# Monitoring the success of Trout in the Town

## Why Monitor?

This document explains our proposed approaches to monitoring Trout in the Town (TINTT) projects. Before moving on to "how", it is worth setting out why we should monitor at all. It is also worth noting that the protection of existing good conditions by sustainable means is just as important as generating new high quality habitat in a degraded river.

At the most basic (and bluntest!) level, monitoring tells you whether restoration works have had the desired effect(s). If there are no before and after -project records or measurements there is no indication of whether all the hard work has been worthwhile. In all cases (and especially for volunteer work forces), great satisfaction can be gained from the certain knowledge that habitat works have had a positive effect. Similarly, measuring project success demonstrates what has been achieved with monies donated by funding bodies - very important when seeking more funding.. Clear demonstrations of what is likely to be achieved using benefactors' money are crucial in securing financial support for conservation projects.

Perhaps most importantly of all, monitoring the effects of habitat improvements helps to build knowledge of "best practice" techniques – promoting the wider use of good practices, and curtailing the use of poor practice. The following sections set out our strategy for monitoring TINTT projects.

## First steps to effective monitoring

### General principles

Probably the most important first step in successful monitoring is setting out exactly what the work is trying to achieve. Setting specific goals for restoration projects should be carried out for all planned activities. Without defined goals, you cannot measure whether they have been achieved. Along with the planning of restoration goals, some time should be spent (ideally) assessing the existing conditions before the start of restoration works. This could include collecting existing information as well as/instead of taking new measurements. Naturally, you should also plan comparable post-restoration assessments for after the works. The ideal situation would include assessments over a period of time that matches any expected lag before benefits appear for each goal.

Where you are setting goals to improve biological conditions (see "Categories of effects to be monitored"), the most robust cases will be where there are clearly identified aspects of the habitat that are lacking, e.g. absence of juvenile habitat for trout. In this example, the ultimate restoration goal would be to create juvenile habitat to complement existing good quality spawning and adult habitat. The goal should specify how much spawning habitat you plan to create - so you can measure whether this is achieved. Not all goals can be so easily measured and guidance on setting goals where it is not

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possible to measure desired improvements in area of spawning gravel, numbers of fish, etc. is offered in the section "Communicating results of monitoring assessments". It is important to focus on improving areas of poor habitat and avoid changing areas of the river that already cater for some aspects of the trout's requirements – changing existing good habitat can have unpredictable effects.

## Categories of effects to be monitored

Two main categories of effects resulting from habitat conservation projects are suggested in the current scheme:

1. **Direct** (physical)
2. **Consequential**

**Consequential** effects are divided further into:

- *Biological*
- *Sociological*

**Direct** effects are the simple physical result of each restoration activity. For example, a restoration goal could be to create 20 $m^2$ of spawning habitat to relieve a habitat bottleneck in recruitment. The **Direct** benefit to the system would be measured as how much of the proposed 20-$m^2$ gravel riffle you were actually able to create. The **Consequential** *Biological* benefits could be expressed as the number of spawning redds observed within the reach before and after restoration work.

**Consequential** benefits can be assessed in layers or tiers because each biological consequence could have knock-on effects, e.g. does increased spawning actually lead to more juvenile trout? The extent of monitoring will, of course, depend on the resources available to each project (Appendix 1 shows an example).

Similarly, **Consequential** *Sociological* benefits are likely to be many and varied. Again, tiered measurements ranging from simple assessments (e.g. the rate of fly-tipping pre and post-restoration or the uptake of youth angling coaching) through to sophisticated professional surveys of multiple benefits should be considered. Suggested example methods for monitoring particular categories of effects are given in the following section.

## Proposed methods for each category

### Direct

The monitoring of direct benefits generally only requires fairly simple measures. For example, fixed point photography of reaches that are subjected to habitat works and/or trash clearances would be required as a minimum. An equally simple measure would be a formal record of planned versus completed works (including quantities and dimensions).

