

Ireland

Red List No. 6



THE IUCN RED LIST
OF THREATENED SPECIES™

Damselflies & Dragonflies (Odonata)





Ireland Red List No. 6:

Damselflies & Dragonflies (Odonata)

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Cover photos: From top: Crescent Bluet (*Coenagrion lunulatum*) © Robert Thompson; Robust Spreadwing larva (*Lestes dryas*) © Robert Thompson; Downy Emerald (*Cordulia aenea*) © Robert Thompson; Northern Emerald (*Somatochlora arctica*) © Brian Nelson; Small Bluetail (*Ischnura pumilio*) © Robert Thompson.

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EXECUTIVE SUMMARY

Based on almost 32,000 records for Ireland, the 24 species of resident damselfly and dragonfly (Odonata) are evaluated for their conservation status using International Union for the Conservation of Nature (IUCN) criteria (IUCN, 2001, 2003). Four (17%) of the Irish species are assessed as threatened, and one species as near threatened. The populations of all five species need to be thoroughly surveyed and monitoring programmes for each initiated. Causes of the decline in each species need to be determined, existing and possible threats identified, and protective measures introduced. The remaining species are all assessed as least concern.

The Irish odonate fauna is a limited one, reflecting the recent geological history of the island; its location off the western edge of the European continent; the climate, and the range of habitats present. Despite this, the fauna is not without interest and in particular when compared to that of Great Britain. The most interesting species of the Irish fauna is the Crescent or Irish Bluet *Coenagrion lunulatum* which is mainly a northern Eurasian species that is absent from Great Britain. The Irish population of the Robust Spreadwing *Lestes dryas* is also of interest because of its association with the turloughs of the western limestone.

Three of the threatened odonates, Northern Emerald *Somatochlora arctica*, Downy Emerald *Cordulia aenea* and Crescent Bluet *Coenagrion lunulatum*, are found in low nutrient status wetlands and the change brought about by enrichment of these habitats is regarded as the primary threat to these species. The decline of these should act as a warning of the negative trend in the state of these wetlands which are a distinctive feature of many Irish counties. These three are also predominantly northern species and the Irish populations lie at the southern edge of their ranges. In the long-term the impact of climate change may be significant. Climate change may actually benefit the remaining threatened species, Small Bluetail *Ischnura pumilio*, and the near threatened Robust Spreadwing *Lestes dryas*, but the immediate threat to these species is habitat loss. Both these damselflies are dependent on specific hydrological conditions which are easily damaged and altered.

ACKNOWLEDGEMENTS

This analysis and evaluation of the Irish odonate fauna would not have been possible without the thousands of records provided by generations of naturalists. We have not listed them here but our sincere thanks are offered to them all. In particular we would like to acknowledge the pioneering naturalists who have previously held the role of Irish Odonata recorder, Cynthia Longfield and Niall MacNeill. The assistance of colleagues in the National Parks and Wildlife Service, Northern Ireland Environment Agency, Ulster Museum and National Biodiversity Data Centre is gratefully acknowledged especially Úna FitzPatrick, Naomi Kingston, Damian McFerran, Áine O Connor, Eugenie Regan, Jochen Roller and Richard Weyl. Vincent Kalkman (Naturalis, Leiden), the organiser of the European Dragonfly Atlas project and a member of the IUCN Odonata specialist group, is thanked for acting as external assessor.

INTRODUCTION

Dragonflies and damselflies are colourful, predatory insects of freshwater habitats. They are characterized by their elongate bodies, long wings and large eyes. Both types of insect belong to the order Odonata, dragonflies being the larger species in the suborder Anisoptera. Damselflies are delicate, thin bodied and less active species and are classified in the suborder Zygoptera. The word dragonfly can be applied to all Odonata so, to avoid confusion, the term odonate is used here when referring to all species.

Odonates are amongst the most vibrant and energetic of all insects. They are held in high regard in some cultures notably in Japan, but they are less well known and treasured in European culture than, for example, butterflies. Appreciation of odonates is undoubtedly greater than before and this is reflected in the increased availability over the past 30 years of national and regional accounts, field guides and web sites providing information and images. The modern trend of recording with digital cameras has helped fuel this appreciation of the photogenic qualities of dragonflies and damselflies and the challenge of observing and identifying them. Concern for the decline of freshwater habitats across the globe has also prompted an increased interest in odonates and their value as indicators of the health of these habitats.

Biologically, odonates are entirely reliant on freshwater as the immature stages are spent in an aquatic environment. The range of habitats utilized by odonates is very wide from the largest lakes and rivers to tiny wetlands, such as mossy pools on the surface of peat bogs and seepages and trickles at the highest point of river systems. All stages are predatory, feeding on other invertebrates. The larval stage is the longest part of the lifecycle of most species and largely dictates the habitat of the species. However, most research and recording effort is directed at the adult rather than the larval stage. The problem with this is that observing only adults may bias results by overestimating the distribution of species (Raebel *et al.*, 2010).

Just over 5,800 species of odonate have been described, with the greatest number in forested tropical regions. Odonates however can be found on all of the continents with the exception of Antarctica. Europe is not rich in odonates possessing only 138 species, but this includes 18 endemic species (Dijkstra & Lewington, 2006; Kalkman *et al.*, 2010). The pattern of species diversity of European odonates (Figure 1) shows an interesting pattern of greatest diversity in central Europe between the Alps and the Baltic and from the Bay of Biscay to European Russia. Species diversity decreases both to the north in Fennoscandia, Britain and Ireland and, to the south, in the Mediterranean region (Figure 1). This pattern reflects the distribution of habitat and climate especially temperature and precipitation (Kalkman *et al.*, 2010). There has been a trend in recent decades, affecting the whole of Europe, with southern species moving north (Ott, 2010). African species have colonized Iberia and Mediterranean species have been increasingly reported in central and northern Europe, including Ireland. This is due to the effect of climate warming and the increased availability of habitat (Kalkman *et al.*, 2010). European species are also threatened by habitat degradation especially in the Mediterranean. The recent Red List Assessment (Kalkman *et al.*, 2010) identified that 22 (15%) of European odonates were threatened and that a quarter of all species were declining. The majority of the threatened species are found in the Mediterranean region especially in Iberia and the southern Balkans. None of the Red Listed species is found in Ireland. The main threats to these species are the increasing demand for water and the increased frequency and duration of hot and dry periods.

