4.7 Brown Trout

4.7.1 Current Status

Brown trout (*Salmo trutta*) is a UK BAP priority species and can be found in rivers and lochs throughout the Biosphere. Although brown trout are found widely across the Biosphere, populations have suffered severe declines in the past due to modifications to their freshwater environment, such as the installation of dams and weirs along rivers, reduced water quality and latterly the spread of invasive species such as the American signal crayfish which predate trout. Acidification, through land use and atmospheric deposition, has also had significant impact in some areas, with some lochs such as Loch Enoch suffering complete extinctions. There is however, considerable work being undertaken to improve habitat quality so recent years have seen an increase in numbers and a return of trout to many waterways and lochs.

4.7.2 Ecology and Habitat Requirements

Brown trout is a fish species associated with a variety of habitats, including rivers and streams, large lochs and upland lochans. Trout have two different life cycle patterns; the first, limited to migrating within freshwater environments only and known as brown trout and the second, anadromous form (migrating between freshwater and sea environments), known as sea trout.

In terms of the species' conservation value, the most valuable are populations associated with isolated freshwater systems, which are often genetically unique and can be dated back to post-glacial period.

The life cycle of a brown trout involves a gradual migration of juvenile trout from their nursery areas in small burns down into larger rivers and lochs where they may stay until they reach the adult stage. They require clean well-oxygenated water and different water depths at different development stages and have a preference for flowing water in their pre-adult stages. Riverbeds with the right size of gravels, water flow and habitat for feeding and shelter from predators are crucial in the spawning, egg development and juvenile growing life stages.

Suitable water quality is required for trout to spawn and grow successfully. Acidification is a concern in many Galloway river headwater areas where poorly buffered underlying soils and large scale conifer planting (which can scavenge pollutants) have resulted in low pH levels. Low pH conditions will kill eggs and young life stages of trout.

4.7.3 Concerns

- Acidification of freshwater systems
- Siltation of gravel beds as a result of bank erosion or poor forestry practice
- Artificial barriers to fish migration

- A lack of good draped overhanging riparian vegetation

4.7.4 Conservation Objectives

To continue to improve habitat and water quality throughout the Biosphere, to protect existing populations of brown trout and to enable them to repopulate waterbodies where past extinctions have occurred.

4.7.5 Management

In addition to habitat management measures detailed for oligotrophic lochs and other fresh water habitats in sections 2 and 3, brown trout require specific management actions to safeguard and enhance its population as the species has undergone a significant decline.

The recommended management actions for Brown trout are to:

- Improve water quality by reducing inputs to freshwater systems
- Restructure of surrounding conifer forests to higher ecological standards especially to develop diverse riparian zones
- Where necessary consider exclusion of livestock from water course edges to prevent erosion
- Remove man-made barriers to fish migration
- Stop inappropriate stocking of brown trout which may interbreed with indigenous stock

4.7.6 Example Projects

- Brown trout study of the Galloway and Carrick Lochs (led by Queen's University of Belfast) investigated over the course of two years (2011/2012) the populations of brown trout in 24 lochs and 51 river locations within the Galloway and Carrick area. Using population genetics it investigated how environmental factors impact on colonization, individual movement, population structure, and genetic diversity of trout in the area.

- SEPA monitoring of inorganic chemistry, metals chemistry, invertebrates in freshwater ecology, phytoplankton in freshwater ecology (only lochs), macrophytes in freshwater ecology, loch morphology for freshwater ecology, chironomid pupal exuviae in freshwater ecology (only lochs), algae in freshwater ecology, morphology (RHS) in freshwater ecology, rapid assessment of invertebrates for freshwater ecology.

- Fish populations (as well as other biological and physical and chemical parameters) are being monitored in the Round Loch of Glenhead, Loch Grannoch and Dargall Lane as part of the UK-wide Acid Waters Monitoring Network[30].

[30] http://awmn.defra.gov.uk/sites/index.php

- Galloway Fisheries Trust (GFT) High Cree project involved creation of limestone gravel spawning beds to increase and improve spawning opportunities for salmonids. Effects of liming are monitored by a number of methods, including water quality testing, egg box research, electrofishing and visual surveys (http://www.gallowayfisheriestrust.org/liming-project-high-cree-water-fleet.asp).

- GFT Big Water of Fleet project involved two different liming techniques, hydrological source liming (application of lime powder over areas which are watercourse sources) and limestone sand addition (adding of limestone sand into small watercourses. Sand is then being washed down the watercourse during flood events). Effects of liming treatments are monitored by electrofishing and water quality sampling and are also covered by SEPA's own sampling sites.

- Annual GFT electrofishing surveys to monitor trout populations,

- Programme of habitat enhancement measures across a range of rivers. In 2015, volunteers worked with GFT to cut away conifer tree regrowth, loosen silted spawning beds and plant deciduous trees around the Little Water of Fleet. Previously GFT removed a number of manmade barrier stopping trout from spawning in the inflowing burns around Loch Fleet.

- GFT Genetic sampling is being undertaken by GFT on the rivers Bladnoch, Luce, Dee, Fleet, Cree and Urr and involves collecting samples from a number of sites across the river catchment in order to obtain information on genetic diversity of species within the river catchments. On a less detailed level, genetic sampling is also carried out as part of European programme aiming to collect genetic samples from each river, enabling identification of any caught fish down to the river level.

- GFT Celtic sea trout project focuses on rivers Luce, Cree and Water of Fleet and investigates the factors and mechanisms leading to development of two forms – brown trout and sea trout – of the same species, as it is believed that migration of trout into the sea is associated with condition experienced in the freshwater environment.

- Ayrshire Rivers Trust (ART) Carrick Invasive Species Project (CISP) focuses on sustainable control of invasive non-native species within Carrick area, including the catchments of rivers Stinchar and Doon. Further details given in section 4.6.4.

- ART Electrofishing surveys are carried out in order to monitor the fish stocks in the Ayrshire rivers. The Core monitoring sites are monitored at least once every three years and further monitoring sites include routine monitoring sites and investigative sites.

- Genetic sampling is being undertaken by ART on the Ayrshire rivers in order to obtain information on genetic diversity of species within the river catchments.

4.7.7 Opportunities

- Landscape Partnership bid by D&G Council within Dee catchment to improve water quality e.g. Blackwater of Dee and to support the work of the Galloway Fisheries Trust.
- Forest restructuring to open up stream sides and establish permanent riparian corridors of broadleaved species such as aspen, alder and willow.
- Bog restoration on previously planted deep peat sites could have positive implications for water quality.
- Ongoing improvement to riparian habitat during forest restructuring.

4.7.8 Further Information

Galloway Fisheries Trust http://www.gallowayfisheriestrust.org/

Ayrshire Rivers Trust http://www.ayrshireriverstrust.org/

The River Annan Trust http://www.riverannan.org/

Scottish Natural Heritage Species information: http://www.snh.gov.uk/about-scotlands-nature/species/fish/freshwater-fish/trout/

The Wild Trout Trust: http://www.wildtrout.org/content/trout-facts