### Consequential (Biological)

A minimum requirement (except in cases of population restoration) for fishery monitoring is angler catch returns. These should be collected using a scheme that records lengths of individual fish and duration of fishing (for an example form, see WTT document "Prioritising projects for Trout in the

Town"). Recording both angler effort (time fished) and different size-classes of fish captured shows the relative success of restoration measures for different age-classes of trout. An additional (more detailed and expensive) option for assessing fish populations would be formal electric fishing surveys carried out by trained personnel.

Another desirable in-stream assessment is invertebrate (bugs and grubs) monitoring. Again, this could be undertaken on a tiered basis according to resources. The basic monitoring should conform to the methods and training provided by the Riverfly Partnership. The example recording sheets suggested for Trout in the Town (WTT document "Prioritising projects for Trout in the Town) can easily be translated into the Riverfly Partnership formats as required. These basic-level monitoring methods will indicate the presence of a generally healthy invertebrate community over time – and will flag up the effects of pollution. However, if project personnel are able to identify invertebrates more fully (to the taxonomic level of Family) then further valuable information can be obtained.

A very useful application of family-level (or even species-level) data would be to monitor the "LIFE" scores of restored streams. The acronym LIFE stands for "Lotic invertebrate Index for Flow Evaluation" and is a ranking of the requirement of invertebrate species and families for strong current flow. When there is a restoration goal to increase the variety of flow and depth, the LIFE score is a very useful tool. This, in conjunction with fishery data, will potentially provide very powerful evidence of habitat intervention leading to tangible ecological benefits. It is useful to have a reference site on the river (where no restoration work takes place) for comparison.

**N.B. – TINTT would give guidance on the location of monitoring and reference sites and would also analyse the resultant data. All that is required of project volunteers is the collection and identification of invertebrates (to the highest level of taxonomic resolution that volunteers can achieve)**

In addition to the monitoring of *biological* consequences of restoration in the stream, the effects on plants and animals on the banks should also be considered. This is especially true where control/eradication of invasive plant species is undertaken. Surveying, mapping and photographing the extent of invasive plants before, during and after control programmes is recommended (and would count as a **Direct** benefit). Where additional resource and expertise is available, formal River Habitat Surveys (RHS) and/or surveys of river corridor plants and animals can be carried out to assess **Consequential** benefits. In some cases, such surveys may already be routinely carried out as part of other conservation/wildlife initiatives – this should be checked before 're-inventing the wheel'! Naturally, the effects on both the stream and the banks should be assessed for all habitat management activities that are expected to influence both environments. An example that ties together bankside and in-stream ecology, is recording the consequences of tree-canopy management to tackle overshading . In these cases, you should incorporate fixed point photography as well as formal surveys for mid-channel plants such as *Ranunculus spp*.. At the same time, surveys of understory vegetation and animals are valuable additional demonstrations of wider biodiversity benefits of river restoration work. For aquatic and terrestrial vegetation, measuring the percentage cover of different varieties is useful. For terrestrial vertebrates and invertebrates, simply recording sightings (presence/absence) may be the realistic limit of what surveys can achieve – unless specialised resources and personnel are available. Finally, where flow deflectors have been installed to generate bed scour, the depth at low flow should be measured

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over the full channel cross section before and after works. A good rule of thumb would be to measure depths every 50 cm along the cross section where scour is anticipated.

### Consequential (Sociological)

As with baseline **direct** effects, fixed point photography detailing pre and post-project fly tipping is a very useful record. In addition, estimates of social use of river corridor (e.g. for staff lunches or walkers) provide indications that the urban green space is valued by local communities. More quantitative measures of social impact may include records of "offered versus accepted" instances of classroom or community engagement initiatives.

For each community engagement or education programme, some means of generating feedback should be incorporated and recorded (e.g. simple questionnaire). For targeted participation activities such as working parties, river festivals and youth angling coaching, informal interviews with participants is a valuable way of assessing success. Asking what activities participants have forgone in favour of Trout in the Town participation are particularly useful in this respect.

