



SECTION 2 : SEA-TROUT

INPUT 2.A : DETERMINING AND DEFINING THE STOCKS OF SEA-TROUT WITHIN THE TWEED SYSTEM AND THEIR LIFE-HISTORIES

Rationale : The most basic information needed on the Sea-trout of the Tweed is their stock structure : Is there just one interbreeding stock of uniform characteristics throughout the whole catchment, or are there stocks differentiated by location and life-history and, if there are, are such differences genetic? If the full range of stocks and run-timings is to be maintained in the Tweed, then it is essential to know the exploitation rate of each stock and how well their spawning requirements are being met. If there are different, geographically based stocks, then the question of how these are related to the Brown-trout in their home areas arises - are these too different "stocks"?

Results from previous Plans :

- a: *Scale reading of Sea-trout killed at the sample rod fisheries and at the estuary has given basic information on life histories and sizes. Till Sea-trout proved to have a different size-range to that Tweed Sea-trout in general (Appendix A2)*
- b: *A few September Sea-trout were successfully Radio-tagged from 1994-96 which gave their pattern of upstream movement, spawning location and pattern of downstream movement (Appendix A2)*
- c. *Tagging and recapture of Sea-trout Kelts showed that the period spent at sea between return and repeat spawning run could be only 3 to 4 months and that their growth rate at sea could be as much as 15mm per month (Appendix A2)*
- d. *Collation of all the pre-1990 records of tagged and recaptured Sea-trout has shown that their migration route is to the south, to East Anglia, the Frisian Islands and the Dutch and Danish coasts. This is a quite different pattern from those of the rivers to the north of the Tweed, whose Sea-trout appear to only come as far south as the Tweed estuary (Appendix A2)*



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Policies for the next five years :

Policy 2.A (1) - Continue to investigate the stock structure and life-histories of the Sea-trout of the District and define any geographical or temporal differences

- (a) Continue collection of Sea-trout scales and measurements from the sample fisheries along the course of the main river and from the larger tributaries and analyse to show :-
 - (i) Geographical / temporal patterns in age structure
 - (ii) Geographical /temporal patterns in lengths and weights
 - (iii) Patterns of marine growth
 - (iv) Characteristics of Spring, Summer and Autumn running fish and whether these could be defined as "runs" produced by particular stocks.
- (b) Continue to micro-tag Sea-trout smolts at the traps. Recaptures will show the life histories of these particular populations both in the river and at sea.
- (c) Continue to micro-tag Trout Parr captured during electric-fishing surveys. Re-captures of those that become Sea-trout will increase the understanding of relationships between:-
 - (i) Juvenile and adult life stages
 - (ii) Connections between home area and type of adult (Spring, Summer, Autumn running) or feeding grounds at sea.
- (d) If the projected tracking project on Salmon goes ahead, investigate the possibilities of tracking Sea-trout as well. Acoustic tags are usually inserted surgically into the body cavities of fish, which makes them more suitable for Sea-trout than standard radio-tags which are put into stomachs.

Policy 2.A (2) - Determine the fecundities of Sea-trout (The fecundity of a fish is the number of eggs that it carries in relation to its size)

- (i) Find if Sea-trout that could represent different stocks have different fecundities.

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INPUT 2.B : INVENTORY THE QUANTITY AND QUALITY OF NURSERY AREAS OF SEA-TROUT

Rationale : *As for Salmon.*

Results from previous editions : *As for Salmon*

Policies for the next five years :

Policy 2.B (1) : Collect and Analyse Historical Data on the Environment of the Fisheries District

- (a) Collect and map the locations of man-made barriers past and present and quantify the areas of spawning blocked or restricted by them. If possible, maps of the area open to Sea-trout spawning in 1800, 1850, 1900, 1950 and at present will be produced.
- (b) Continue analysis of long-term catch records and environmental data