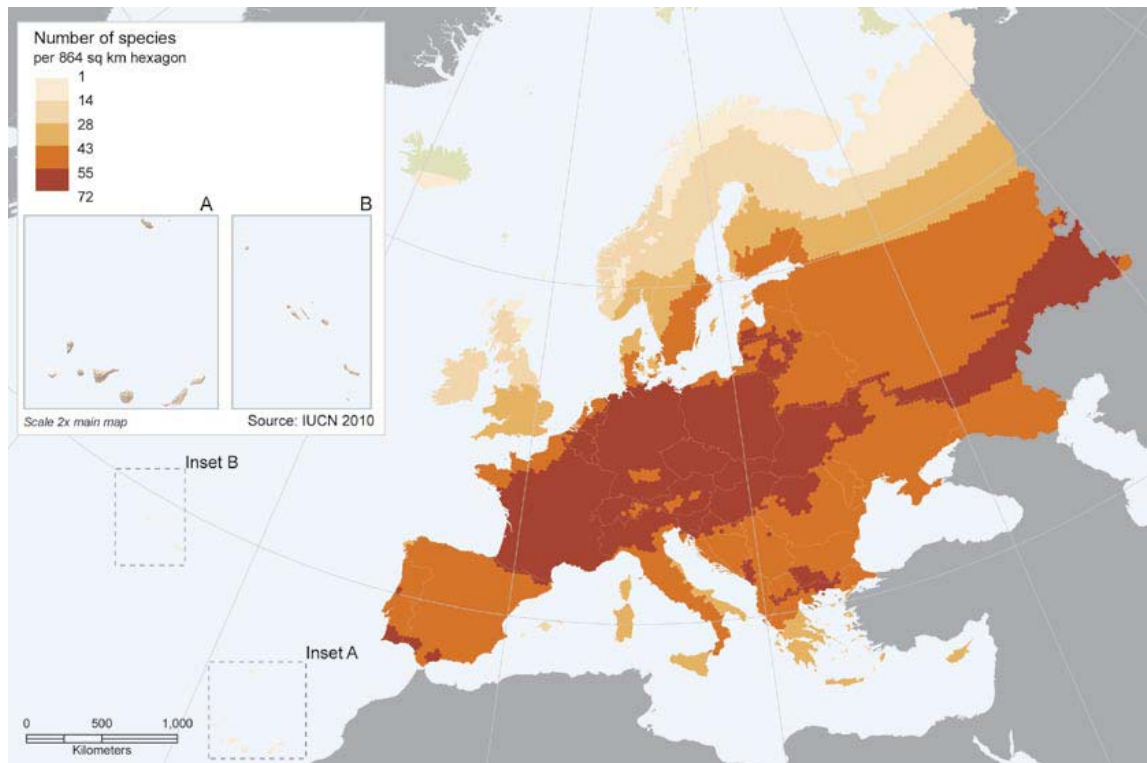


Figure 1: Species richness of European odonates (from Kalkman *et al.*, 2010)

Recording of odonates in Ireland

The first records of Irish dragonflies date from the middle decades of the nineteenth century. Through the rest of that century and the first half of the twentieth century recording of Irish dragonflies was very sporadic. Few records are available from this period and many of these are vague and cannot be mapped to modern standards. The level and quality of recording has increased markedly since the 1970s (Figure 1; Nelson & Thompson, 2004). The initial impetus to this increase was the Odonata Recording Scheme (ORS) run by the Biological Records Centre in Monk's Wood. The ORS started in 1970s and gathered data from Britain and Ireland until 1990. The results of the ORS were however not published until 1996 (Merritt, Moore & Eversham, 1996). Initially the scheme was coordinated by a single organiser covering Britain and Ireland, but as the workload increased in the 1980s, an additional tier of regional recorders were appointed, including one in Ireland, Colm Ronayne. Regional recorders received and validated records before they were passed to the scheme organizer. This system necessitated the creation of a database of all the validated Irish records which has been held and maintained ever since by the Irish recorder. This work was crucial in the relative success of the ORS in Ireland and set the foundations for what has followed. In 1996, Robert Thompson took over as Irish recorder and during this period the DragonflyIreland project was initiated. This recording project ran for four seasons from 2000 to 2003 and generated some 13,000 records. The results were published in 2004 (Nelson & Thompson, 2004). The DragonflyIreland dataset has been maintained since the end of DragonflyIreland by Brian Nelson.

Legal Protection

At the time of writing (February 2011) no species of odonate is legally protected in Ireland. If enacted the Northern Ireland Wildlife and Natural Environment Bill will add the Crescent Bluet *Coenagrion lunulatum* to Schedule 5 of the Wildlife Order and the species will be fully protected at all times. It will be illegal to disturb, catch, kill or sell individuals of that species without a licence from the Northern Ireland Environment Agency.

METHODS AND DATA SOURCES

Irish Checklist

Appendix 1 provides the latest Irish checklist of Odonates. The nomenclature in this Red List (scientific and common name) follows Dijkstra & Lewington (2006). The common names used in Dijkstra & Lewington (2006) differ from those used in Nelson & Thompson (2004) and other field guides, and are listed in Appendix 2. One species, Common Goldenring *Cordulegaster boltonii*, has been added to the Irish list since 2003.

Species coverage

Assessments were done for the 24 species listed in Table 1 that are considered permanently resident for at least 10 years as recommended by the IUCN regional guidelines (IUCN, 2003). These guidelines also state that migrant and vagrant species and any which have not established permanent populations in the region should not be assessed. The Irish species which fall in to this category are listed in Table 2.

Geographical coverage

The assessment was done on an all Ireland level so includes both Northern Ireland and the Republic of Ireland in line with the standard practice for other Irish red lists.

Sources of information

The sole source of distribution data on the species was the DragonflyIreland dataset. This is maintained and updated by the Irish dragonfly recorder. Access to the data can be obtained on request through CEDaR (National Museums Northern Ireland). It is also available online through the interactive mapping system of the National Biodiversity Data Centre, Waterford. This information was supplemented by the expert knowledge of the assessing panel and other data from published and unpublished sources.

The version of the DragonflyIreland dataset used for this analysis included all the records received up to 31 December 2010. The total number of records available was just under 32,000. Figure 2 shows the number of validated records in the dataset from before 1900, for each decade since 1900 and for the period of 11 years since 2000. It can be seen that more than 90% of the records have been gathered since 1980. Figure 3 shows the geographical coverage of the validated records by hectad (10x10 km squares) of the Irish grid and the coverage in the two time periods used in the assessment of change. Overall coverage exceeds 94% of the Irish hectads and the respective figures for the two time periods are 75% pre-2000 and 85% post-2000.

Regionally determined settings

The assessment process followed the IUCN categories and criteria (IUCN, 2001) supplemented by the latest IUCN guidelines for their application (IUCN, 2010). IUCN recommend that regional Red List classifications are carried out as a two stage process (IUCN, 2003). Stage one is the application of IUCN criteria to the regional population of each species. Stage two involves

an assessment of whether the regional extinction threat determined in stage one is affected by the existence of conspecific populations outside of the region in question. For example, a species may be assessed as threatened in Ireland, but it may be common elsewhere and capable of dispersing to Ireland. There is potential therefore for a ‘rescue effect’ and in such a scenario a threat category can be downgraded. Upgrading is also possible in certain circumstances. All the Irish species were subjected to this two stage process, but no threat statuses were changed in the second stage.

The time frame for assessing change was determined as 2000-2010 and pre-2000. The data set was considered sufficiently complete that Area of Occupancy (AOO) and Extent of Occurrence (EOO) were used to guide the assessments. Area of Occupancy was calculated for all species, but Extent of occurrence was only calculated for the threatened and near threatened species. The calculations were made following the IUCN guidelines (IUCN, 2010). The AOO was calculated based on the number of occupied tetrads (2km x 2km grid squares) in the two time periods. EOO was calculated based on the entire recording period. The number of locations was relevant only to two species, Downy Emerald *Cordulia aenea* and Northern Emerald *Somatochlora arctica*, and the interpretation of this for each species is explained in the species accounts.

Setting of assessments

The assessments were undertaken by a panel comprising Brian Nelson, Colm Ronayne and Robert Thompson, who each have acted the Irish Dragonfly recorder at some time since the mid 1980s. The document was sent for comment in February 2011 to staff in NPWS, NIEA, CEDaR and NBDC and to the external assessor, Vincent Kalkman (Naturalis, Leiden). The revised document incorporating changes and corrections was finalised in March 2011.