Where suitable resources and working partnerships exist, these basic assessments could be supplemented by professional assessment of community impact. For example, the not-for-profit organisation "SUBSTANCE" has recently won substantial funding to assess the social benefits of participation in angling. It is intended that all TINTT projects will receive questionnaires from the SUBSTANCE group for completion.

## Communicating the results of monitoring assessments

The most concise and easily interpreted way of communicating project monitoring is the "profiling" approach that is used to characterise "ecosystem goods and services". This involves plotting the degree of success of a particular restoration goal as a proportion of the planned / desired value. Using the example of the goal to create a 20-$m^2$ spawning riffle: if financial or legal (e.g. land drainage) constraints meant that this was limited to a 10-$m^2$ riffle – then this would yield a 50% achievement of that restoration goal. The full range of restoration goals should be arrayed on the horizontal axis of each project profile. The percentage of each goal that has been attained can then be plotted against the vertical axis (e.g. Fig.1). For clarity, it may be desirable to have three separate profiles; one each for **Direct** (physical), **Consequential** (biological) and **Consequential** (sociological) categories.

In some instances it will not be possible to produce adequate measured estimates of desired goals. For example, if the aim is to "increase abundance of high-scoring LIFE species/families", it is only realistic to show whether this has improved or not (because it is not possible to predict the size of such changes). Therefore, the change should be plotted – but clearly annotated to indicate that these do not relate to a specified desirable level.

There will be cases where it is not appropriate to plot percentage changes. Where restoration goals include encouraging or establishing the presence of a species that is initially absent, then the difference between presence and absence is an "all or nothing" condition. Again, profile plots should be annotated to make this clear. One method of doing this would be to replace plotted bars with "YES" or "NO" against the appropriate horizontal axis label (Fig. 1).

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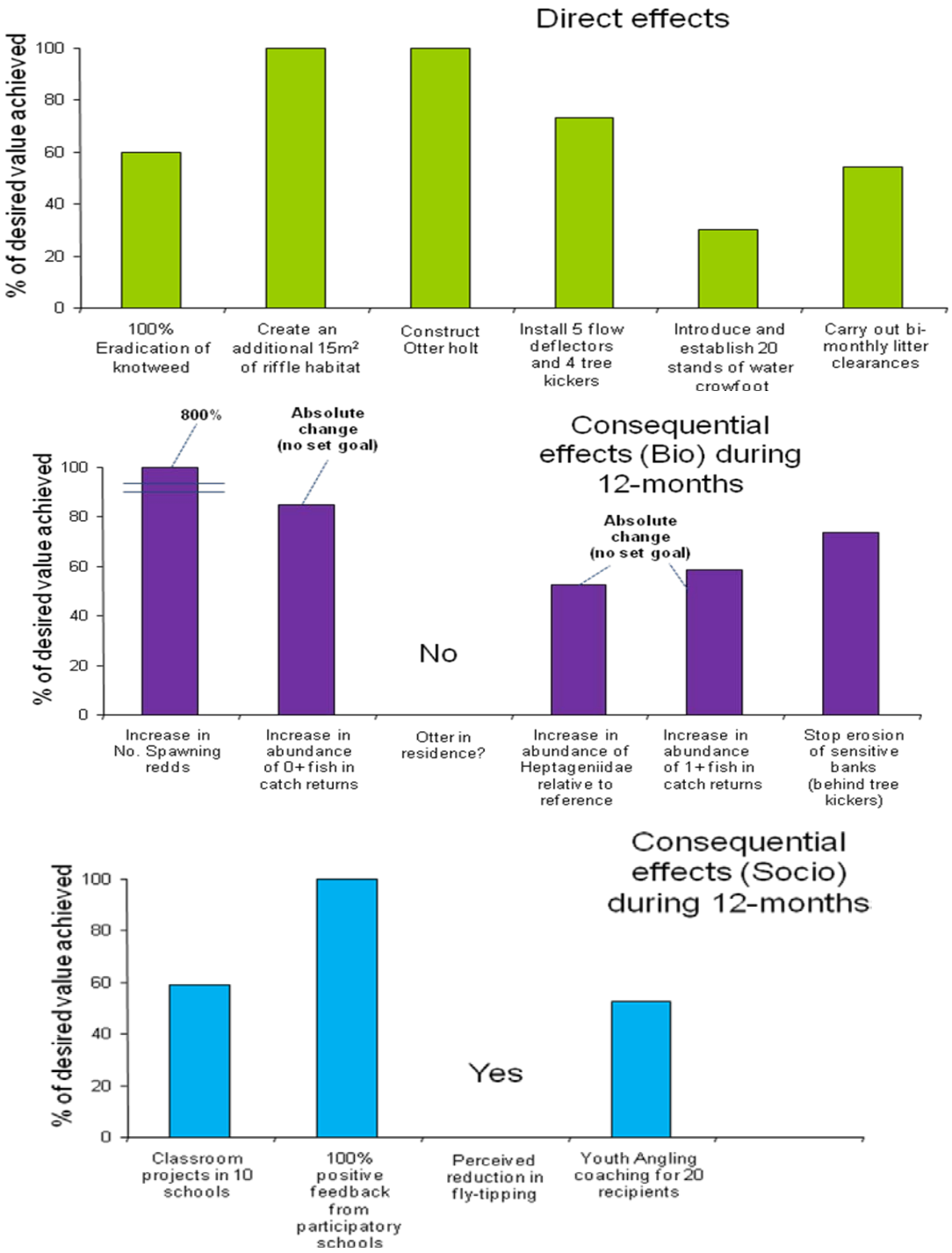


