



SECTIONS 5 to 9: OTHER FISH SPECIES

The species lists for the Tweed and the Eye are given in Chapter 3, where it is also pointed out that the introductions, deliberate or accidental, of alien species have meant that the original, native species community of the Tweed has been well diluted. However, all of these species have not spread to all of the catchment: Grayling, for instance, are kept out of the Gala altogether by a cauld and out of some sections of other tributaries by caulds and waterfalls and other alien species have been limited in smaller channels by culverts and other obstacles. As mentioned elsewhere, when obstacles to Salmon and Trout are eased, attention is given as to whether this might allow alien species to spread further and fish passes and other alterations can be designed to allow native species (Trout, Salmon, Eel and Lamprey) to pass but prevent other species from doing so - this is possible as none of the alien species in the Tweed catchment at present are either good jumpers or crawlers.

The species complex of the Eye Water is closer to the original, only Baggies (Minnows) and Beardies (Stone Loach) having arrived there. Although no historical records of Salmon being present in the Eye have yet been found, there is a significant population at present, as shown by electro-fishing of juveniles. The ammocoete larvae of Lampreys are widespread in the Eye, but it is not known what species these represent, most likely the Brook and River Lampreys – there are no known records of adult Sea Lampreys.

Apart from Salmon and Trout, the only other exploited fish species within the Fisheries District are the Grayling and, in the past, the Eel of the Tweed. The former was deliberately introduced to the Tweed in the 1850s to provide Winter fishing for anglers as Grayling are in prime condition at that season as they approach their spawning time in Spring (trout, in Winter, are, by contrast in poor condition as they recover from their Autumn spawning). Eels are native to the Tweed and the Eye and have occasionally been the target of small commercial net fisheries. As a species however, they have undergone a steep decline in Europe generally and advice now is that their exploitation should be reduced. As there is no commercial exploitation at present, the logic of the situation would be not to allow any new fishery to start here.

Much of the Tweed is a European Special Area of Conservation (SAC) for all three species of Lamprey as well as for Salmon.

The management issues for this group of species are therefore to: -

- (1) Monitor the Grayling stock – as very few are killed, there is little pressure on the stock from angling but a check should be kept on them in case disease or environmental problems occur. Determination of an appropriate close season to protect them after spawning is the most significant management issue.
- (2) Protect the native fish species.
- (3) Map the present distribution of alien fish species and prevent their further spread.
- (4) Prevent the arrival of any more alien aquatic species - see Section 10, Biosecurity.

SECTION 5: GRAYLING

INPUT 5A: DEFINE THE POPULATIONS OF TWEED GRAYLING

Rationale: Little is known of how much the Grayling of the Tweed move around or whether there are migrations to particular spawning areas and this needs to be determined if the effect of angling pressure is to be assessed. If there is much movement of fish, then pressure will be on the population as a whole, if there is little movement, then pressure will be on local stocks.



The Current Situation: Recaptures of tagged Grayling have shown that they generally move around very little, most recaptures being very close to the original tagging sites. Two recaptures did, however, show that longer distances can be travelled and that such movements could be spawning migrations, taking fish from the main channel into tributaries (Appendix 5A for details).

Genetic analysis of Grayling from the Tweed carried out by the Grayling Research Trust confirmed that the R. Derwent in Derbyshire was the source of the fish brought to the Tweed in 1855. Preliminary analysis showed that genetic variation within populations was low (Appendix 5A).

Policies for the next five years

Policy 5A.1: Tag adult Grayling to show patterns and extent of movements

- (a) Use the acoustic tracking equipment to: -
- (i) Tag Grayling in tributaries at spawning time to find if they are local or have migrated up from the main river.
- (ii) Acoustic tag and track of fish in the main river to check that movements are as restricted as the external tagging suggests.

Policy 5A.2: Find suitable methods to age larger Grayling.

As Grayling get larger, their scales thicken and become unreadable, so other body parts in which growth patterns are laid down have to be used, such as the otoliths (ear-bones) or *operculi* (gill-covers). To use these requires the fish to be killed but it may be possible to use fin-rays, which can be cut off without killing. However, otoliths or *operculi* would be needed to validate the use of fin-rays.

INPUT 5B: INVENTORY THE QUANTITY AND QUALITY OF HABITAT FOR GRAYLING SPAWNING

Rationale: If spawning areas of Grayling could be identified and mapped, it would help to develop an idea of their stock strength.

The Current Situation: Only a few Grayling spawning areas are known at present (locations in Appendix 5B).