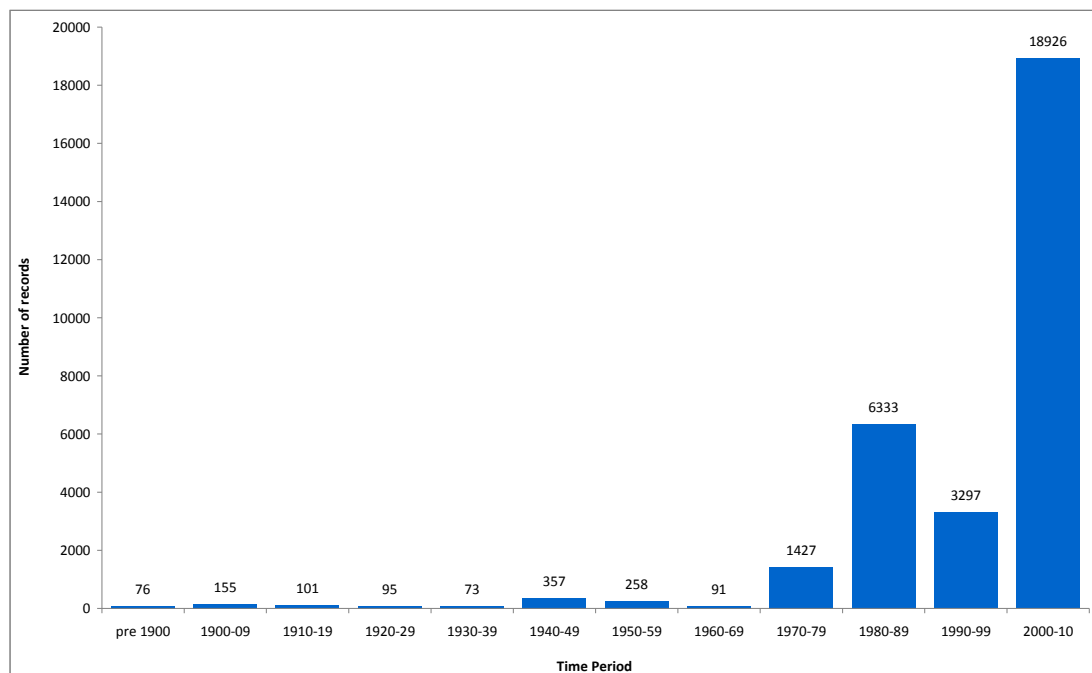


Figure 2: The number of validated records in the DragonflyIreland database from before 1900, each decade of the 1900s and 2000-2010

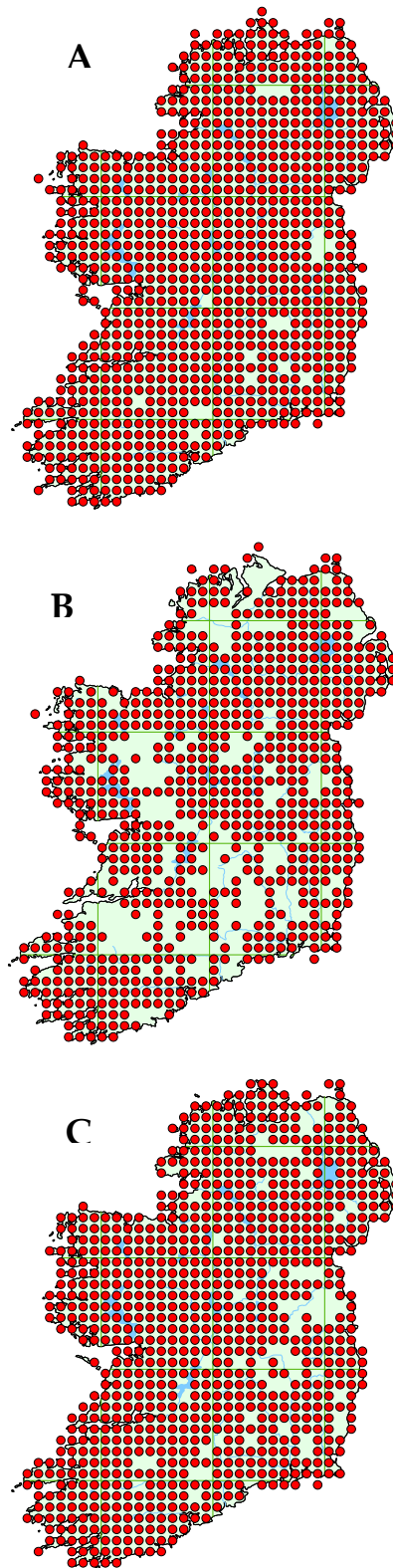


Figure 3: Coverage maps of records of Irish odonates showing (A) all the hectads with at least one validated record (954), (B) hectads with records before the end of 1999 (754) and (C) hectads with records since the start of 2000 (887). The island of Ireland has just over 1000 hectads containing some land.

Table 1: The Red List of Irish odonates

| Species | | Assessment | Criteria | Trend |
|---------------------------------|----------------------|------------|-----------|-------------------|
| <i>Somatochlora arctica</i> | Northern Emerald | EN | B2ab(iii) | Stable |
| <i>Cordulia aenea</i> | Downy Emerald | EN | B2ab(iii) | Stable |
| <i>Coenagrion lunulatum</i> | Crescent Bluet | VU | A2c,A3c | Decrease |
| <i>Ischnura pumilio</i> | Small Bluetail | VU | A2c,A3c | Decrease |
| <i>Lestes dryas</i> | Robust Spreadwing | NT | B2ab(iii) | Decrease |
| <i>Calopteryx splendens</i> | Banded Demoiselle | lc | | Stable |
| <i>Calopteryx virgo</i> | Beautiful Demoiselle | lc | | Possible increase |
| <i>Lestes sponsa</i> | Common Spreadwing | lc | | Stable |
| <i>Coenagrion puella</i> | Azure Bluet | lc | | Possible decrease |
| <i>Coenagrion pulchellum</i> | Variable Bluet | lc | | Decrease |
| <i>Enallagma cyathigerum</i> | Common Bluet | lc | | Stable |
| <i>Ischnura elegans</i> | Common Bluetail | lc | | Stable |
| <i>Pyrrhosoma nymphula</i> | Large Red Damselfly | lc | | Stable |
| <i>Aeshna grandis</i> | Brown Hawker | lc | | Increase |
| <i>Aeshna juncea</i> | Moorland Hawker | lc | | Stable |
| <i>Aeshna mixta</i> | Migrant Hawker | lc | | Increase |
| <i>Anax imperator</i> | Blue Emperor | lc | | Increase |
| <i>Brachytron pratense</i> | Hairy Hawker | lc | | Stable |
| <i>Libellula quadrimaculata</i> | Four-spotted Chaser | lc | | Stable |
| <i>Orthetrum cancellatum</i> | Black-tailed Skimmer | lc | | Increase |
| <i>Orthetrum coerulescens</i> | Keeled Skimmer | lc | | Stable |
| <i>Sympetrum danae</i> | Black Darter | lc | | Possible decrease |
| <i>Sympetrum sanguineum</i> | Ruddy Darter | lc | | Stable |
| <i>Sympetrum striolatum</i> | Common Darter | lc | | Stable |

SUMMARY OF EVALUATIONS

The Irish populations of twenty-four species of damselfly and dragonfly were assessed using the latest IUCN criteria (IUCN, 2001, 2003, 2010). Four of the Irish odonate species (16.7%) are assessed as under threat. The four threatened species are the Northern Emerald *Somatochlora arctica*, Downy Emerald *Cordulia aenea* (both Endangered), Crescent Bluet *Coenagrion lunulatum* and Small Bluetail *Ischnura pumilio* (both Vulnerable). In addition one species, Robust Spreadwing *Lestes dryas*, is considered Near Threatened. There have been no recorded extinctions of any Irish odonate. Rather, the Irish fauna has been boosted since 2000 with the addition of four species. This is part of a general trend in Europe of increases and range extensions of southern species. None of the Irish species are listed on the European red list (Kalkman *et al.*, 2010). Within the biogeographical area of Britain and Ireland, Ireland possesses the only population of *Coenagrion lunulatum* and a significant proportion of the populations of both *Lestes dryas* and *Ischnura pumilio*. These two damselflies species are both red listed in Great Britain (Daguet *et al.*, 2008).

