



SECTION 3 : BROWN TROUT

INPUT 3.A1: DETERMINING AND DEFINING THE STOCKS OF BROWN TROUT WITHIN THE TWEED SYSTEM AND THEIR LIFE-HISTORIES

Rationale : Just as for Salmon and Sea-trout it is necessary to know how many stocks of the species there are. As Brown-trout are not migratory in the same way, however, they will not divide into different stocks with different run timings, but being sedentary the scope for local differentiation is greater - though the influence of interbreeding with Sea-trout which could have different run-timing stocks on this pattern is at present unknown.

Results from previous editions of the Management Plan :

- a: Genetics research has shown that the trout of the Tweed originate from three different lineages that colonised the catchment after the Ice Age, and that fish from different tributaries can be distinctive Research has also shown that 20% of the trout examined had an Atlantic Salmon gene in them and that there were high rates of first generation trout-salmon hybrids in the samples.*

Policies for the next five years:

Policy 3.A (1) - Continue to investigate Brown-trout stock structure and life-histories in the Tweed and Eye catchments

- (a)** Continue collection of Brown-trout scales and measurements from throughout the Tweed and Eye catchments and analyse these for :-
 - (i) Geographical pattern and age structure*
 - (ii) Relationships to lengths and weights of the sample fish*
 - (iii) Patterns of growth*

- (b)** Continue to micro-tag emigrating trout juveniles at the traps. Later recaptures will show the life histories of these particular populations.



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- (c) Continue to micro-tag trout Parr captured during electric-fishing surveys. Re-captures of those that become Brown-trout will increase the understanding of relationships between locations of juvenile and adult life stages
- (d) Investigate the possibilities of tracking adult Brown-trout from the traps using small acoustic tags. This would:
 - (i) Show where the adults of a particular spawning population go outside the spawning season
 - (ii) Whether Brown-trout from the upper river visit the lower river or the estuary.
- (e) Devise a large scale genetics survey for the Tweed and Eye catchments to find out:
 - (i) How many different stocks of trout there are ?
 - (ii) What areas they occupy ?
 - (iii) Map these areas and determine whether the number of juvenile sampling sites within each is adequate to show trends in their numbers.

INPUT 3.B : INVENTORY THE QUANTITY AND QUALITY OF HABITAT FOR BROWN TROUT

Rationale : Whilst this is largely the same as for Salmon and Sea-trout, there is a difference in that adult Brown-trout do not go to sea and so must find suitable habitat within their river systems. It appears that long-range migrations can be made along main channels though little is known about how far trout generally travel from their spawning burns. Deeper water and good cover is a critical need for these larger, mature fish - the broodstock of the populations - and their lack has been identified as the cause of extinctions - The American Fisheries Society has actually identified loss of overhanging banks due to overgrazing as "*one of the principal factors contributing to the decline of native trout in the West*" (American Fisheries Society 1991). Brown-trout are therefore more severely affected by the loss of deeper water and bankside cover through overshading or overgrazing than Salmon or Sea-trout.

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Results from previous editions : *As for Salmon and Sea-trout, with the addition of*

a : Brown-trout use much smaller burns than Salmon or large Sea-trout but the habitat surveys omitted burns under 2m wide to reduce the amount of work to manageable levels. Most small burns go through one or more road culverts which can be obstacles to spawning trout moving upstream. A map study to list all the road and other culverts in the Tweed and Eye catchments started in 2000 and is the basis for the investigations of culverts planned in this edition.

Policies for the next five year :

Policy 3.B (1): Survey and map Brown-trout spawning and juvenile habitat

- (a) Produce a map of all the culverts and road crossings on smaller burns.
- (b) Collate with previous surveys to produce lists of crossings requiring inspections having first eliminated those of no significance (on very steep burns, above waterfalls etc.)
- (c) Organise Angling Clubs to survey habitat and obstacles in small burns not previously covered. Add any obstacles found to the list above.
 - (i) Set up habitat survey training days for Club members with the Wild Trout Trust.
 - (ii) Analyse survey results with Clubs and the Wild Trout Trust and formulate restoration plans for damaged areas

Policy 3.B (3): Survey, Assess and Monitor adult Brown-trout habitat

- (a) Collect and collate historical evidence for changes in the amount of deeper water in the larger channels and establish the present day, baseline, state.

