

Environment & Heritage Service

NORTHERN IRELAND SPECIES ACTION PLAN ARCTIC CHAR

April 2008

Northern Ireland Species Action Plan
Arctic Char *Salvelinus alpinus*
April 2008

1 Current Status

- 1.1** The Arctic char *Salvelinus alpinus* belongs to the family Salmonidae and is closely related to trout *Salmon trutta* and salmon *Salmo salar*. It is similar in appearance to the brown trout and also has a similar ecology. Arctic char are the most northerly-distributed freshwater fish in the world and are likely to have been the first freshwater fish to re-colonise our rivers and lakes at the end of the last Ice Age, over 13,000 years ago (Igoe & Hammar, 2004).
- 1.2** The species has a circumpolar distribution and occurs in Ireland at the southern limit of its geographic range where it is generally confined to deep mountain lakes in which the water temperature remains cool enough for its survival. The Arctic char is highly sensitive to environmental change and is vulnerable to eutrophication, acidification, climate change and competition from introduced species.
- 1.3** Populations of Arctic char in Ireland appear to have remained genetically isolated in their respective lakes since the end of the Ice Age, and genetic studies have indicated that separate Irish populations are derived from a common ancestor (Ferguson, 1981). Igoe & Hammar (2004) have highlighted the significance of Irish char from genetic, ecological and evolutionary perspectives, and have emphasised the importance of the species in terms of its national and international scientific and heritage interest.
- 1.4** Throughout Ireland approximately one third of over 70 known Arctic char populations are now believed to be extinct (Igoe *et al.*, 2003). In Northern Ireland the Arctic char is long extinct from Lough Neagh and Lough Erne (Went, 1945), with Lough Melvin holding the only remaining significant population.
- 1.5** Surveys of Lough Melvin in 1986 and 2001 by the Central Fisheries Board suggested low numbers of Arctic char in relation to trout, but little change in abundance during that period (Delanty & O’Grady, 2002). The most recent survey in 2005, as part of the North South Shared Aquatic Resource (NS SHARE) Fish in Lakes Project, indicated a similar ratio of abundance between trout and Arctic char (F Kelly, Central Fisheries Board (CFB), pers. comm.). It would appear that the Melvin stock has been at a low level for some time but, with such low numbers, it is difficult to comment on whether or not the species may be in decline.
- 1.6** The NS SHARE Fish in Lakes Project has recently revealed a previously unknown population of Arctic char in Lough Formal, a small upland lough in Co. Fermanagh (Girvan *et al.*, 2006). It is possible that additional isolated populations of Arctic char may be present in similar waters.
- 1.7** The Arctic char is listed in the Irish Red Data Book as Vulnerable (Whilde, 1993), but it is not protected under the *Wildlife (Northern Ireland) Order 1985* and is not listed in Annex II of the *Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora* (the ‘Habitats Directive’).

- 1.7 Arctic char is now listed as a UK Priority Species, following the recent UK review (Biodiversity Reporting and Information Group (BRIG), 2007).
- 1.8 It is not possible to state that the Arctic char is in decline in Northern Ireland waters due to inadequate data on individual stocks. However the species is very sensitive to environmental change and is therefore vulnerable to a number of factors.