The precise threats to the threatened Irish odonates are not well known. Eutrophication, habitat loss and in the longer term climate change are considered the most significant. The threatened species of Irish odonate are found in low-nutrient freshwaters and three are northern species.

Table 2: Species included in the Irish checklist which were not assessed.

| Species | Status | Reason for non assessment |
|---|--------------------------------|------------------------------------|
| Common Clubtail <i>Gomphus vulgatissimus</i> | One record, pre 1845 | Vagrant/never established |
| Blue Hawker <i>Aeshna cyanea</i> | One record, 1988 | Vagrant/never established |
| Vagrant Emperor <i>Anax ephippiger</i> | One record, 1913 | Vagrant/never established |
| Lesser Emperor <i>Anax parthenope</i> | Multiple records, 2000-2007 | Irregular and rare migrant |
| Common Goldenring <i>Cordulegaster boltonii</i> | Two seen in 2005 & one in 2008 | Recently confirmed; status unclear |
| Broad-bodied Chaser <i>Libellula depressa</i> | One record, 1834 | Vagrant/never established |
| Blue Chaser <i>Libellula fulva</i> | One record, 1849 | Vagrant/never established |
| Yellow-winged Darter <i>Sympetrum flaveolum</i> | Recorded in 1995 and 1998 | Vagrant/never established |
| Red-veined Darter <i>Sympetrum fonscolombii</i> | Multiple records, last in 2010 | Irregular and rare migrant |

Table 3: Statistics used in the red list assessment of the resident species of Irish odonate. Extent of occurrence was only calculated for the threatened and near threatened species.

| Species | Area of occupancy(km ²) | | | EOO (km ²) | Locations | Number of hectads | | |
|---------------------------------|-------------------------------------|--------------|---------------|---------------------------|-----------|-------------------|--------------|---------------|
| | Total | Pre- 2000 | Post- 2000 | | | Total | Pre- 2000 | Post- 2000 |
| <i>Calopteryx splendens</i> | 2608 | 1156 | 1700 | | | 357 | 197 | 256 |
| <i>Calopteryx virgo</i> | 1392 | 660 | 856 | | | 196 | 110 | 143 |
| <i>Lestes dryas</i> | 172 | 76 | 108 | 26000 | >10 | 26 | 15 | 16 |
| <i>Lestes sponsa</i> | 3748 | 1720 | 2336 | | | 486 | 267 | 370 |
| <i>Coenagrion lunulatum</i> | 396 | 216 | 248 | 26000 | >10 | 61 | 39 | 38 |
| <i>Coenagrion puella</i> | 3664 | 2068 | 2036 | | | 433 | 305 | 285 |
| <i>Coenagrion pulchellum</i> | 3236 | 1924 | 1740 | | | 409 | 293 | 255 |
| <i>Enallagma cyathigerum</i> | 6568 | 3460 | 4176 | | | 617 | 416 | 508 |
| <i>Ischnura elegans</i> | 8396 | 4588 | 5048 | | | 756 | 522 | 603 |
| <i>Ischnura pumilio</i> | 392 | 232 | 176 | 85400 | >10 | 82 | 51 | 38 |
| <i>Pyrrhosoma nymphula</i> | 6804 | 3700 | 3888 | | | 700 | 487 | 520 |
| <i>Aeshna grandis</i> | 3496 | 1408 | 2508 | | | 379 | 183 | 302 |
| <i>Aeshna juncea</i> | 5084 | 2036 | 3468 | | | 574 | 298 | 461 |
| <i>Aeshna mixta</i> | 332 | 0 | 332 | | | 53 | 0 | 53 |
| <i>Anax imperator</i> | 268 | 0 | 268 | | | 47 | 0 | 47 |
| <i>Brachytron pratense</i> | 2032 | 960 | 1280 | | | 265 | 150 | 194 |
| <i>Cordulia aenea</i> | 60 | 28 | 44 | 1500 | 4 | 8 | 5 | 6 |
| <i>Somatochlora arctica</i> | 16 | 12 | 12 | 200 | 1 | 3 | 3 | 2 |
| <i>Libellula quadrimaculata</i> | 4852 | 2292 | 3092 | | | 544 | 332 | 409 |
| <i>Orthetrum cancellatum</i> | 544 | 184 | 448 | | | 77 | 30 | 65 |
| <i>Orthetrum coerulescens</i> | 980 | 476 | 588 | | | 147 | 77 | 105 |
| <i>Sympetrum danae</i> | 2532 | 1112 | 1564 | | | 366 | 188 | 257 |
| <i>Sympetrum sanguineum</i> | 1880 | 660 | 1432 | | | 260 | 114 | 211 |
| <i>Sympetrum striolatum</i> | 7544 | 3352 | 5100 | | | 737 | 444 | 634 |

Table 4: Summary table showing associations of the threatened and near threatened Irish odonates with the habitats listed on Annex I of the Habitats Directive. Assessment of the habitats is taken from NPWS (2008). These assessments cover the Republic of Ireland only. The associations listed apply only to the breeding and larval habitat. Additional habitats may be utilised by the adults, but these are not listed.

| Annex I Habitat | Future prospects | Overall | Threatened Irish odonate associated with this habitat |
|--|------------------|---------|---|
| 2190 Humid dune slacks | Bad | Bad | Small Bluetail <i>Ischnura pumilio</i> (VU) |
| 3130 Oligotrophic to mesotrophic lakes | Bad | Bad | Downy Emerald <i>Cordulia aenea</i> (EN); Crescent Bluet <i>Coenagrion lunulatum</i> (VU) |
| 3150 Naturally eutrophic lakes | Bad | Bad | Crescent Bluet <i>Coenagrion lunulatum</i> (VU); Small Bluetail <i>Ischnura pumilio</i> (VU) |
| 3160 Dystrophic lakes | Bad | Bad | Downy Emerald <i>Cordulia aenea</i> (EN) |
| 3180 Turloughs | Poor | Poor | Robust Spreadwing <i>Lestes dryas</i> (NT) |
| 4010 Wet heath | Bad | Bad | Northern Emerald <i>Somatochlora artica</i> (EN) |
| 7140 Transition mires | Bad | Bad | Crescent Bluet <i>Coenagrion lunulatum</i> (VU) |
| 7230 Alkaline fens | Bad | Bad | Crescent Bluet <i>Coenagrion lunulatum</i> (VU); Small Bluetail <i>Ischnura pumilio</i> (VU) |

SPECIES NOTES

This section gives brief notes on all the assessed species. More detailed information, especially relating to habitat of the species, is given in Nelson & Thompson (2004).

Damselflies (Zygoptera)

Banded Demoiselle

IUCN least concern

Calopteryx splendens

Found throughout Ireland on the middle and lower reaches of rivers where the bed is muddy or silty and there are stands of riparian plants. There is no evidence of any change in its distribution or abundance and it is assessed as of least concern.