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- (i) Organise Club members to collect historic photographs & anecdotes on gravel movement and loss of deeper waters.
- (ii) Organise photographic and video surveys of each Club's area of water to show present day distribution of gravel and pools and establish baseline points for monitoring gravel movements.
- (b) Set up a system to monitor gravel movements and amount of deeper water using these baseline surveys

Policy 3.B (2): Inspect the culverts and road crossings for which investigation is thought necessary, as listed according to Policy 3.B(1) and prepare plans for easing, if appropriate

- (a) **Ease obstacles to Brown-trout spawning migration:**
 - (i) Have all culverts and road-crossings listed as a result of previous work inspected according to a standard protocol. ***(Inspections will be made by the RTC Bailiffs)***
 - (ii) Draw up a list of those that appear to require a more detailed investigation or electric-fishing surveys to show whether they are problems or not. These surveys consist of six three-minute samples upstream and downstream of a possible barrier, any differences showing up the effect of the obstacle.
 - (iii) Evaluate those culverts and road crossings shown to be obstacles in terms of the value of the spawning that would be opened up if they were eased and whether easing would result in the spread of introduced species into an area that they had been barred from. *Where remedial works are undertaken, the aim should be to allow access to fish that can jump, such as Trout and Salmon, or can otherwise pass round, such as Eels but not allow access to introduced species and so allow them to spread to hitherto inaccessible areas. Even quite small barriers can prevent the movement of Signal Crayfish or Bullheads upstream.*

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- (iv) Prepare work plans to ease those culverts identified as blocking access to valuable spawning areas and set up a programme to undertake these.
 - (v) Before easing any culverts, undertake “before” electric-fishing so changes upstream after the work can be assessed and monitored
- (b)** Ensure the access problems of the past for Brown-trout do not recur:
- (i) Collect information from the UK and abroad on best practice Road-building in relation to waters and fish populations.
 - (ii) Disseminate this information amongst local land-users and provide practical advice on its implementation.

Policy 3.B (3): Restore areas of damaged spawning and nursery habitat identified through Input 3.B(1)

- (a)** Organise training of Club members in restoration techniques with the Wild Trout Trust
- (b)** Organise restoration of damaged habitat with Club members on the basis of the surveys and restoration plans made under Policy 3.B (1)c
- (c)** **Ensure habitat problems for juvenile Brown-trout do not recur:**
 - (i) Collect information from the UK and abroad on best practice Forestry and Farming in relation to waters and fish populations.
 - (ii) Disseminate this information amongst local land-users and provide practical advice on its implementation.

Policy 3.B (4): Survey and Assess invertebrate food supplies for Trout

- (a)** Collate existing data on invertebrates from SEPA and other sources

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- (b) Organise surveys of each Club's area of water to show present day levels of invertebrates and species distribution and record places and dates of hatches of particular species :
 - (i) Organise Club members to collect historic evidences of insect hatches and timings
 - (ii) Set up training days in invertebrate identification and sampling techniques for Club members

- (c) Set up a system to monitor the invertebrates in each Club's area using this baseline data
 - (i) Train club members in monitoring and recording techniques.

- (d) Monitor the diet of Trout and Grayling as part of this work
 - (i) Organise training in the "spooning" of live fish
 - (ii) Collect stomachs from killed fish for analysis
 - (iii) Analyse diet to show extent of possible competition, between Trout and Grayling for the same food supplies or habitats.
 - (iii) Publish data for anglers' information

INPUT 3.C: MONITOR THE BROWN-TROUT POPULATIONS THROUGHOUT THE TWEED AND EYE CATCHMENTS, ANALYSE THE INFLUENCE OF HABITAT CHARACTERISTICS ON THEM AND ASSESS THE EFFECTS OF PREDATION

Rationale : *As for Salmon*

Results from previous editions : *As for Sea-trout*

Policies for the next five years :