Policy 2.B (2) : Survey of Sea-trout Spawning Areas

- (a) Although the foot surveys of the nursery areas were completed in the last Management Plan period, analysis of the information obtained did not keep pace with the surveys themselves, owing to the bulk of data collected. The advent of the G.I.S. Data Management System makes the handling and analysis of such large data sets and the gathering of relevant inputs from other sources (such as geological and physical maps) much more practicable. Analysis of this habitat data will aim to show:
 - (i) Geographical relationships with recorded habitat quality - the effect of gradient, geology etc.
 - (ii) Cultural relationships of with recorded habitat quality - the effect of fencing, commercial forestry, land-use etc.

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Policy 1B (3) - Monitor the effects of obstacles on fish passage and undertake appropriate habitat protection and restoration work in Sea-trout spawning and nursery areas.

- (a) All obstacles in the catchment are now passable by Sea-trout, but possible restriction of access, in particular in dry years, needs to be monitored.
- (b) While no specific areas where bankside fencing to provide buffer zones around Sea-trout spawning and nursery areas have been identified, the fencing undertaken for the general protection of watercourses will benefit them.

Policy 1B (4) : Monitor the physical changes and the juvenile trout populations where habitat protection or restoration has been undertaken

- (a) Continue to monitor the long-term changes at the Habitat Pilot Projects set up during the period of the first Management Plan to evaluate the techniques used.
- (b) Continue the monitoring programme of sites in areas of habitat rehabilitation and analyse the results.
- (c) Set up and maintain a database of protection and restoration sites : To include pre-works photographs and data, rationales, plans, costs and contracts for the restoration work, post-works photographs and continuing monitoring data

Policy 1B (5) : Ensure the access and habitat problems of the past do not recur

- (a) Collect information from the UK and abroad on best practice in Farming, Forestry and Road-building in relation to waters and fish populations.
- (b) Disseminate this information amongst local land-users and provide practical advice on its implementation.

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INPUT 2.C: MONITOR THE JUVENILE POPULATIONS OF EACH STOCK OF SEA-TROUT: THE INFLUENCE OF HABITAT CHARACTERISTICS ON THEM AND THE EFFECTS OF PREDATION

Rationale : *As for Salmon*

Results from previous editions : *As for Salmon, and in addition :-*

e: In the first edition of the management plan (1990-95) Electric-fishing surveys were made of the fish populations in the smaller burns (dominated by Trout) of the Ettrick, Eden, Till, Teviot and upper Tweed catchments and in the second edition (1995-2000) the Whiteadder, Leader, Leet, Gala and minor tributaries were surveyed in the same way. The survey of the districts smaller burns has thus been completed. In all, 460 locations on 350 streams were visited and trout were shown to be the most widespread fish species in both the Tweed and Eye catchments

Policies for the next five years :

Policy 2.C (1) Monitor the densities of juvenile Trout at key sites throughout the medium-sized channels of the catchment and survey any smaller burns required.

(a) Continue the electric-fishing monitoring of the sites set up previously - the cycle will be:-

SECTORS OF THE CATCHMENT TO BE SAMPLED IN :

2005	2006	2007	2008	2009
Ettrick	Upper Tweed	Middle Tweed	Ettrick	Upper Tweed
Whiteadder	Gala	Teviot	Whiteadder	Gala
Eye	Leader	Eden & Leet	Eye	Leader
		Till		
		Total number of sites		
<u>51</u>	<u>58</u>	<u>58</u>	<u>51</u>	<u>58</u>
(Further sites may be added if found necessary)				

