**RRC Catchment Restoration Fund monitoring protocol**

**Key:**

* **Target/why –** What is the overall objective of the works which are to be monitored?
* **What –** What are you trying to observe from your monitoring? E.g. increased sinuosity and habitat heterogeneity through re-meandering and adding large wood / reduction in nutrient inputs by installing SuDS.
* **How –** What techniques are being used to collect data and what assessment methods are you using? E.g. electro-fishing monitoring diversity, abundance, density, length and age.
* **When –** When are you collecting data (month/season)? Duration/length of monitoring period, how many sampling repeats, how regularly?
* **Who –** Who is the individual and/or organisation responsible for monitoring? Will this be done by more than one organisation?
* **Data –** Do you have access to any pre-project data? E.g. monitoring data from the Environment Agency.
* **Cost –** Cost of monitoring. Are all costs in kind, or are there expenditures for e.g. external lab analysis.
* **Which WFD objective is this helping to achieve –** Which WFD quality element will be addressed by your works? If not WFD, does the work/undertaking aim to improve favourable conditions (for designated sites or species, e.g. SSSI/SAC/SPA/BAP) or does it relate to any other policy drivers (e.g. public engagement, socio-economics, flood management, ecosystem services)
* **Priority and confidence:**Priority: High/Medium/Low importance that your monitoring method can show potential improvement of the related WFD quality element; the favourable condition (i.e. designated site or species such as SSSI, SAC, SPA, BAP); and/or other policy drivers (e.g. socio-economics, flood management, ecosystem services).
Confidence: High/Medium/Low confidence that the monitoring is robust, suitable and has the potential to show what you are trying to observe within the CRF project time limit.

| **Target/Why**What is the overall objective of the works which are to be monitored? | **What**What are you trying to observe from your monitoring? | **How**What methods are you going to use? | **When**What periods over the year and how often? (to indicate variability)And where if possible | **Who**Who is going to do this? | **Data**What existing data is available in addition to the monitoring being outlined here | **Cost**(can be in kind) | **Which WFD quality element is this helping to achieve?****If not WFD specify (e.g. SSSI, SAC, BAP or other policy driver)** | **Priority**High/medium/low linked to WFD or other designation  | **On target**Are the monitoring tasks outlined running to schedule?(if no specify)NOTE- can use RRC update questionnaires as a start. | **Key reporting tool and reporting output** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Confidence** High/medium/low robustness of monitoring |
| **Will be different for each project – what is the project aim for the area being photographed?**  | A visual change in (please specify) as a result of (please specify) | Fixed point photography – for methodology, refer to RRC’s Practical river monitoring guidance (2011)X number of photos (state if known) & indicate if RRC have been provided with a map of points (Y/N) | E.g. Before, immediately after and post works recommended (state dates if known, e.g. month and year) | Project team/ Volunteers | State if fixed point photography or any anecdotal/ ad-hoc photography prior to CRF | Through project/ In-kind | State which of the following, the FPP demonstrates: a) WFD targets, b) designated river or c) other e.g. social science targets | Priority: Please state (only grey if High) | Yes/ No | A time-series of fixed point photographsState if any other analysis is being done |
| Confidence: Please state (only grey if High) |

* **On target –** Are the monitoring tasks outlined running to schedule? If no, why not?
* **Reporting tool and reporting output –** How will your collected monitoring data be recorded and the analysis outputs reported?