Beautiful Demoiselle

IUCN least concern

Calopteryx virgo

This has a more restricted range than the previous species. It is also a river species but tends to occur on smaller tributary streams with sand and gravel substrate and so the two species generally do not overlap. The map in Nelson & Thompson (2004) showed the range to be south of a line from Galway Bay to Dublin and in Connemara. This has not changed significantly apart from a slight northward spread in recent years with records in Co. Louth and Co. Kildare.

Robust Spreadwing

IUCN Near Threatened

Lestes dryas

B2ab(iii)

The Robust Spreadwing is found in ephemeral natural and artificial wetlands, including turloughs, which fill regularly in the winter but dry out gradually in summer. Its rapid larval growth allows it to complete development before the water disappears. The eggs are laid in vegetation and only hatch when covered by water. The association with turloughs and similar water bodies results in a mainly western range in the limestone geology of Clare, east Galway, east Mayo, Roscommon, Sligo and Leitrim especially. It is not however confined to base-rich sites as there are records from more acid sites in Meath and, formerly, Wicklow. There are historic records from sites through the Irish midlands and in the south and east, but it was lost from most of these before the mid 1980s. Within the core range in the west several large populations have been reported but records are sparse and trends are not known. However numbers at one well known site (Ballyvelaghan Lough, Co. Clare) appear much reduced since the 1990s and none were seen here in 2010. Turloughs are a priority habitat and their overall status and future prospects are considered poor (Table 4). There is a need for a thorough assessment of the size and extent of the populations throughout its range and a better definition of its habitat requirements. The evidence of the decline in the east prior to 2000 and the poor current status and future prospects for turloughs, the species is evaluated as Near Threatened as it might meet criteria B2a, b(iii) in the near future.

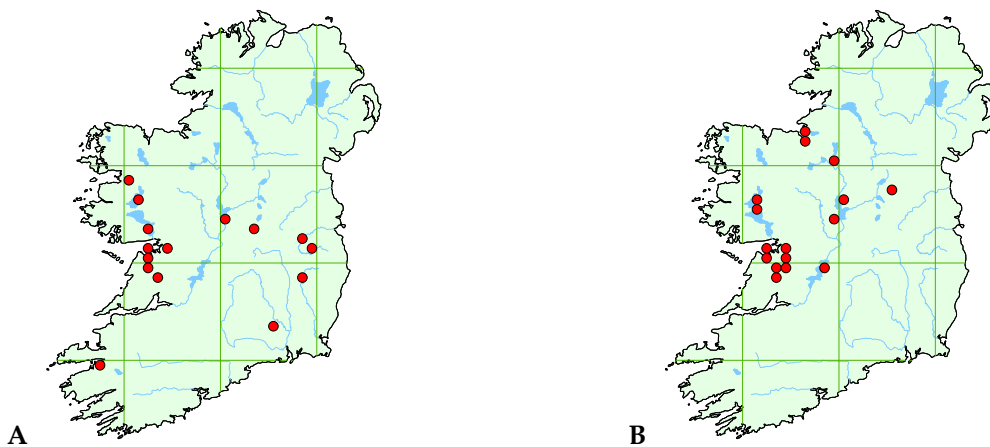


Figure 4: Distribution of Robust Spreadwing *Lestes dryas* in Ireland pre-2000 (A) and post-2000 (B)

Common Spreadwing

IUCN least concern

Lestes sponsa

Common and widespread in small waterbodies throughout Ireland. There is no evidence of any change in its distribution or abundance and it is assessed as of least concern.

Crescent Bluet**IUCN Vulnerable***Coenagrion lunulatum***A2c,A3c**

This is the rarest of the three *Coenagrion* species that are found in Ireland and, uniquely amongst the Irish odonates, it is absent from Great Britain. The nearest populations in Europe are in the Netherlands. It was discovered in Ireland in 1981 but there is no evidence or reason to suppose it is not a native species. The species has been recorded from just over 100 sites in 61 hectads (Table 3). Whilst the number of sites for the species continues to grow, there have also been significant losses. The number of viable colonies is unknown, but few large populations are known and it is considered that many of the records of small numbers of individuals from sites indicate dispersal from large colonies. The Northern Ireland survey found more than 57% of colonies supported small numbers of adults and only 2 (less than 10%) of sites were assessed as supporting large colonies (Nelson, 1999).

The comparison of the AOO and number of occupied hectads shows no evidence of decline (Table 3). However a survey in N. Ireland during the 1990s revealed a decline of 25% in the known sites in just a decade since it was recorded in the area (Nelson, 1999). The increase in the number of occupied hectad in the post-2000 period was through the discovery of species in 27 unrecorded squares, but in the same period there were no records from 19 of the previously recorded squares. Many of these 'new' hectads came from a survey of the species in Co. Monaghan (Woodrow, 2009). It is considered that the increased level of recording is masking a decline and that the number of large populations is significantly less than the total suggests.

The colonies are found in small lakes, fens and cutover bogs. These equate to four Annex I priority habitats whose overall status and future prospects are all rated as Bad (Table 4). Based on this the species is evaluated as VU under criteria A2c and A3c.

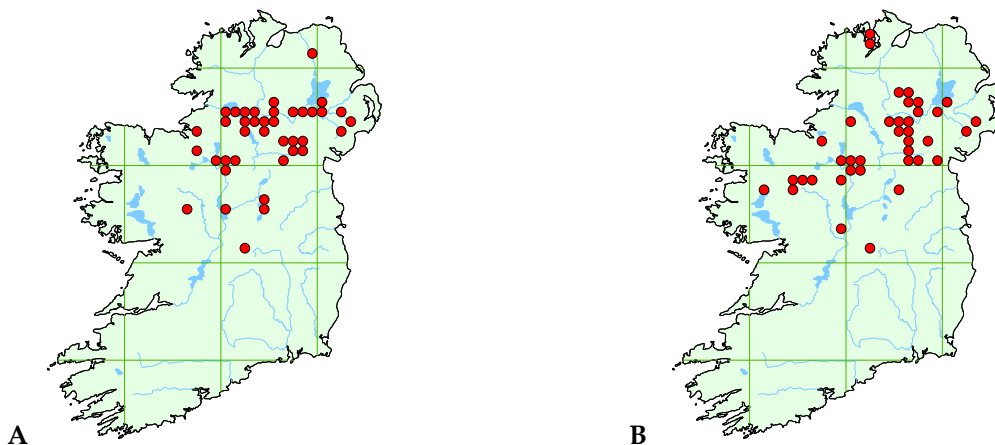


Figure 5: Distribution of Crescent Bluet *Coenagrion lunulatum* pre-2000 (A) and post-2000 (B)

Azure Bluet

IUCN least concern

Coenagrion puella

A common and widespread damselfly found in small lakes and ponds in lowland areas. Often co-occurs with *C. pulchellum* and tends to replace it at enriched sites. There appears to be a declining trend in this species (Table 3), but not at a rate that justifies a threat category.

Variable Bluet

IUCN least concern

Coenagrion pulchellum

Especially associated with fens, cutover bogs and small mesotrophic lakes where it is often the dominant species of damselfly. Currently this is a common and widespread damselfly in the small lakes and fens of northern and western Ireland. The reduction in AOO (Table 3) despite the increase in recording is indicative of decline. It is assessed as least concern as the species is relatively abundant and the rate of decline is below the threshold for one of the threat categories. This is a priority species for monitoring.