2 Current Factors Causing Loss or Decline

- 2.1 Introduced species can exert pressure on Arctic char stocks through competition and predation. Igoe & Hammar (2004) examined fish species data from Irish lakes with surviving Arctic char populations and demonstrated that the risk of extinction increases with each subsequent addition of a non-indigenous species.
- 2.2 The introduction of roach *Rutilus rutilus* to large Irish lakes has been well documented (Fitzmaurice, 1984; O'Grady *et al.*, 1996; Rosell, 1994), and recent extinctions of Arctic char in two large Irish lakes have been attributed to a combination of roach expansion and organic enrichment (Igoe *et al.*, 2001). Roach are likely to compete with Arctic char for zooplankton, a major feature in the diet of both species. Roach and rudd *Scardinius erythrophthalmus* are both present in Lough Melvin as introduced species, rudd having been noted by Ferguson (1986) prior to the appearance of roach which are very much less abundant (Delanty & O'Grady, 2002). Increasing enrichment of the lough could create more favourable conditions for roach leading to increased competition for zooplankton.
- 2.3 The excessive input of nutrients, especially compounds of phosphorus and/or nitrogen has resulted in eutrophication of many lakes throughout Ireland including Lough Neagh and Lough Erne. Arctic char are particularly sensitive to changes brought about by enrichment and it is probable that eutrophication has contributed to the extinction of the species in many Irish lakes (Igoe *et al.*, 2003). The impact of eutrophication on the Arctic char of Lake Windermere was recorded by Mills *et al.*, (1990), while a subsequent upgrade in sewage treatment reduced nutrient enrichment and resulted in a recovery of the Arctic char population (Elliott & Reynolds, 1996).
- 2.4 Lough Melvin, host to the only significant population of Arctic char in Northern Ireland, is currently showing signs of nutrient enrichment. Girvan & Foy (2005) have recorded an increase in total phosphorus (TP) levels since the 1990s, now approaching eutrophic concentrations. The increase in TP has resulted from higher TP inputs from inflowing streams and this is linked to forestry activity and the initiation of clear-felling of conifers in the catchment during 1999.
- 2.5 Most forestry development has taken place in upland areas in poor quality soils which tend to be unproductive for standard forms of agriculture. However these areas contain a network of small streams which may feed into lakes which contain populations of Arctic char. Forestry operations can have complex effects on freshwater ecology in a number of ways but the impact can be particularly severe in the case of clear-felling.
- 2.6 Clear-felling can result in increased run-off of suspended solids from changes in flow regime, increased solar penetration leading to higher temperatures, and nitrification

resulting in increased primary production and eutrophication (Jeffries & Mills, 1990). Clear-felling of conifers growing on peat soils in Ireland has been shown to be followed by increased phosphorous and dissolved organic carbon in run-off (Cummins & Farrell, 2001 a and b). There is a real danger that the newly-discovered population of Arctic char in Lough Formal could be endangered through imminent application of this practice in the area (R. Rosell, Department of Agriculture and Rural Development (DARD), pers. comm.).

- 2.7** The zebra mussel *Dreissena polymorpha* was accidentally introduced into the Shannon system circa 1993/4 and has spread rapidly throughout the navigable reaches of the Shannon/Erne waterways (McCarthy & Fitzgerald, 1997, Rosell *et al.*, 2003). In Lough Erne the zebra mussel has altered nutrient cycling, increased water clarity and reduced the abundance of phytoplankton and is now affecting fish populations. Zebra mussels colonise hard surfaces including rock/gravel areas, and could therefore have potential impacts on the spawning grounds of fish species. The zebra mussel has recently been detected in Lough Neagh (R. Davidson, Environment and Heritage Service (EHS), pers. comm.), but has so far has not been recorded from Lough Melvin. The Arctic char, which spawns in shallow gravel areas, would be vulnerable to an invasion by zebra mussel.
- 2.8** Climate change has become a major issue with global warming resulting from the emission of greenhouse gases. In Northern Ireland long term seasonal warming of 0.77°C since the mid-nineteenth century has been demonstrated by Jones & Lister (2004). As these changes impact on the aquatic environment conditions may become less favourable for salmonid species resulting in a shift towards cyprinid and percid species in fish communities (Lehtonen, 1996). Arctic char exist in Ireland at the southern limits of their geographic and climatic range and are the most temperature-sensitive of the salmonids (Baroudy & Elliott, 1996). Any significant rise in temperature could therefore have potentially serious implications for the survival of the species.

3 Current Action

- 3.1** In 2000, the Northern Ireland Biodiversity Group (NIBG) produced its recommendations to Government (NIBG, 2000). These recommendations were accepted by the Northern Ireland Executive in 2002, with the publication of the *Northern Ireland Biodiversity Strategy* (DOE, 2002). As part of this process, a revised list of priority species was published in March 2004. This list includes Arctic char.
- 3.2** Also as part of the *Northern Ireland Biodiversity Strategy*, a list of Northern Ireland priority habitats was identified and includes mesotrophic lakes for which a Northern Ireland habitat action plan has been published. This plan, which will cover lakes such as Lough Melvin, sets specific objectives aiming to maintain, or where appropriate restore, favourable water quality and wildlife conditions for the habitat throughout Northern Ireland.
- 3.3** Lough Melvin was designated as an Area of Special Scientific Interest (ASSI) in 1997 with the Arctic char included as a selection feature of the ASSI. EHS are therefore required to carry out monitoring to ensure the population remains in favourable condition.