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- (b)** Analysis of the information obtained has not kept pace with monitoring cycles, owing to the bulk of data collected, but the advent of the G.I.S. Data Management System makes the handling and analysis of such large data sets and the gathering of relevant inputs from other sources (such as geological and physical maps) much more practicable. Analysis of the data will aim to show :
- (i) Geographical (including altitudinal, geological and locational) variation in abundances of Trout juveniles throughout the District
 - (ii) Local effects of the width, depth, substrate and cover on the numbers and ages of fish present at sample sites
 - (iii) The combinations of factors that give good juvenile Trout numbers and those that give poor numbers.
 - (iv) An assessment of whether samples that produced poor numbers were being affected by natural or artificial problems and the definition of the latter.
 - (v) Listing of any problem areas discovered for appropriate remedial action.
 - (vi) Identification of where new monitoring sites could extend and improve coverage by the monitoring programme.
- (c)** Similar analyses are required for the data collected from the smaller burns surveyed in previous plans
- (d)** Although the smaller burns survey has been completed, there may be further surveys necessary of such burns for particular reasons from time to time
- (e)** Liase with SEPA through the SFCC to establish the role these electric-fishing sites could play in the biological monitoring dimension of the forthcoming Water Framework Directive. The implementation of the Water Framework Directive has been identified as a Key Issue in the "Rivers and Burns" section of the Local Biodiversity Action Plan.

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Policy 2.C (2) : Collect Data on the Effects of Predation on Juvenile Trout, and on Sea-trout Smolts in particular

- (a) Continue to count the numbers of Goosanders and Cormorants in January, April, May and September of each year.
- (i) Use the information from these counts and from published analyses of the diet of Goosanders and Cormorants on the Tweed to make annual assessments of the total impact of their predation on the Sea-trout Smolt run
- (ii) Analyse the results of the counts to show any geographical pattern to the distribution of Goosanders along the river. If any locations are found where the birds are regularly clustered these could be "choke-points" where smolts are particularly vulnerable and special measures to protect such sites could be taken.

INPUT 2.D : ANALYSE THE CATCH COMPOSITION AND TRENDS OF EACH STOCK OF SEA-TROUT

Rationale : Analysis of catches for their composition shows which stocks (and areas of the catchment) are producing the fish that support the fisheries - and also what level of exploitation is being suffered by each stock. Knowledge of trends and cycles allows annual catches to be judged in a wider context.

Results from previous editions :

- a: Scale reading has shown the age structure and life-histories of the Sea-trout caught in the rod fisheries. Of fish sampled at the nets, 79% were returning for the first time, 18% for the second and 1.5% for further times.*

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- b: Analysis of long-term net catches of Sea-trout has shown that the run timing has remained centred in the middle of the year, but with more September fish in the later 19th century and more May and June fish in more recent times (Section 4)*
- c: RTC Assessment Records of Sea-trout rod catches have been collated and computerised (Section 4)*
- d: All available long series of Sea-trout catch records at individual fisheries were collected and computerised as part of the Catch Records Project 2001-04. These give sizes (weights) of fish and so provide more details than the RTC records.*

Policies for the next five years :

Policy 2.D (1) - Determination of Long-term trends and changes

- (a)** Continue analyses of catch and environmental data to show any long term trends or cycles.

Policy 2.D (2) - Monitor catch composition

- (a)** Continue collection of Sea-trout scales from the sample fisheries along the course of the main river and from the larger tributaries:-
 - (i)* Analyse these so show the different stocks and age classes of fish being caught. This shows how dependent catches are on particular ages of fish and how success or failure of particular spawning or Smolt years can be reflected in the catches of the resultant adults.

Policy 2.D (3) - Monitoring and Analysis of Catch Trends

- (a)** Continue to analyse the rod and net catch records for trends and changes and improve catch recording detail if possible.

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- (i) Improve the quality of rod catch records by recording the amount of fishing effort at at least a sample of fisheries - the same total of fish caught with a little effort indicates a very different situation than if caught with a lot of effort.
- (b) Continue the accumulation of data for modelling the Sea-trout stock(s) of the District and the collection of examples from elsewhere.