Common Bluet

IUCN least concern

Enallagma cyathigerum

This is a widespread and often common damselfly of large open waterbodies throughout Ireland. The species is assessed as least concern.

Common Bluetail

IUCN least concern

Ischnura elegans

Based on the number of occupied hectads and the AOO (Table 3), this is the most widespread odonate species in Ireland. It can be found at most types of lowland ponds and lakes, including the most enriched and brackish sites. It is assessed as least concern.

Small Bluetail

IUCN Vulnerable

Ischnura pumilio

A2c,A3c

The Small Bluetail is the smallest Irish damselfly and associated with early successional wetlands. Conditions suitable for it can be found in natural sites such as spring-fed fens and flushes, the fluctuating margins of lakes, and in artificial situations such as quarries. Typically the habitat will have shallow, unshaded water (often just a few centimetres deep) with a slow flow over a soft substrate and with sparse and low vegetation. These habitat conditions are often ephemeral and whilst they can be created through disturbance such as quarrying, equally they are very easily damaged by management. There is, however, contradictory evidence as to the importance of disturbance in maintaining and creating habitat (Allen & Thompson, 2010; Allen *et al.*, 2010). This uncertainty also extends to the degree of mobility of the species. It is clearly able to colonise new sites, but a mark recapture study at a large population in England showed that the species was essentially sedentary (Allen *et al.*, 2010). This may reflect a

difference in the behaviour of the species on permanent stable sites where movement is not necessary. The Small Bluetail is a southern species and may benefit from the trend of climate warming as appears to have happened in the Netherlands.

The data shows that this is a declining species of odonate with a 25% decline in the number of occupied hectads and AOO (Table 3). This decline has happened in a period of increased coverage and it is considered that the actual decline is more than that measured. The species is assessed as Vulnerable under the criteria A2c and A3c.

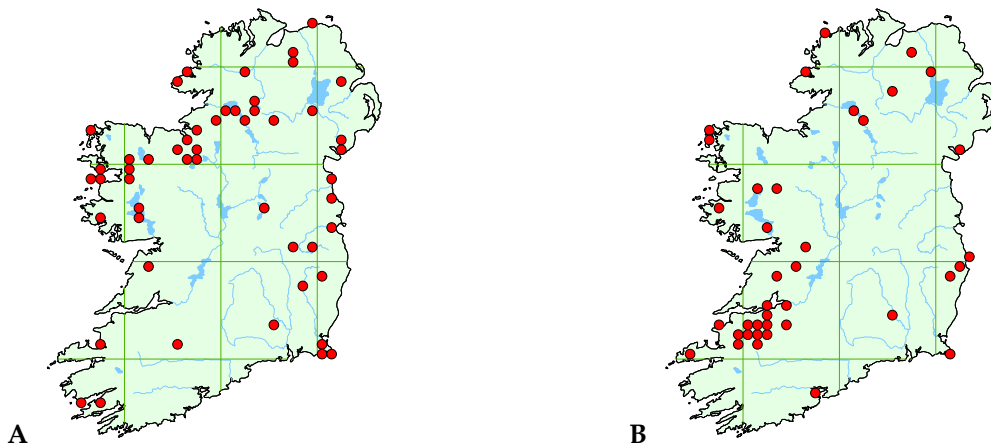


Figure 6: Distribution of Small Bluetail *Ischnura pumilio* pre-2000 (A) and post-2000 (B)

Large Red Damsel

IUCN least concern

Pyrrosoma nymphula

The Large Red Damsel is often the first damselfly to appear in spring. It is typically found in small ponds, ditches and streams and can be found throughout Ireland. The population is not considered threatened.

Dragonflies (Anisoptera)

Brown Hawker

IUCN least concern

Aeshna grandis

This is the characteristic hawker of lowland lakes, especially favouring sheltered sites with some trees. It is widespread and often common in the midlands and northern counties between the Shannon and Lough Neagh. The species appears to have increased.

Moorland Hawker

IUCN least concern

Aeshna juncea

Widespread throughout Ireland. Typically a species of small pools in raised and blanket bogs, it also occurs in suitable small water bodies in fens, dunes and even garden ponds. It can be seen from sea level to over 500m. There is no evidence of any significant change in its range or abundance.

Migrant Hawker

IUCN least concern

Aeshna mixta

First seen in Ireland in 2000 in Co. Wexford and now well-established as far north as Co. Down and on the Shannon Estuary. It is especially common in the south-east and is not threatened. There appears no reason why it should not continue to increase.

Blue Emperor

IUCN least concern

Anax imperator

Like the preceding species this was first noted in Ireland in 2000 in Co. Wexford. By the end of DragonflyIreland the species had been reported from west Cork to Wicklow and was clearly well-established. Further spread has happened since with records as far north as south Armagh and into Limerick and Clare in the west. There have also been records well inland in Kildare, Laois and Monaghan.

Hairy Hawker

IUCN least concern

Brachytron pratense

The earliest of the hawkers to emerge each year. Widespread recorded from the whole of the island but locally distributed away from the Shannon catchment and the lakeland region. Generally seen in small numbers on breeding sites but, judging by the reports of large emergences from coastal sites in Co. Wexford and aggregations of adults in woodland in Co. Clare, the numbers seen on breeding sites do not reflect its true abundance. There is no evidence of any significant change in the abundance and distribution.

Downy Emerald
Cordulia aenea

IUCN Endangered
B2ab(iii)

Currently known from four locations – Killarney National Park, Co. Kerry, Glengarriff, Co. Cork, Roundstone Bog and Lettercraffroe in Connemara, Co. Galway. The Lettercraffroe location has only recently been discovered and is the only one where larvae have been found in Ireland (Drinan *et al.*, 2011). The species occurs here in a series of interconnected nutrient poor (dystrophic) lakes on treeless blanket bog and wet heath which is contrary to the supposed association with broad-leaved woodland. More information is needed on the status of the species at all its locations and especially the ‘new’ population at Lettercraffroe. Downy Emerald is assessed as Endangered based on the small area of occupancy, the restricted number of locations (Table 3) and the decline in the quality of habitat (Table 4). Whilst there is no evidence of decline of the species itself, the future prospects and overall status of the habitats occupied in Ireland (natural dystrophic lakes, wet heath and active blanket bog) are all bad (Table 4).

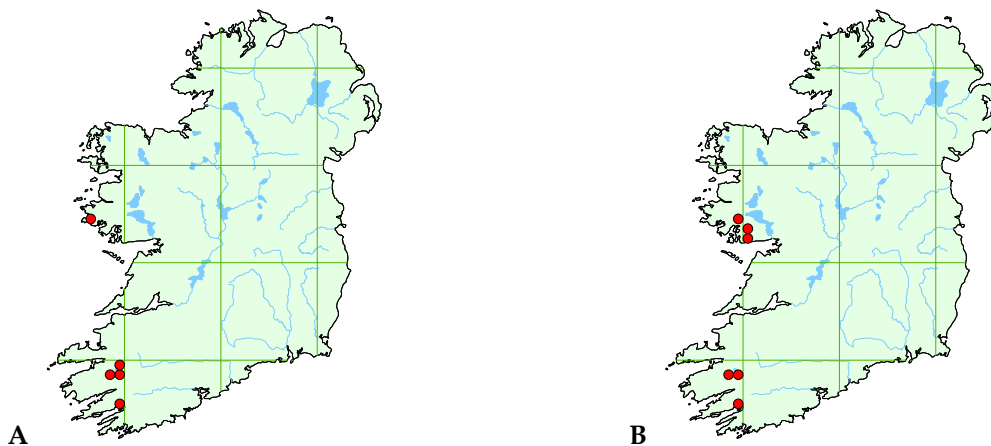


Figure 7: Distribution of Downy Emerald *Cordulia aenea* pre-2000 (A) and post-2000 (B)