- 3.4** In co-operation with the Republic of Ireland Lough Melvin has also been designated as a Special Area of Conservation (SAC) under the EC Habitats Directive (92/43/EEC). The selection features for the SAC include *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea*.
- 3.5** The Department of Culture, Arts and Leisure (DCAL) has overall policy responsibility for the supervision and protection of inland fisheries, and for the establishment and development of fisheries. Under existing legislation the Fisheries Conservancy Board is the enforcement and licensing agency responsible for conservation and protection of inland fisheries, other than those in the Foyle and Carlingford areas which are the responsibility of the Foyle, Carlingford and Irish Lights Commission (FCILC). The FCILC is a cross-border implementation body with responsibility for the conservation, protection, management and development of inland fisheries in the Foyle and Carlingford areas.
- 3.6** Water quality is a key environmental factor in the maintenance of Arctic char populations in standing waters. Under the *Water Act (Northern Ireland) 1972*, EHS has responsibility for protection of the aquatic environment and monitors the water quality of surface waters throughout Northern Ireland.
- 3.7** The EC Directive 2000/60/EC, *Establishing a Framework for Community Action in the Field of Water Policy* or the Water Framework Directive (WFD), was transposed into Northern Ireland law by the *Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003*. This legislation sets a new framework for the management, protection and improvement in the quality of water resources across the European Union and will be the key driver for water pollution policy in the future. The overall requirement of the WFD is to achieve 'Good Ecological Status' in all natural surface waters and groundwater by 2015.
- 3.8** Implementation of the WFD is to be achieved through river basin management planning which requires the preparation, implementation and review of a River Basin Management Plan (RBMP) every six years for each River Basin District (RBD). Four RBDs have been delineated in Northern Ireland, three of which are International River Basin Districts (IRBDs) and will require co-operation with the Republic of Ireland. The North Western IRBD includes Lough Melvin which hosts the only significant stock of Arctic char in Northern Ireland.
- 3.9** Areas of woodland either managed or grant-aided by Forest Service must comply with the UK Forestry Standard (Forestry Commission & Department of Agriculture for Northern Ireland, 1998). Field practices must also adhere to recommendations described in Forest and Water guidelines, which is considered a pre-requisite of sustainable forestry in water catchment areas (Forestry Commission, 2003).
- 3.10** In 2003, the Department of the Environment (DOE) extended the designation of waters under the *European Communities Directive 78/659/EEC on the quality of fresh waters needing protection or improvement in order to support fish life* (the Freshwater Fish Directive). A total of 17 reservoirs and lakes received designations including Lough Melvin which became designated as 'salmonid'. Under the Freshwater Fish Directive designated waters are required to comply with defined chemical quality standards.