Grayling spawning on the Leader at Drygrange



Policies for the next five years

Policy 5B.1: Maintain a map of the areas used for spawning by Grayling

- (a) Grayling are very obvious at their spawning areas and it should be possible to observe and map these, especially in tributaries. This could give information on: -
 - (i) Stock strength – large numbers of spawning areas should indicated large stocks
 - (ii) Stock distribution – some parts of the catchment may have higher densities of spawning areas than others.
- (b) Add the sites where Grayling fry are electric-fished during the fry surveys and found during main channel netting.

Identification of such spawning areas would be an appropriate "Citizen Science" project for volunteers.

INPUT 5C: COLLECT INFORMATION ON GRAYLING FRY AND PARR

Rationale: Little is known of the habitat used by juvenile Grayling. If nursery areas with good numbers of juvenile Grayling could be identified where electro-fishing was practicable, they could be assessed and monitored in the same way as Salmon and Trout juveniles.

The Current Situation: Juvenile Grayling have been regularly found in electro-fishing surveys of the lower Leader, Eden and Ale, but in very small numbers. It may be that most of their spawning takes place mainly in the larger channels. Main channel netting, although aimed at catching adult trout and Grayling, has also caught Grayling fry, sometimes in large numbers, from which the habitat types utilised by this life-cycle stage have become apparent. Grayling grow much faster than salmon or trout juveniles and more information on is needed on this and on their diet and habitat usage to see if they are competing with salmon fry and parr and trout parr (trout fry are in the smaller channels) (Appendix 5C for details)



Grayling fry from Walkerburn, upper Tweed

Policy 5C.1: Count and measure Grayling fry and parr found during electro-fishing and netting surveys

- (a) Count and measure the Grayling fry and parr taken during large channel netting.



Some of the catch from netting the lower Teviot at Nisbet on the 18th of August, 2010. Most of these are Grayling fry (young of the year)

INPUT 5D: MONITOR AND ANALYSE ANGLING CATCHES OF GRAYLING

Rationale: Grayling being inhabitants of deeper water and not running in to small trappable burns at spawning time, like trout, it is not possible to examine their spawning stocks in the same way. Catches at fishing competitions are therefore the only source of information on the adults of this species.

The Current Situation: Monitoring of the catches made at the Earlston Angling Club's annual Grayling competition have shown that catches - and probably stocks - fluctuate greatly over the years (Appendix 5D) due it seems to variability in the numbers of new recruits (one year olds) entering the adult population. Grayling angling catch logbooks have been devised for use by anglers during the Winter grayling season.



Tweed Grayling run to large sizes

Policies for the next five years

Policy 5D.1: Monitor the angling catches of Grayling as an index of stock abundance

- (a) Continue the Grayling Angling catch logbooks and increase the numbers of anglers keeping records.
- (b) Monitor the catches at the Earlston Grayling competition each year.
- (c) Assist / organise other Grayling competitions in other areas.
- (d) Analyse Grayling catch records to show trends and changes over the years.
 - (i) In particular, monitor the numbers of one year old fish caught during competitions as an index of year class strength. Scales from larger Grayling are difficult to read due to very slow growth as they age, but one year olds are obvious from both size and scale readings. There is some evidence that occasional year classes can be weak, possibly due to unsuitable temperatures during the Spring spawning season and the water temperature data collected under Policy 1B.1 can be analysed in relation to this.

Policy 5D.2: Check catch regulations against catch data and fish condition, to be able to give advice to clubs

- (a) As there is no formal Grayling season in Scotland, information is needed with which to define one that clubs could then use in their own regulations. To do this will require: -
 - (i) Information on the condition factors and feeding of Grayling through the winter, over their spawning season in April and through to whenever they can be said to have recovered condition.
 - (ii) Information on when the fish can be said to be gravid and therefore "*unclean and unseasonable*".
 - (iii) Analyses of the temperature data collected in Grayling spawning areas as water temperature is said to control spawning times.

A suitable Grayling close season for the Tweed would therefore be from when they become "*unclean and unseasonable*", cover their actual spawning season and end when they had regained full condition.



INPUT 5E: ASSESS THE CATCH RATE OF GRAYLING

Rationale: If catch rates are known, it becomes possible to make estimates of stocks.

The Current Situation: After an appropriate tagging method was found in 2004 recaptures of Grayling showed them to be very sedentary, most remaining in the same areas and being fished over repeatedly, giving very high recapture rates of up to 100%. It is clear therefore that there is considerable "recycling" of Grayling in popular fishing areas with anglers' catches including many fish that have been caught before and therefore that high catches may not necessarily represent large stocks (Details in Appendix 5E)

Policy 5E.1: Tag Grayling to find recapture rate

(a) Repeat previous (external) tagging as and when possible to check if there has been any change.

SECTION 6: EEL

Due to concerns over the widespread decline of this species, the UK is now covered by regional Eel Management Plans, the local one being the Solway Tweed Eel Management plan (STEMP), which is led by the Environment Agency. This section therefore includes relevant items from this plan.

