

A FORMULA FOR FISHERIES IMPROVEMENT

OUR FORMULA FOR FISHERIES MANAGEMENT HAS DEVELOPED OVER THE LAST TWO DECADES AND TODAY FORMS AN ACTION-ORIENTATED APPROACH THAT IS BASED UPON ANSWERING THE ESSENTIAL QUESTIONS THAT ARE USED TO DIRECT OUR WORKS ON RIVERS.

The Westcountry Rivers Trust's approach to fisheries management has evolved through interaction with various individuals and agencies, both within the UK and beyond, but perhaps the greatest single influence has been that of Ronald Campbell from the Tweed Foundation.

This action-focused approach allows volunteer and professional organisations of various types and sizes, with a range of budgets, to take informed decisions that lead to both delivery on the ground as well as an increase in our collective knowledge.

Looking at the flow diagram on the next page, the focus of our efforts is on the right-hand side of the diagram - the analysis, information and the questions themselves are all directed to the goal of knowing what is likely to be the most effective action we can take on the rivers. This systematic approach seeks to gather the essential data to make an informed decision as to what is the best action. It takes the view that the worst action we can take is no action, and that, provided the risks are low, we are better taking action based on imperfect data than waiting to get the whole in-depth picture. This is the correct interpretation of the precautionary principle.

In order to manage fish stocks WRT considers three basic questions:

1. *How many fish populations are there in a catchment?*
2. *What habitat is available for fish at various stages of their life cycle?*
3. *What is the status of these populations at the moment?*

How many fish Populations are there?

This fundamental question has slowly come to the fore over the last few decades. Only recently has the genetic technology matured enough to answer this question in a reliable and affordable manner that can be applied on a catchment-wide basis. It is very hard to

attempt to manage fish populations if it is not known how many of them are in a catchment. This is best demonstrated by the 'weak population problem' as described in Box 1 (right). Once we know the stock structure of the river we can manage it with much more confidence and effectiveness. For example we may realise that the weak stock can be restored by the removal of a barrier to migration and it might be worthwhile to prioritise that barrier removal over other activities. This is a clear case of seemingly complex genetic science leading to concrete action on the ground.

Genetic diversity is the anvil upon which natural selection forges a species ability to cope with the future

What habitat is available for fish at various stages of their life cycle?

All fish species require a variety of different habitat types at different stages of their life cycle. However, the issue is of particular importance to migratory fish such as Salmon and Sea Trout as their life stages are many, and the habitats they use are hugely varied over their lifetime development. Every river is unique; it has different amounts and arrangements of pools, spawning gravels, riffles for fry and deeper habitat for parr. If we carry out rapid habitat walkover surveys (which can be conducted by Trust staff and also by trained volunteer groups) then we can build up a picture of the quirks of our river. Maybe it has lots of spawning gravel but this is mostly silted up and unusable, or perhaps there is plenty of spawning and fry habitat, but very little habitat suitable for the maturation of parr.

Once we know this information our management actions can be well focused to achieve maximum impact with the resources we have available.

What is the status of these populations at the moment?

Substantial effort is already being made to

monitor the status of fish populations on many rivers. This effort includes the use of fish counters, tagging studies, electro fishing, rod catches, log books etc. and much of this data is published by the Environment Agency to report nationally and internationally. Detailed examination of the 'exploitation rate' of a fishery, that is to say the proportion of the fish that are caught on a river, is of particular importance when trying to assess the health of the stock.

We then take this data and combine it with our own, such as rapid semi-quantitative

electrofishing to assess the current state of the fish stocks.

Realism

It is clear that we do not have conclusive answers to the three questions above for all our catchments (though we are getting close for Salmon on some of our catchments, e.g. the River Exe). It is therefore appealing to respond in the immortal phrase 'more research is needed'. However, taking the approach 'the worst action is no action', that response is not an option for us. It would lead to us standing by whilst we monitor decline – most definitely not the approach of a Rivers Trust.

Our constructive approach to this situation is to act simultaneously on all fronts (most importantly we will take the actions as described on the diagram overleaf) based on the best evidence we have whilst, simultaneously, we will gather and analyse the relevant information from the middle of the diagram to guide this action. As we take action, we are able to gather more information which promotes more and better-focused action on the catchment. It is this learning cycle of action, information and analysis that is our formula for fisheries improvement.

The 'weak population' problem

BOX 1

Imagine a river with three Salmon populations in it. They do not breed much with each other, but live next to each other in different tributaries of our imaginary river.

The first population is made up of about 500 fish, the second population 450 fish and the third 30 fish. The third stock is our 'weak population'.