Policy 3.C (1) Monitor the Densities of Trout at Key Sites throughout the Medium-sized Channels of the Catchment

- (a) Continue the electric-fishing of juveniles in medium-size channels - *As for Sea-trout, including the micro-tagging of trout Parr*

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- (b) Analyse results - *As for Sea-trout, but by stock of Brown-trout*
- (c) Trials during the previous Plan showed that it was possible to effectively electric-fish long sections of 3 to 8 (approx) metre wide channels using back-pack gear to sample two year and older Brown-trout. These larger fish are rarely found in the small sections used for the juvenile surveys but this technique can cover enough water and range of habitat to show their abundance. Set up such sections in each sector of the Tweed and in the Eye for sampling as part of the regular rotation and
 - (i) Analyse results in relation to the habitat characteristics of the sections
 - (ii) Analyse variations between sections

INPUT 3.D : COLLECT DATA ON, AND ANALYSE TRENDS IN THE ROD CATCHES OF BROWN TROUT

Rationale : Monitoring the catches and fishing efforts of a sample of anglers is the only way in which a reasonable indication of the state of the trout fishing can be produced. The recording of the amount of effort that produced catches also means that they can be compared over the years. The sizes and ages of the trout being caught are also indicators of the state of stocks. Without a sound and reliable knowledge of the past nature and state of the Brown Trout stocks of the Tweed it is impossible to properly evaluate their present state.

In recent years there has been a perceived decline in the trout fishing, though the lack of systematically kept records means that this has been based on opinion and memory rather than on statistics. Understanding whether or not this perceived decline is due to an actual reduction in the abundance of Brown Trout within the catchment; changes in catch regulations and angling culture or simply a form of nostalgia is of crucial importance - if it is the first of these, then action is required, if the others, it is better catch recording and reporting methods that are needed so anglers can have a better understanding both of the present and the past. As trout catches have not been of commercial

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importance, records such as those available for Salmon do not exist, so historical trends and changes have to be reconstructed from club competition records, angling diaries and published accounts. The present pressures on the stock also need to be known so that clubs can be advised on appropriate catch regulations.

The most basic need of a stock is that enough fish should escape all the pressures on them to spawn and fully seed their nursery areas for the next generation. Pressure on a fish population can be shown by changes in sizes and in age of maturity as well as by numbers, and if good baselines of the sizes and ages of each stock of Brown-trout being caught by anglers can be established, changes in these over the years can be monitored as indicators of pressure on the stocks.

Results from previous editions :

- a: A history of the Brown Trout stocks and fishing has been compiled from published sources (Section 4.3)*
- b: Competition catch records of the Ellem, Selkirk, Kelso and Greenlaw fishing Associations / Clubs have been computerised and analysed (Appendix D3)*
- c: Three angling diaries, covering 1900-1928; 1951-1991 and 1967-1990 have been computerised and analysed (Appendix D3)*
- d: A Trout catch diary recording scheme has been in operation since 1991 in which a sample of anglers record their catches (Section 4.3). This was suspended in 2000 to make way for a national catch recording scheme organised by the SFCC*

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Policies for the next five years :

Policy 3.D (1) - Analyse the history of Brown-trout catches of the different sectors of the Tweed and of the Eye for as far back as possible

- (a) Continue the collection of Tweed Brown Trout records and references in published sources.
- (b) Continue the collection and computerisation of angling club competition records.
- (c) Continue the collection and computerisation of angling diaries.
- (d) Establish any historic trends

This policy and its prescriptions produced the Tweed Trout Report 2000, which now forms the basis of Section 4.3 and Appendix D3 of this Manual

Policy 3.D (2) - Monitor present day Brown-trout catches and their composition

- (a) The Tweed Trout fishing diary scheme was suspended in 2000, when it was proposed that the SFCC produce a National fishing catch diary for all species with a computer programme for analysis of the resulting data. This is now (2005) coming into operation and monitoring of Brown-trout catches will resume. The data will be analysed for:-
 - (i) Geographical patterns in catch rates and size of trout caught
 - (ii) Relationships between fishing methods and conditions and catch rates of different sizes of trout
 - (iii) Trends in catch rates and sizes
- (b) Organise the collection of scales through the logbook programme to give information on:-
 - (i) The ages of the Brown-trout being caught
 - (ii) Differences in growth rates between stocks or geographical areas

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- (c) Organise bankside creel surveys to gather data from anglers: this will cover visiting anglers who are more difficult to include in logbook surveys :-
 - (i) Devise a creel survey form and protocol
 - (ii) Organise club members to undertake surveys.