Northern Emerald
Somatochlora arctica

IUCN Endangered
B2ab(iii)

This the rarest Irish odonate, recorded from 3 hectads (Table 3). The species occurs in relatively low numbers and the total Irish population might be below 1,000 adults annually. A proper estimate of the numbers present is, however, currently not available. The recorded distribution is restricted to two small areas in Killarney National Park, one on the southern shore of the Upper Lake and along the Galway’s River valley and the second at Dinish between Muckoss and the Upper Lake. All the sites are within the single management unit of Killarney National Park which is defined as a single location. Adults have been seen flying over areas of wet heath with small, *Sphagnum*-filled hollows and in glades within native broad-leaved woodland. The only confirmed breeding site is in the lower part of the Galway’s River valley in a small area of gently sloping heath and poor fen with shallow pools and flushes. The range of the species does not appear to have changed but the paucity of records and lack of information on breeding sites hampers an accurate assessment. The indicated loss of the species from V97 since 2000 only

reflects that the boundary between V97 and the adjacent square V98 crosses the Galway's River valley. There is a very small area of habitat in V97 and this is contiguous with the main habitat area in V98. The species is assessed as EN based on the criteria of restricted range and the past and future decline in the quality of habitat. The current status and future prospects for wet heath in Ireland are considered bad (Table 4). An additional conservation issue is Common Rhododendron *Rhododendron ponticum* which is an invasive alien plant of the woodland and adjacent areas of habitat in many parts of Killarney National Park (NPWS, 2005). Common Rhododendron is present in the Galway's River valley and does pose a threat to the breeding site. This requires monitoring and sensitive management to prevent damage to the habitat of this species.

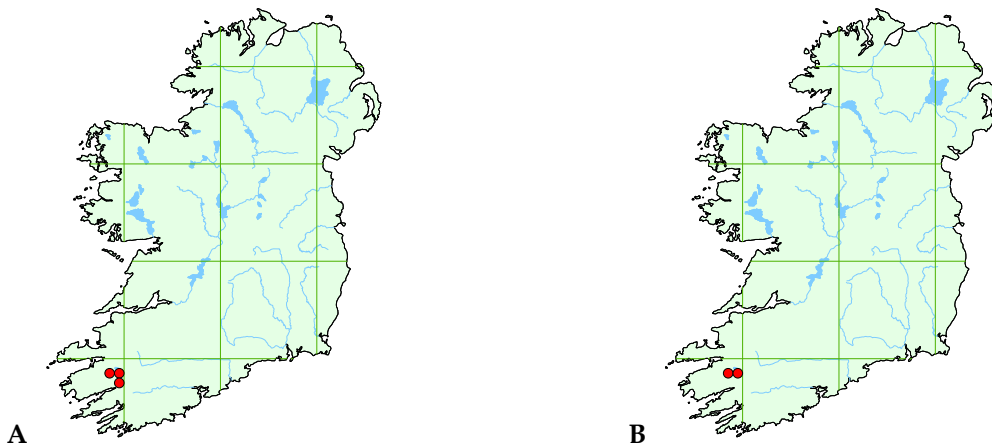


Figure 8: Distribution of Northern Emerald *Somatochlora arctica* pre-2000 (A) and post-2000 (B)

Four-spotted Chaser

IUCN least concern

Libellula quadrimaculata

This widespread and often common species can be seen at many types of lakes and ponds in bogs and fens. There is no evidence of any significant change in either the overall population or its distribution.

Black-tailed Skimmer

IUCN least concern

Orthetrum cancellatum

The Black-tailed Skimmer is a common inhabitant of the shallow edges of base-rich lakes in the west of Ireland. A spread into eastern counties has been evident in recent decades, the species apparently benefitting from the creation of artificial water bodies by mineral, peat and gravel extraction. It is still absent from Northern Ireland and the south west. It is assessed as least concern.

Keeled Skimmer

IUCN least concern

Orthetrum coerulescens

A genuinely local species of dragonfly, mainly found in the south west and in western Galway and Mayo. There are scattered records from most upland areas of Ireland and across the central plain. It inhabits shallow runnels, flushes and drains in heaths and bogs especially on the margins and lower slopes of upland areas. Many of the sites are small and they can easily be damaged or destroyed. However the species is assessed as least concern in the absence of evidence of significant decline.

Black Darter

IUCN least concern

Sympetrum danae

This is the typical darter of lowland raised bogs, heaths and low level blanket bogs. It is present throughout Ireland except for the south-east. Its population has probably been affected by the large scale loss of its main habitat although this will have been offset to some extent by the creation of pools by handcutting. There is no quantified evidence of decline across the whole island to justify a threat category (Table 3), but the map in Nelson & Thompson (2004) does suggest a decline in parts of Northern Ireland. This is a species which needs increased surveillance.

Ruddy Darter

IUCN least concern

Sympetrum sanguineum

This darter is found in fens, small lakes, turloughs and similar ephemeral wetlands. There is no evidence of any significant change in its distribution.

Common Darter

IUCN least concern

Sympetrum striolatum

This is the most widespread Irish dragonfly (Table 3). It is an adaptable species that will quickly colonise new sites but is also found in large populations in shallow lakes in western coastal sites. There is no evidence of any change in its abundance or distribution. The form *nigrescens* is now confirmed as simply a dark western variant of this species (Parkes *et al.*, 2009).

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APPENDIX 1: SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN A THREATENED CATEGORY; CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE (IUCN, 2010).

| Use any of the criteria A–E | Critically Endangered | Endangered | Vulnerable |
|---|--|---|---|
| A. Population reduction | | | |
| | Declines measured over the longer of 10 years or 3 generations | | |
| A1 | ≥ 90% | ≥ 70% | ≥ 50% |
| A2, A3 & A4 | ≥ 80% | ≥ 50% | ≥ 30% |
| A1. Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased, based on and specifying any of the following: | | | |
| (a) direct observation | | | |
| (b) an index of abundance appropriate to the taxon | | | |
| (c) a decline in area of occupancy (AOO), extent of occurrence (EEO) and/or habitat quality | | | |
| (d) actual or potential levels of exploitation | | | |
| (e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites. | | | |
| A2. Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible, based on (a) to (e) under A1. | | | |
| A3. Population reduction projected or suspected to be met in the future (up to a maximum of 100 years) based on (b) to (e) under A1. | | | |
| A4. An observed, estimated, inferred, projected or suspected population reduction (up to a maximum of 100 years) where the time period must include both the past and the future, and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible, based on (a) to (e) under A1. | | | |
| B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy) | | | |
| B1. Extent of occurrence (EEO) | < 100 km ² | < 5,000 km ² | < 20,000 km ² |
| B2. Area of occupancy (AOO) | < 10 km ² | < 500 km ² | < 2,000 km ² |
| AND at least 2 of the following: | | | |
| (a) Severely fragmented, OR Number of locations | = 1 | ≤ 5 | ≤ 10 |
| (b) Continuing decline in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals. | | | |
| (c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals. | | | |
| C. Small population size and decline | | | |
| Number of mature individuals | < 250 | < 2,500 | < 10,000 |
| AND either C1 or C2: | | | |
| C1. An estimated continuing decline of at least: | 25% in 3 years or 1 generation | 20% in 5 years or 2 generations | 10% in 10 years or 3 generations |
| | (up to a max. of 100 years in future) | | |
| C2. A continuing decline | | | |
| AND (a) and/or (b): | | | |
| (a i) Number of mature individuals in each subpopulation: | < 50 | < 250 | < 1,000 |
| or | | | |
| (a ii) % individuals in one subpopulation = | 90–100% | 95–100% | 100% |
| (b) Extreme fluctuations in the number of mature individuals. | | | |
| D. Very small or restricted population | | | |
| Either: | | | |
| Number of mature individuals | < 50 | < 250 | D1. < 1,000 AND/OR |
| VU D2. Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time. | | | D2. typically: AOO<20 km ² or number of locations ≤ 5 |
| E. Quantitative Analysis | | | |
| Indicating the probability of extinction in the wild to be: | ≥ 50% in 10 years or 3 generations (100 years max.) | ≥ 20% in 20 years or 5 generations (100 years max.) | ≥ 10% in 100 years |

APPENDIX 2: CHECKLIST OF IRISH ODONATA.