- 3.11** Current participation by farmers in agri-environment schemes, such as Environmentally Sensitive Areas (ESAs), in the Lough Melvin catchment has the potential to reduce nutrient inputs and will thereby contribute to the maintenance of satisfactory trophic status of the lough. Similar uptake of the Rural Environment Protection Scheme (REPS) in the Republic should also have a positive impact on the lough.
- 3.12** Regional Planning and Transportation division within DRD is responsible for the implementation of the *Regional Development Strategy (RDS) for Northern Ireland 2025*, which provides an overarching framework for competitive and sustainable development in Northern Ireland (DRD 2001). Operational policies to give effect to the Strategic Planning Guidelines of the RDS are contained in Planning Policy Statements (PPSs).
- 3.13** Planning Service assesses the impact of development proposals on wildlife using policies in *Planning and Policy Statement 2 – Planning and Nature Conservation* (currently under review). EHS is a statutory consultee to Planning Service and provides advice on site specific impacts both within designated sites and in the wider countryside, when requested to do so. Impacts of development proposals are assessed and the proposals amended or mitigated to ensure continued sustainable development in the countryside.
- 3.14** Site protection policies are included in Development Plans. These include the identification of Sites of Local Nature Conservation Importance (SLNCIs). Planning Service is currently considering which SLNCIs will be formally identified in Development Plans. Where such sites are confirmed in adopted plans, specific planning policies will be applied to development proposals on those sites.
- 3.15** The development of Local Biodiversity Action Plans (LBAPs) based on District Council areas and/or discrete landscape areas, and the appointment of Local Biodiversity Officers will help to build on the SLNCI network and encourage, co-ordinate and inform local biodiversity action.
- 3.16** In 2003 and 2004, DCAL attempted to capture mature char from Lough Melvin to produce juvenile stock for translocation to other waters as an angling development initiative.
- 3.17** The Irish Char Conservation Group (ICCG) was set up in 2000 to create a public profile for the species in Ireland. ICCG has surveyed 41 Irish loughs to international standards and documented five previously undiscovered populations and a number of extinctions. ICCG has also initiated studies on feeding ecology and trophic position (using stable isotopes), spawning habit and spawning bed characteristics, bathymetric surveys of Arctic char loughs and other biological parameters (fecundity, morphometrics etc.).
- 3.18** The ICCG is linked to the International Society of Arctic Char Fanatics (ISACF) and has established international collaborations in Canada, USA, Scotland, Northern Ireland and Sweden. ICCG is currently involved with Queens University on genetic investigations of Arctic char stocks from Irish waters including Lough Melvin. Preliminary results suggest that each population may be unique to its respective lake.

4 Action Plan Targets

- 4.1 Maintain existing Arctic char population in extant sites (Lough Melvin and Lough Formal)
- 4.2 Establish a self-sustaining 'back-up' population of Arctic char by 2012.

5 Proposed Actions with Lead Agencies

5.1 Policy and legislation

- 5.1.1 Ensure that River Basin Management Plans developed under the requirements of the Water Framework Directive fully address the requirements of Arctic char.
(ACTION: EHS, DCAL, DARD)
- 5.1.2 Consider newly identified populations e.g. Lough Formal, for ASSI designation.
(ACTION: EHS)
- 5.1.3 Seek to achieve and enforce an appropriate level of fishery protection in waters occupied by the species.
(ACTION: DCAL, FCB, Loughs Agency.)

5.2 Site safeguard and management

- 5.2.1 Maintain mesotrophic status of Lough Melvin and Lough Formal.
(ACTION: EHS, DARD, Forest Service, DCAL)
- 5.2.2 Prevent introduction of non-native or predatory fish to waters containing Arctic char.
(ACTION: DCAL, DARD)
- 5.2.3 Protect Arctic char spawning areas from gravel removal and silt deposition.
(ACTION: EHS, DARD, DCAL, FCB, Loughs Agency)
- 5.2.4 Consider adjusting the scale and timing of forestry operations to minimise the risk of acidification in poorly buffered Arctic char lakes.
(ACTION: Forest Service, EHS)
- 5.2.5 Ensure that the sensitivity of lake catchment areas, particularly those hosting Arctic char populations, is taken into account when planning harvesting operations.
(ACTION: Forest Service, EHS)
- 5.2.6 Consider avoiding re-planting of forestry after harvesting in catchments of small lakes containing Arctic char.
(ACTION: Forest Service)
- 5.2.7 Avoid water abstraction schemes from Arctic char lakes and consider remediation measures where existing schemes affect spawning areas.
(ACTION: Water Service, EHS, DCAL)

5.2.8 Continue cross-departmental and cross-border action to prevent the spread of zebra mussel to Lough Melvin.
(ACTION: EHS, DARD, DCAL)

5.2.9 Ensure non-native farmed Arctic char do not have access to waters containing native Arctic char populations.
(ACTION: DCAL, DARD, EHS).