INPUT 2.E: ESTIMATE THE EXPLOITATION RATE OF EACH STOCK OF SEA-TROUT

Rationale for this work : As for Salmon

Results from previous editions :

- (a) *Tagging Sea-trout in the estuary each September to find the number later caught by anglers has shown that the exploitation rate by the rod fisheries of these later fish is very low, only 2% or so (Appendix E).*

Policies for the next five years :

Policy 2.E (1) : Monitoring of Angling Exploitation Rates of Sea-trout

- (a) Continue the assessment of the rod exploitation rate of September Sea-trout through tagging and recapture. This is based on the use of a netting station after the netting season ends.
- (b) If possible, extend to Spring and Summer Sea-trout as well : This would require the use of a station during the netting season. There are, at present, no estimates for the exploitation rate of Tweed Spring and Summer Sea-trout. **This should be possible as part of the Exploitation Rate Project beginning in 2005**

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INPUT 2.F: COUNT ADULT SEA-TROUT

Rationale : As for Salmon

Results from previous editions :

- (a) Counts of Trout over 40 cm long have been made at the Ettrick fish-counter since 1998*
- (b) Upstream / downstream traps have been set up on two larger burns of the upper Tweed and counts of spawning adult Sea-trout going upstream in the Autumn.*
- (c) An upstream trap on a small Middle Tweed burn has been operated by the St. Boswells Angling Association since 1998 giving counts of Sea-trout for that size of burn, and another, on a tributary of the Jed Water has been operating effectively since 2002*
- (d) The distinctiveness of the Till Sea-trout and the local importance of the fisheries based on it gives it particular importance A standard electric-fishing site was therefore set up in 1999 on an upper tributary of the College Burn to monitor the over-summering adults found there (Appendix A2). A second site, further downstream on the main burn has since found to be required as well, as it was found that repeat-spawning fish enter the College later and do not reach the upper site by the time that it is generally sampled.*

Policies for the next five years :

Policy 2.F (1): Continue the counts of adult Trout at the Fish Counter on the Ettrick

- (a)** Re-calculate the data using the better information on trout and salmon sizes now available from the camera system

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Policy 2.F (2): Install a fish counter in the fish ladder on the Gala Water.

- (a) Funding for this has been obtained from the Life In UK Rivers Project and should go ahead in 2005. Though the funding is for Salmon management, the camera system will allow it to be used to count trout as well.

Policy 2.F (3): Plan for further counters on Tweed tributaries

- (a) Gather information on fish counter models, with particular regard to those that could be used on existing caulds and other in-river structures: There are a number of these in the lower reaches of Tweed tributaries that it might be possible to adapt to carry counters.
- (b) Where possible sites match with counter models available, conduct feasibility studies

Policy 2.F (4): Monitor adult stocks of Till "Whitling" Sea-trout

- (a) Continue the monitoring sites on the College Burn.

Policy 2.F (5) : Establish spawning escapement targets for the Sea-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 Sea-trout (identified through scale reading) running upstream to spawn each year
 - (ii) Count the numbers of Sea-trout smolts that move downstream each year.
 - (iii) Survey the burns upstream of the traps to estimate carrying capacity

Whilst these index populations are only two out of a great many within the Tweed they will give some guide as to whether the Sea-trout populations in general are making their escapement levels. This will only be a guide for "Tweed" trout populations. They will not necessarily provide any information for the Till or Eye populations.

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BASIC RESEARCH NEEDS IDENTIFIED FOR SEA-TROUT

For Input 2C

(1) Monitoring juveniles of large channels. As for Salmon, though large channels are not thought to be as important as trout spawning areas

(2) The Relationship between Sea-trout and Brown-trout : As outlined above there is a need to understand how Sea-trout relate to Brown-trout; in particular, whether they should be thought of as being in “negatively correlated” with each other (i.e. more Sea Trout meaning fewer Brown Trout) or as being “positively correlated” (more of the one meaning more of the other) or as two sides of a single population. There is some indication that Brown-trout tend to be male and Sea-trout female and this needs to be investigated further.

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