The nomenclature follows Dijkstra & Lewington (2006). The alternative common names given are those used in Nelson & Thompson (2006) and Brooks & Lewington (2002). Where same appears this denotes the name used in one or both of these books is the same as in Dijkstra & Lewington (2006); The Assessments columns refer to IRL – Ireland this assessment, GB – Red list status for Great Britain (Daguet *et al.* 2008) and EU – Red List status for Europe (Kalkman *et al.* 2010). EN – Endangered; VU – Vulnerable, NT – Near Threatened, lc – least concern, na – not applicable; ne – not evaluated.

| Species | Common Name | Alternative common names Nelson & Thompson (2006)/Brooks & Lewington (2002) | Assessments | | |
|--|----------------------|--|----------------|----|----|
| | | | IRL | GB | EU |
| ZYGOPTERA (DAMSELFLIES) | | | | | |
| Family Calopterygidae | | | | | |
| <i>Calopteryx splendens</i> (Harris, 1782) | Banded Demoiselle | Banded Jewelwing/same | lc | lc | lc |
| <i>Calopteryx virgo</i> (Linnaeus, 1758) | Beautiful Demoiselle | Beautiful Jewelwing/same | lc | lc | lc |
| Family Lestidae | | | | | |
| <i>Lestes dryas</i> Kirby, 1890 | Robust Spreadwing | Turlough Spreadwing/Scarce Emerald D'lfly | NT [B2ab(iii)] | NT | lc |
| <i>Lestes sponsa</i> (Hansemann, 1823) | Common Spreadwing | same/Emerald Damselfly | lc | lc | lc |
| Family Coenagrionidae | | | | | |
| <i>Coenagrion lunulatum</i> (Charpentier, 1840) | Crescent Bluet | Irish Bluet/Irish Damselfly | VU [A2c,A3c] | | lc |
| <i>Coenagrion puella</i> (Linnaeus, 1758) | Azure Bluet | same/Azure Damselfly | lc | lc | lc |
| <i>Coenagrion pulchellum</i> (Vander Linden, 1825) | Variable Bluet | same/Variable Damselfly | lc | lc | lc |
| <i>Enallagma cyathigerum</i> (Charpentier, 1840) | Common Bluet | Common Blue Damselfly | lc | lc | lc |
| <i>Ischnura elegans</i> (Vander Linden, 1820) | Common Bluetail | Common Bluetip/ Blue-tailed Damselfly | lc | lc | lc |
| <i>Ischnura pumilio</i> (Charpentier, 1825) | Small Bluetail | Small Bluetip/Scarce Blue-tailed Damselfly | VU [A2c,A3c] | NT | lc |
| <i>Pyrrosoma nymphula</i> (Sulzer, 1776) | Large Red Damsel | Spring Redtail/Large Red Damselfly | lc | lc | lc |
| ANISOPTERA (DRAGONFLIES) | | | | | |
| Family Aeshnidae | | | | | |
| <i>Aeshna cyanea</i> (Linnaeus, 1758) | Blue Hawker | Southern Hawker | na | lc | lc |
| <i>Aeshna grandis</i> (Linnaeus, 1758) | Brown Hawker | Amber-winged Hawker/same | lc | lc | lc |
| <i>Aeshna juncea</i> (Linnaeus, 1758) | Moorland Hawker | same/Common Hawker | lc | lc | lc |

| Species | Common Name | Alternative common names Nelson & Thompson (2006)/Brooks & Lewington (2002) | Assessments | | |
|---|----------------------|--|----------------|----|----|
| | | | IRL | GB | EU |
| <i>Aeshna mixta</i> Latreille, 1805 | Migrant Hawker | Autumn Hawker/same | lc | lc | lc |
| <i>Anax ephippiger</i> (Burmeister, 1839) | Vagrant Emperor | same/same | na | na | lc |
| <i>Anax imperator</i> Leach, 1815 | Blue Emperor | same/Emperor Dragonfly | lc | lc | lc |
| <i>Anax parthenope</i> (Selys, 1839) | Lesser Emperor | Yellow-ringed Emperor/same | na | ne | lc |
| <i>Brachytron pratense</i> (Müller, 1764) | Hairy Hawker | Spring Hawker/Hairy Dragonfly | lc | lc | lc |
| Family Gomphidae | | | | | |
| <i>Gomphus vulgatissimus</i> (Linnaeus, 1758) | Common Clubtail | River Clubtail/Club-tailed Dragonfly | na | NT | lc |
| Family Cordulegastridae | | | | | |
| <i>Cordulegaster boltonii</i> (Donovan, 1807) | Common Goldenring | Golden-ringed Spiketail/Golden-ringed Dragonfly | na | lc | lc |
| Family Corduliidae | | | | | |
| <i>Cordulia aenea</i> (Linnaeus, 1758) | Downy Emerald | same/same | EN [B2ab(iii)] | NT | lc |
| <i>Somatochlora arctica</i> (Zetterstedt, 1840) | Northern Emerald | Moorland Emerald/same | EN [B2ab(iii)] | NT | lc |
| Family Libellulidae | | | | | |
| <i>Libellula depressa</i> Linnaeus, 1758 | Broad-bodied Chaser | same/same | na | lc | lc |
| <i>Libellula fulva</i> Müller, 1764 | Blue Chaser | Scarce Chaser/Scarce Chaser | na | NT | lc |
| <i>Libellula quadrimaculata</i> Linnaeus, 1758 | Four-spotted Chaser | same/same | lc | lc | lc |
| <i>Orthetrum cancellatum</i> (Linnaeus, 1758) | Black-tailed Skimmer | same/same | lc | lc | lc |
| <i>Orthetrum coerulescens</i> (Fabricius, 1798) | Keeled Skimmer | Heathland Skimmer/same | lc | lc | lc |
| <i>Sympetrum danae</i> (Sulzer, 1776) | Black Darter | same/same | lc | lc | lc |
| <i>Sympetrum flaveolum</i> (Linnaeus, 1758) | Yellow-winged Darter | same/same | na | lc | lc |
| <i>Sympetrum fonscolombii</i> (Selys, 1840) | Red-veined Darter | same/same | na | lc | lc |
| <i>Sympetrum sanguineum</i> (Müller, 1764) | Ruddy Darter | same/same | lc | lc | lc |
| <i>Sympetrum striolatum</i> (Charpentier, 1840) | Common Darter | same/same | lc | lc | lc |