A major investigation on the Eel of the Tweed was carried out in the late 1970s / early 1980s as a Ph. D. study (Husein, 1983) which provides a solid baseline against which the stock changes could be measured, if resources were available.

All work in this section is subject to the availability of resources and opportunities.

The European Eel population of the Tweed differs in one very basic respect from all the other fish species found in the Tweed - it breeds outside the Fisheries District and arrives here by migration from its marine spawning areas to live until it is mature enough to leave and spawn. Setting a Management Level for the stock found in the Tweed alone would not therefore serve any purpose, but if it was determined that the species was in decline throughout its range and there was international action to reduce exploitation levels, then conservation measures could be introduced here.

The Current Situation: Electro-fishing data showed large declines in the numbers of Eel found at monitoring sites, though more recent sampling has shown better numbers of younger Eel on the lower river (Appendix 6).

Stock structure of Eel. As Eels return randomly to rivers from their marine spawning grounds, there is no opportunity for the development of locally adapted stocks. Distribution within the catchment can, however, determine the sex that they mature in.

INPUT 6A: Ensure access to all parts of the Tweed and Eye catchments by Eels [Solway Tweed Eel Management Plan [STEMP] Table 5.2: *Passage*]

Policy 6A.1: Collect information on the ability of Eels to pass barriers and on the design of suitable fish passes.

Policy 6A.2 When fish passes are being redesigned or rebuild, ensure that they will allow Eels to pass (but not allow non-native species to do so). *As Eels are predators of Crayfish, it is an advantage to have them well spread through the catchment as a way of controlling crayfish spread and numbers.*



A 550mm long Eel found during electro-fishing in a small burn on Crystal Rig – at this size, this will be a female. Male Eels leave at smaller sizes and do not generally penetrate so far upriver.

INPUT 6B: Survey and monitor the Eel populations of the Tweed and the Eye [STEMP Table 5.2: Monitoring].

Policy 6B.1: Maintain the database of Eel distribution

- (a) Add historic records when these are found
- (b) Add records from electro-fishing and other surveys as these are made. Presence / absence of Eel should be recorded at all electro-fishing sites (on the SFCC scale where appropriate methods are being used)
- (c) Eels over 500mm are females and of particular importance and their distribution within the catchment needs to be recorded.

Policy 6B2: Where quantitative electro-fishing takes place, continue to count and measure the Eels captured.

- (a) Retrieve past data and consolidate into the Eel distribution database
- (b) If resources become available, set up 10 electro-fishing sites at which to monitor Eels every two years, re-using sites from which data is available from the 1970s in Hussein (1983)
- (c) Examine all Eel caught in electro-fishing or other surveys for signs of "Cauliflower Disease" and database any resulting records (**see also Policy 10.****)
- (i) Photograph any infected Eels and add to database.

Eel Catches – there are no Eel fisheries now on the Tweed and advice is that that such fisheries would be inappropriate in the present situation.

INPUT 6C: Record predation of juvenile and adult Eel

- (a) Record examples of predation on Eels.



SECTION 7: LAMPREYS

All work in this section is subject to the availability of resources and opportunities



Typical lamprey feeding scars on Salmon and Sea-trout. The first three are under the heads of the fish, the commonest site while the fourth was at the pectoral fins. Adult River and Sea lamprey feed on fish only at sea and in the estuary. Brook Lamprey, which do not leave fresh water do not feed as adults after they metamorphose from the larval stage.

Rationale: Much of the Tweed catchment is a European Special Area of Conservation (SAC) for the three British species of Lamprey: Sea Lamprey, River Lamprey and Brook Lamprey. Lamprey are also listed as a qualifying species for the Tweed Estuary SAC.



The Current Situation: Lamprey surveys have been made of the R. Till in 2002; the Tweed in England and the Till in 2013 and the Till again for adult spawning in 2015, all funded by English Nature / Natural England. The lamprey of the Scottish part of the catchment were surveyed for SNH in 2004 and the Gala Water was surveyed in 2005 as part of the environmental assessments made for the Waverly rail line reconstruction. Some further information was obtained as part of an Environmental Impact Assessment for gravel removal from The Junction fishery in 2006. As Lamprey are not only found in the more sedimented lowland parts of the catchment, for which surveys are generally commissioned, but also in more upland areas, a quick "presence / absence" check for them is made at each site sampled during the general salmon and trout electro-fishing surveys (Data and maps in Appendices 7B [juvenile distribution], 7C [adult distribution and spawning sites] and 7D [records of predation])

INPUT 7A.1 : Investigate the genetic stock structures of the lamprey species

- (a) It is not thought that Sea or River Lamprey show any great genetic diversity within river catchments, but more research on this is needed.
- (b) Brook Lamprey, not being migratory, may therefore be more likely to develop locally distinctive populations but this also needs more research. Any investigations on the Tweed should specifically include the Brook Lamprey populations:
 - (i) upstream of Stichill Linn on the Eden Water. These may have been isolated for a very long period.
 - (ii) above the Skinworks Cauld on the Gala Water as these have probably been isolated since 1821
 - (iii) in the Meggat Water and Little Yarrow as these have probably been isolated above St. Mary's Loch for a very long time.