**Figure 1:** Profiling plots for Direct, Consequential (biological) and Consequential (sociological) benefits against specific goals

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## Summary of TINTT project monitoring process

1.) All projects must IDENTIFY and SET goals for their restoration activities (with TINTT programme manager advice)
2.) Undertake the **mandatory** and **optional** measures according to available project resources and delivery partner support (Table 1)
3.) Feed data back to TINTT programme manager for collation

### Table 1: Mandatory and optional assessments of project benefits

| | | Direct effects | Consequential effects | |
|---|---|---|---|---|
| | | | Biological | Sociological |
| **Habitat works** | **Mandatory** | • Assessment of planned versus executed works<br>• Fixed-point photographic record | Catch return records (when project involves an angling club) | SUBSTANCE questionnaires (where available) |
| | **Optional** | Monitor local/national media coverage | • Riparian and aquatic flora/fauna (formal surveys or presence/absence records)<br>• Invertebrate monitoring to :<br>i. Riverfly methodology<br>ii. Full family/species level | Canvassing of public using project green space |
| **Trash cleanups** | **Mandatory** | Planned versus executed programme | | SUBSTANCE questionnaires (where available) |
| | **Optional** | Monitor local/national media coverage | | Canvassing of public perception & fly-tipping rates |
| **Community & educational schemes & events** | **Mandatory** | Self-assessment of goal attainment (aims met? To what degree?) | | Canvassing of participants and SUBSTANCE questionnaires (where available) |
| | **Optional** | Monitor local/national media coverage | | Environmental careers uptake c.f. regional average |

