recognises species of economic value but does not apply to any of the bee species in Ireland.

Step 8: Species of cultural importance

Step 8 recognises species of cultural importance but does not apply to any of the bee species in Ireland.

This is taken from:

Fitzpatrick, U., T.E. Murray, R.J. Paxton & M.J.F. Brown (2006). Building on IUCN National Red Lists to produce national lists of conservation priorities – a model using Irish bees (submitted to Conservation Biology).

Copies of this manuscript are available from the author: una.fitzpatrick@gmail.com