Lamprey larvae coming out of sediment during electro-fishing on the Wauchope Burn (Jed Water) on the 3rd of August 2005



INPUT 7B.1: Survey the distribution of lamprey larvae

- (a) Maintain the database of lamprey larvae distribution
 - (i) add historic records when these are found.
 - (ii) add records from electro-fishing and other surveys as these are made. Sea Lamprey larvae have been found as far upstream as Kelso, but spawning behaviour has been reported further upstream at Mertoun. Adult Sea Lamprey have also been captured much further upstream, at Elibank and from the Jed Water, a secondary tributary.



Sea-lamprey larvae are more heavily pigmented than those of the Brook and River Lamprey. In these photographs, the Sea-lamprey larvae are the lower of the two, showing how the hood round the "mouth" and the blade of the tail have more pigment spots.

INPUT 7C.1: Record the distribution of adult lampreys and spawning sites

- (a) Maintain the database of adult lamprey distribution.
 - (i) add historic records when these are found.
 - (ii) add records from electro-fishing, other surveys and general observations as these are made.
- (b) Investigate and record reports of lamprey spawning (*While the spawning penetration of Sea Lamprey can be worked out from the distribution of their larvae, which are distinctive, the larvae of River Lamprey cannot be distinguished in the field from those of Brook Lamprey*)
- (c) Return to known sites of lamprey spawning in subsequent years to check if these are being re-used.



Brook Lamprey spawning in the Turfford Burn at Earlston, 7th April, 2010

INPUT 7D.1: Record predation and exploitation of juvenile and adult Lampreys.

- (a)** Add records of predated lamprey to the juvenile and adult distribution databases.



8: OTHER NATIVE FISH SPECIES (Flounder and Three-spined Stickleback)



Small Flounder are common on lower river and have been recorded as far upstream as The Junction pool at Kelso

INPUT 8A: COLLECT AND COLLATE HISTORICAL AND PRESENT DAY RECORDS OF THESE SPECIES

Rationale: Knowing what fish species are present and where throughout the District is a basic background requirement for fisheries management. Such information is often of interest to other organisations concerned with conservation and maintenance of this information in a compatible, database, format allows requests for this type of information to be answered quickly and easily.

The Current Situation: Distribution data derived from both Tweed Foundation and earlier surveys have been combined into a database from which fish species distribution maps have been made. This data has been contributed to the local Biological Records Centre and to the Institute of Terrestrial Ecology's Atlas of British Fishes (Details in Appendix 8A).

Policy 8.A.1 : Record the distribution of Flounder and Stickleback.

- (a) Add records of these species to the distribution database.
 - (i) add historic records when these are found.
 - (ii) add records from electro-fishing and other surveys as these are made.



- (b) Provide updates of species distribution data to the local Biological Records Centre and to SNH if and when requested.

9: NON-NATIVE FISH SPECIES

(Perch, Pike, Roach, Dace, Gudgeon, Rainbow Trout, Bullhead, Carp species, Pink Salmon)

INPUT 9A : COLLECT AND COLLATE HISTORICAL AND PRESENT DAY RECORDS OF THESE SPECIES

Rationale: Knowing what fish species are present and where throughout the District is a basic background requirement for fisheries management. Such information is often of interest to other organisations concerned with conservation and maintenance of this information in a compatible, database, format allows requests for this type of information to be answered quickly and easily. The existing distribution of non-native fish species also has to be known so that the RTC can take this in to consideration when applications to stock such species within the catchment are made.

The Current Situation: Distribution data derived from both Tweed Foundation and earlier surveys have been combined into a database from which fish species distribution maps have been made. This data has been contributed to the local Biological Records Centre and to the Institute of Terrestrial Ecology's Atlas of British Fishes. The distribution data collected informs the RTC's stocking policy, showing which parts of the catchment already have populations of non-native fish species and which do not. The possible impact of Bullhead on salmonid fry is monitored under Policy 10B.8 in the Biosecurity section. Species maps are given in Appendix 9.

Policy 9.1.1: Survey and monitor the distribution of non-native fish species.

- (a) Add records of these species to the distribution database.
 - (i) add historic records when these are found.
 - (ii) add records from electro-fishing and other surveys as these are made.
- (b) Provide updates of species distribution data to the local Biological Records Centre and to SNH if and when requested.