



Species Action Plan

‘Arctic Char’



Author – Jonathan Swale

Living Shetland Biodiversity Action Plan
May 2004

Species Action Plan

Arctic Char *Salvelinus alpinus*

Species profile

UK B/D status

Not listed in the UK Biodiversity Action Plan

UK lead partners

Not relevant

Shetland status

Locally rare, Local Priority Species

Relevant HAP's

Freshwater, AgriBAP

Statutory Protection

None specifically related to this species

Current Status

UK status

There are about 200 separate populations of Arctic char in Britain, 175 of them in Scotland

Local Status

The species has only ever been recorded from one site in Shetland – the Loch of Girlsta. Char occur in angling records dating back at least to the 19th century but as they are rarely caught on rod and line this gives no indication of the population size; indeed, in the early 1950s the species was thought to be extinct in Shetland, as none had been caught (or at least reported) for many years. It is difficult to assess the size of the population and impossible to make any judgement about population trends on the basis of current data, but netting by SNH in 1993¹ and again in 2003³ has confirmed that the char are present in good numbers and are still breeding.

Culture and Folklore

“Char” derives from the Gaelic name for the fish which means “red belly” - a reference to its colouration in the breeding season. It is not known to feature in Shetland’s culture or folklore.

Ecology & Management

The Arctic char is a fish of the salmon and trout family, found in the Arctic and north Atlantic regions including Great Britain and Ireland. It has also been successfully introduced in the former Yugoslavia. As it requires cold, well-oxygenated water, water temperatures largely determine its distribution. In northern latitudes it displays two distinct behavioural traits, like brown/sea trout, with some fish remaining in lakes or rivers throughout their lives whilst others migrate to sea, returning to freshwater to spawn. Populations further south, including those in Britain, are confined to the deeper or higher altitude (hence colder) lakes. These non-migratory populations are believed to have been isolated as the climate warmed at the end of the last ice age and have each evolved their own, often quite distinctive, physical characteristics. The Shetland char are distinct in being more slender than other populations.

The biology of char is not well understood. Most populations of Arctic char in Britain spawn between late September and early December in beds of clean gravel, usually in the lakes themselves, although some use streams or rivers. In Shetland, spawning seems to occur in late October and early November. The eggs hatch after about six weeks at 4°C and fish are believed to reach maturity at 3-4 years of age.

Current Factors Causing Loss or Decline

Eutrophication – Nutrient enrichment as a result of agricultural improvement, effluent run-off from housing or farmyards or the use of the loch for aquaculture could cause growth of vegetation or algae on spawning beds or produce algal blooms that would increase water turbidity and might be toxic. Because of its large volume and small catchment, the Loch of Girdsta has a low turnover rate (water residence time is around 2 years), which makes it particularly vulnerable to eutrophication and pollution.

Silting of spawning beds – Fine sediment or peat particles (e.g. due to erosion of the peat banks on the hill to the east) entering the loch, may reduce the circulation of water through the gravels and so deprive the fish eggs of oxygen.

Engineering works/water abstraction – The Loch of Girdsta provides water for the nearby hatchery. The loch has a very small catchment of about 4.6 km² – only five times the area of the loch - and during summer the abstraction rate exceeds the inflow, causing the loch level to fall significantly. During dry summers in the 1990s, the water fell to as much as a metre below natural levels, but since then the mill dam at the loch outflow has been reinstated to increase summer storage capacity and a recycling system has been installed at the hatchery to minimise water consumption. Although the water still fluctuates, it now generally remains above natural levels. Char, which feed on plankton, are less affected by fluctuating water levels than the other salmonids whose food comes largely from the shore and shallows but their breeding would be affected if spawning gravels were exposed during early winter. This might occur if abstraction increased, causing a greater drawdown and delaying refilling of the loch later in the year.

Fishery management – The Loch of Girdsta supports a population of brown trout, which are known to predate char but do not appear to threaten the char population. Management of the trout stocks (e.g. introduction of non-native strains of brown trout) could have implications for the char. Char in Heldale Water, the only site for the species in Orkney, are believed to have been wiped out by trout introduced for angling, although in that case the loch was previously trout free. The char themselves are also occasionally caught by anglers but are not the usual target species and fishing is not considered damaging at present levels. A targeted fishery could threaten the population. Over-fishing is believed to have eradicated the char in St Mary's Loch. Elsewhere in Scotland, the populations of a number of other rare fish have been affected by the introduction of coarse fish such as perch and pike. This appears unlikely in Shetland

Pollution – Char are believed to be particularly sensitive to pollution. Although the catchment of the loch is entirely agricultural land and moorland, the main road north from Lerwick runs close to the loch along its entire length and will contribute a certain amount of pollution, particularly road salt, hydrocarbons and rubber residues. There is also potential for acute pollution in the event of a road accident as there is no barrier to prevent spillages (e.g. petrol, milk) from quickly reaching the loch.