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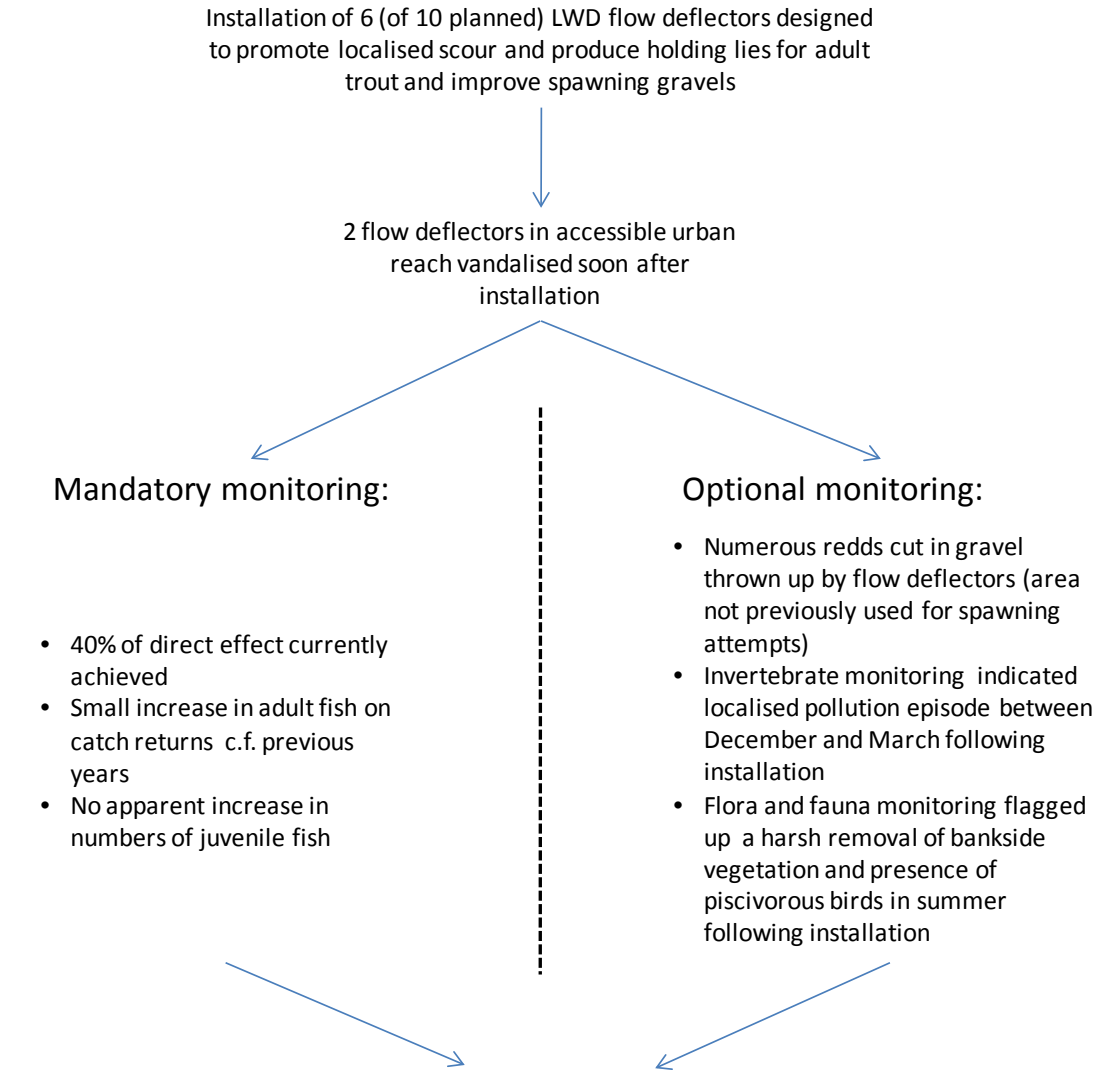
# Appendix 1: Example application and interpretation of monitoring programme (biological information)




Combining mandatory and optional monitoring gives:

- Indication of direct results
- Assessment of consequences
- Improved ability to interpret consequences
- Direction for future restoration work/campaigns i.e.
  - Improved bankside vegetation management
  - Investigate and prevent recurrence of pollution incident
  - Provide juvenile and adult refuge habitat

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