5.3 Species management and protection

5.3.1 By 2008, establish a hatchery programme utilising Lough Melvin spawning stock for juvenile fish production.
(ACTION: EHS, DCAL)

5.4 Advisory

5.4.1 Pass information gathered during survey and monitoring to the Joint Nature Conservation Committee (JNCC) for incorporation in a national database and contribution to the maintenance of an up-to-date Red List.
(ACTION: EHS)

5.4.2 Ensure that information on Arctic char and its distribution in Northern Ireland is available to all those who could play a role in its conservation and recovery.
(ACTION: EHS, DCAL)

5.4.3 Support the Irish Char Conservation Group in collection and distribution of information on Arctic char, and promotion of conservation measures.
(ACTION: EHS, DARD, DCAL)

5.5 International

5.5.1 Further develop links with the Republic of Ireland to coordinate survey and monitoring of Lough Melvin which is divided by the border.
(ACTION: EHS, DARD, DCAL)

5.5.2 Develop an all-Ireland Arctic char action plan.
(ACTION: EHS)

5.5.3 Further develop links with other European and international organisations to promote exchange of information and to highlight the importance of Arctic char in terms of its genetic, ecological and evolutionary significance.
(ACTION: EHS)

5.6 Future research and monitoring

5.6.1 By 2009, survey all potential Arctic char waters to establish presence and status of existing stocks.
(ACTION: EHS, DCAL)

- 5.6.2 By 2009, survey Lough Melvin to identify Arctic char spawning areas and to provide quantitative assessment of indigenous stock.
(ACTION: EHS, DCAL)
- 5.6.3 By 2008, initiate regular monitoring of Arctic char stocks and ecological conditions in Lough Melvin and other Arctic char waters identified through survey.
(ACTION: EHS, DCAL)
- 5.6.4 By 2009, identify two potential waters for translocation of back-up Lough Melvin stock.
(ACTION: EHS, DCAL)
- 5.6.5 Continue regular monitoring of water quality and trophic status of Lough Melvin.
(ACTION: EHS, DARD)
- 5.6.6 Continue genetic investigations to provide a better understanding of each Arctic char population and their relationship with other Irish and European stocks.
(ACTION: EHS, DCAL)

5.7 Communications and publicity

- 5.7.1 Inform local authorities and statutory agencies of the presence of Arctic char in their areas of responsibility and ensure that they are aware of the potential risks to stocks that could be caused through inappropriate land management or development.
(ACTION: EHS)
- 5.7.2 By 2008, produce information on Arctic char for dissemination to general public and through schools, explaining the significance of the species in terms of its biodiversity and conservation value.
(ACTION: EHS, DCAL, DENI)
- 5.7.3 Encourage managers in Aquariums, Country Parks etc. to actively promote Arctic char highlighting the importance of conserving the species.
(ACTION: EHS)

6 Links with other Action Plans

- 6.1** This plan should be considered in conjunction with the following UK and Northern Ireland Habitat Action Plans:
- Mesotrophic Lakes
- 6.2** This plan should be considered in conjunction with the following UK and Northern Ireland Species Action Plans:
- Brown Trout (UK only)

7 References

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List of Useful Acronyms

ASSI	Area of Special Scientific Interest
BAP	Biodiversity Action Plan
CEDaR	Centre for Environmental Data and Recording
CMB	Countryside Management Branch
CMS	Countryside Management Scheme
DARD	Department of Agricultural and Rural Development
DCAL	Department of Culture, Arts and Leisure
DETI	Department of Enterprise, Trade and Investment
DENI	Department of Education for Northern Ireland
DOE	Department of the Environment
DRD	Department for Regional Development
EHS	Environment and Heritage Service
ESA	Environmentally Sensitive Area
ESCRs	Earth Science Conservation Review Site
FCB	Fisheries Conservancy Board
HAP	Habitat Action Plan
JNCC	Joint Nature Conservation Committee
NMNI	National Museums of Northern Ireland
NESA	New Environmentally Sensitive Area
NIBG	Northern Ireland Biodiversity Action Group
NICS	Northern Ireland Countryside Survey
NNR	National Nature Reserves
NT	National Trust
PPS	Planning Policy Statement
RA	Rivers Agency
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAP	Species Action Plan
SLNCI	Site of Local Nature Conservation Importance
SoCC	Species of Conservation Concern
SPA	Special Protection Area
UWT	Ulster Wildlife Trust
WFD	Water Framework Directive
WWT	Wildfowl and Wetlands Trust



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