Acid rain – The Loch of Girdsta overlies a band of limestone but its water is nevertheless slightly acidic as most of its catchment is on acidic rocks or peat. The limestone is likely to have some buffering capacity so the loch itself may not be directly at risk of acidification, but acidified inflows can bring in aluminium, which is toxic to fish. Acid rain, exacerbated by afforestation is believed to have wiped out char in at least two lochs in southern Scotland

Gulls – large numbers of gulls used to roost on or near the loch during the winter although this rarely happens now that there are no more Klondykers. This may cause several problems. Gull faeces can contribute to nutrient loading of the loch and may deoxygenate the water, cause silting of spawning beds and increase water turbidity. The 1993 survey of the char in the Loch of Girdsta¹ found that most were carrying a heavy load of gut parasites, which may be a consequence of the gull roosts, the birds being secondary hosts for the parasites.

Genetic "pollution" – Char are farmed commercially (this has been tried in Shetland) and fry are available, however these differ genetically and physically from the Girdsta fish which have presumably been adapted to their environment by natural selection. Introduction of fish from other stocks (e.g. in a misguided attempt to "improve" the Girdsta fish) could alter the physical characteristics of the stock and affect its fitness to the environmental conditions of the loch.

Current Action.

The Loch of Girdsta is designated as a Site of Special Scientific Interest, which gives some degree of protection against, or at least early warning of, changes that might threaten the char population.

In 1999/2000, SNH commissioned an assessment of the suitability of other lochs in Shetland for char with a view to establishing a second population in the Islands to give more security to the local strain.² The lochs

identified as most suitable on the basis of similarity to Girlsta in a number of parameters were, in order: Eela Water; Loch of Clousta; Loch of Watlee; Lunga Water; Clings Water; Punds Water; Loch of Aithness; Hulma Water; Sand Water and Loch of Vaara. The study did not take into consideration other conservation or management interests nor the presence of suitable spawning substrates and these would need to be addressed when selecting sites for any translocation.

Action Plan Objectives, Targets and Actions

Publicise the potential threats to the char, particularly amongst surrounding landowners and crofters and the hatchery by the end of 2004. (SNH/SEPA)

Develop a whole catchment management plan to address drainage, fertiliser use, peatland erosion, road management and housing developments by the end of 2005. (SNH/SEPA/SIC)

Ensure that only trout of local provenance (and preferably from the loch itself) are used in any restocking and take all possible steps to prevent introduction of non-native char and other fish species. Ongoing. (Shetland Anglers' Association/SNH/SSFA)

Encourage anglers to record and release any char caught on the Loch of Girlsta. Ongoing. (SAA)

Following consultation with relevant communities, owners and the Shetland Anglers' Association, establish char from Girlsta in at least one other suitable loch in Shetland, either by transferring adult fish or by releasing captive-hatched fry. Work to begin in 2005 with a view to having at least one population established (i.e. breeding proven) by 2010. (SNH/SAA)

References.

- The Arctic Charr *Salvelinus alpinus* population of Loch Girlsta, Shetland. A report to SNH by Dr Colin E. Adams, Fish Behaviour & Ecology Group, University Field Station, Rowardennan. February 1995
- Species Action Plan for Arctic Charr *Salvelinus alpinus* in Shetland. A report to SNH by Dr Peter S Maitland, Fish Conservation Centre, Haddington. February 2000
- Loch of Girlsta SSSI Site Condition Monitoring 2003. Unpublished report to SNH

This action plan is largely condensed from a detailed report² by Peter Maitland of the Fish Conservation Centre in Haddington

Key Contacts

- **Living Shetland Officer**
Shetland Island's Council
Infrastructure Services, Grantfield, Lerwick
ZE1 0NT
Tel: 01595 690832
Email: livingshetland@fwag.org.uk
- **Scottish Natural Heritage**
Stewart Building
Lerwick
ZE1 0LL
Tel: 01595 693345
Fax: 01595 692565
Email: northern_isles@snh.gov.uk
Website: www.snh.gov.uk
- **Shetland Island's Council (SIC)**
Austin Taylor (Conservation Manager) Shetland Island's Council
Infrastructure Services, Grantfield, Lerwick
Tel: 01595 744833
Fax: 01595 695887
Email: austin.taylor@sic.shetland.gov.uk
- **Scottish Environment Protection Agency (SEPA)**
The Esplanade, Lerwick. ZE1 0LL
Tel: 01595 696926
Fax: 01595 696946
Email: david.okill@sepa.org.uk
Website: <http://www.sepa.org.uk>
- **Shetland Anglers Association**
Club room, 9, Burns Lane,
Lerwick, Shetland
Email: alec@troutfishing.shetland.co.uk
Website: <http://www.troutfishing.shetland.co.uk>

JS, 2004