Now imagine that we set nets on the bottom of our river and each year we semi-randomly select returning fish from the different stocks. Normally this does not cause a problem, but, given enough time,

there may come a year when the third population is unlucky and a large proportion of its returning fish will be caught: worse still, it may be that many of the females from that population are caught. This random over fishing of the third population could easily be enough to tip it into terminal decline, and if we have not done our homework and found out that there are three populations there then we could easily make that stock extinct and never know it.

You may be asking why do local populations matter? They matter because fish

populations that are genetically different are likely to have adapted to their particular river or tributary, and so they represent a reservoir of 'genetic diversity' which acts as our insurance policy against risks in our changing world.

Our imaginary third population may just be the one that contains the genes necessary for UK salmon to survive global warming – but we will never know this because it was wiped out by our lack of knowledge of the population structure of our rivers.

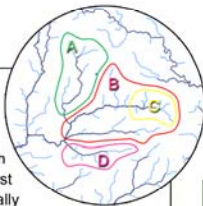
Questions

Information & Assessment

Actions

HOW MANY FISH POPULATIONS EXIST?

Before we can begin to manage and conserve the fish in a river system we must first work out how many genetically different populations or stocks of fish there are in the system. If we do not define these populations first then we run the risk that small, weak stocks will be overlooked and may become vulnerable to extinction. For more info - see Box 1.



GENETIC POPULATION STRUCTURE ANALYSIS

The latest genetic analysis methods now allow us to take samples from fish caught by anglers or during monitoring work and determine the structure of the fish populations that live in our river systems. By identifying the unique combination of genetic markers a fish has we can now determine which population, and even which river, it originally came from.



WHAT HABITAT IS AVAILABLE?

All species need habitat to live and breed in and this is especially true for salmon, which have very specific habitat requirements for several stages of their lifecycles. Salmon need a good supply of clean spawning gravel in which to lay their eggs and the resulting fry and parr also need suitable habitat if they are to thrive and complete their lifecycles.



HABITAT WALKOVER SURVEYS

We use a quick but detailed fisheries walkover survey method to assess the provision of fish habitat in a river system and to determine its condition. We also identify where there are potential threats to the condition of the fish habitats present and where barriers or obstacles exist in the river that may act to stop fish accessing those habitats.



HOW MANY FISH ARE IN THE RIVER?

If we are to identify when action needs to be taken it is vital that we assess the number of fish in each population. When anglers report good catches it may indicate the presence of high fish numbers, but it may just indicate that, by chance, the conditions for fishing were good at the right time that year. Only detailed study allows the stock to be accurately assessed.



FISH POPULATION MONITORING

We use a wide array of methods to determine the number of fish in a river system and to assess the health of the different populations present. These methods include; electrofishing surveys, automatic fish counters, fish tagging, genetic determination of breeding (effective) population size, and analysis of anglers catch-returns and log-books.



Stock near extinction

Stock struggling

Stock healthy

HATCHERY WORKS
If fish stocks are in danger of local extinction we will carry out supportive stocking from local fish stocks. If fish stocks are fully extinct we will introduce stocks from neighbouring populations with a similar genetic make up, whilst simultaneously working on the causes of these extinction threats.

CATCHMENT MANAGEMENT
If water quality issues are due to problems in catchment utilisation then we will selectively increase fenced buffer zones, lime-acidified water sources, appropriate grazing, and most importantly work with farmers to enable them to improve the management of their land to improve water quality and quantity.

FISH PASSAGE
If a weir or other man made fish obstacle can be removed, then it should be removed. If it cannot be removed (for example it is adjacent to a major road or residential buildings) then a suitable multi-species fish pass should be installed and any existing fish pass should (if necessary) be improved. Well designed hydro-power systems should only be used in the latter case, with caution, and with the goal of benefiting the river connectivity or greater management objectives on the catchment.

SET UP TRIAL PROJECTS
New projects will develop new ideas to monitor, protect and restore rivers.

SENSITIVE EXPLOITATION
People value that which they use and get a benefit from. Therefore we seek to develop schemes such as Angling Passports to enhance the value of the river to anglers and thus improve its care. Linked into this is the development of sensible limits on fishing exploitation, such as bag limits and slot limits.

MONITOR SUCCESS
If fish stocks are doing well, then we will monitor the situation so as to be aware of any developing problems.

DEVELOP LOCAL KNOWLEDGE & FORUMS
We will work with local interest groups such as farmers and fishermen to help inform and engage them about issues related to good river management. This will help to avoid new problems created by users of the environment, and engage such groups in active protection of the riverine environment.

Schematic showing how our formula for fisheries improvement integrates different monitoring approaches to assess the condition of the fish stocks and then target and tailor our actions