Policy 3.D (3) : Conduct a survey of Tweed trout anglers, both local and visiting on their fishing aims and preferences and investigate the distribution of angling pressure within the catchments.

- (a) Analyse and report on the Angler Survey findings
- (b) Map the information on places fished collected in the Catch Logbooks to show which parts of the catchment are most heavily fished. Areas of particular concentration may require particular management policies e.g. if it was found that areas near towns were too heavily fished, they could be reserved for under 18's and over 60's as a way of reducing pressure on the trout in those areas or simply be made "Catch & Release".

INPUT 3.E : ESTIMATE THE EXPLOITATION RATE OF BROWN-TROUT

Rationale for this work: As for Salmon and Sea-trout

Results from previous editions:

None - this has not been possible due to lack of a good method for tagging adult Brown-trout that live in rivers. Further attempts will be made to find suitable methods.

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INPUT 3.F: MONITOR ADULT BROWN TROUT POPULATIONS AND ESTABLISH TRENDS IN NUMBERS AND POPULATION CHARACTERISTICS.

Rationale : The most basic need of a stock is that enough fish should escape all the pressures on them to spawn and fully seed their nursery areas for the next generation. Pressure on a fish population can be shown by changes in sizes and in age of maturity as well as by numbers, giving various methods by which the health trout stocks can be assessed.

Results from previous editions :

- a : A trout trap was set up on a small Middle Tweed burn 1998 and has been operated by the St. Boswells Angling Association since then, producing annual counts of spawning runs (Appendix F). A similar trap on a small tributary of the Jed Water has been working effectively since 2002 (with the Jedforest Angling Association)*
- b : Two traps on larger burns of the upper Tweed came in to operation in 2001 and have produced annual counts for their Brown-trout spawning runs since then (Appendix F)*

Policies for the next five years:

Policy 3.F (1) Continue to count the spawning runs of Brown-trout at traps and analyse the data to show :-

- (a)** The relative numbers of mature males and females
- (b)** The size / age at which spawning starts to give a guide to appropriate size limits.
- (c)** The mortality rates of the fish i.e. the numbers surviving from being two years old, to three years old, three to four, four to five and so on. The rate of survival from one age to the next shows when fish are dying and if these rates can be established, increases in death rates in the future will show if pressure on the population is increasing.

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- (d) Set up further traps on suitable sites to be run by Club members:
 - (i) Identify suitable sites for traps & design appropriate structures
 - (ii) Built traps with Club members' assistance
 - (iii) Train club members in fish handling and trap operation

Policy 3.F (2) : Establish spawning escapement targets for the Brown-trout of the Index populations upstream of the upper Tweed traps

- (a) Model the populations of the burns on which upstream / downstream traps have been established :-
 - (i) Count the numbers of Brown-trout (identified through scale reading) running upstream to spawn each year
 - (ii) Count the numbers of juveniles that are not Sea-trout smolts that move downstream each year.
 - (iii) Survey the burns upstream of the traps to estimate carrying capacity
 - (iv) Model the populations of the burns to see if the estimated escapement requirement is being met each year.

- (b) Whilst these index populations are only two out of a great many within the Tweed they will give some guide as to whether the Brown-trout populations in general are making their escapement levels and so whether the Management Levels are appropriate or not. This will only be a guide for "Tweed" trout populations, and possibly for Till trout. It will not provide any information for use on the upper Eden or Eye populations

BASIC RESEARCH NEEDS FOR BROWN-TROUT

For Input 3E

91) A tag for efficient use on river Brown-trout

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