**Example of Fixed Point Photography:**

| **Target/Why**What is the overall objective of the works which are to be monitored? | **What**What are you trying to observe from your monitoring? | **How**What methods are you going to use? | **When**What periods over the year and how often? (to indicate variability)And where if possible | **Who**Who is going to do this? | **Data**What existing data is available in addition to the monitoring being outlined here | **Cost**(can be in kind) | **Which WFD quality element is this helping to achieve?****If not WFD specify (e.g. SSSI, SAC, BAP or other policy driver)** | **Priority**High/medium/low linked to WFD or other designation  | **On target**Are the monitoring tasks outlined running to schedule?(if no specify)NOTE- can use RRC update questionnaires as a start. | **Key reporting tool and reporting output** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Confidence** High/medium/low robustness of monitoring |
| **Improve river habitat and ecology in South Hams area waterbodies**  | Assessment of baseline condition of waterbodies in the South Hams area & identify the benefits of targeted measures on ecology and habitat to review practical measures including: river bank shade management by coppicing, laying & CWD revetment @ 15 sites.  | Catchment walkovers and fluvial audits UKTAG method to produce WFD compatible scoresFixed point photography @ each project site | Pre: Walkover surveys January to March 2013Post: FPP on completion of works & a follow-up is planned for August 2014 for remaining works once vegetation has grown backSpot checks where work has been carried out (October 2014 - March 2015) | WRT  | Existing data collected through other WRT projects; Environment Agency WFD data | Through project | ALL WFD failures in South Hams waterbodies. Catchment walkovers cover the following WFD elements:‘Fish’ - evidence from weir works and habitat changes ‘Phytobenthos’ - nutrients and pathways ‘Copper’ -heavy metal concentrations ‘pH’ - acidity ‘Temperature’ - water | Priority: High | Yes | Catchment walkover reportsTime-series of fixed point photographs |
| Confidence: High |
| **Ease barriers to fish migration** | Determine fish abundance at defined points in the South Hams area.  | Semi-quantitative survey electro-fishing survey on 16 rivers by qualified staff Map providedUse of SNIFFER assessment survey to prioritise weirs (only on Avon) and assess passability post works | Pre: Electrofishing completed on all catchment excluding Yealm due to project delay with staff issues and EA consent. All sites relate to project works.Post: Electrofishing season monitoring August 2014 (after works completed)Undertaking some genetic work to inform our actions | WRT | Existing data collected through other WRT projects; Environment Agency WFD data (e.g. existing electro-fishing sample sites which complement the CRF sampling sites)Note: EA data limited | Through project | ‘Fish’ in all relevant failing waterbodies in the South Hams area | Priority: High | Yes | Data output will be WFD compatible - Fisheries Classification Scheme (FCS2)SNIFFER output – Passability classes  |
| Confidence: Medium (Only 1 pre and 1 post)  |
| **Reduce sedimentation issues in South Hams area waterbodies** | Better understand pollutant dynamics, pathways and interactions with flowChange in benthic macroinvertebrates over time (gravel augmentation sites). | Water quality and hydrometric monitoringReal-time pH loggers | 11 pH loggers deployed measuring 10-15 min samples Diatoms spring & autumn 2013 (map to send separately) | WRT (data collection) in association with University College London (data analysis) | Existing anecdotal data and information gathered about the waterbodies from other projects WRT have been involved in | Through project | WFD failures ‘Dissolved Inorganic Nitrogen’, ‘pH’, ‘Phosphate’ and ‘Ammonia’ in multiple waterbodies | Priority: High | Yes | Biological Monitoring Working Party (BMWP) and River Invertebrate Prediction & Classification System (RIVPACS), NTAXA scores –WFD compatible |
| Confidence: High |
| **Nutrient management** | Reduction in the adverse impact that farming practices have on ecological health of waterbodies in the South Hams area | Report outcome of:- Practical actions- Targeted agricultural advice- 100 free soil testsFixed point photography @ each project siteNutrient modelling with Export Coefficient Model (ECM+), developed with stakeholder input to run scenarios for change  | Post change in farming practices -Winter 2013/14 running nutrient model at baseline and adding work alterations to show reduction | WRT, working with farmers | Existing anecdotal data and information gathered about the waterbodies from other projects WRT have been involved inWRT also have similar proof of concept work in this area having proved the success of farm advice 10 years later via revisits  | Through project | WFD failures ‘Dissolved Inorganic Nitrogen’, ‘pH’, ‘Phosphate’ and ‘Ammonia’ in multiple waterbodies  | Priority: High | Yes | Farm management reportsTime-series of fixed point photographs (for practical actions) |
| Confidence: Medium (expected outcome within the timescale of the CRF programme) |
| **Maximise smolt movements downstream of the Avon Dam to recreated spawning sites** | To estimate the best management cycle of ‘fishery bank release’.Ties in with low flow analysis and assessment of weir works being done through CRF on the River Avon | Radio tag migrating smolts and recording movements vs. flow-based movements  | Smolt tagging & remotely operated vehicle (ROV) deployment in April 2014 to study smolt holding areas; in conjunction with fisheries bank water release. End estimated to be July 2014 as through only one season (one year, one off). | WRT | Existing anecdotal data and information gathered about the waterbodies from other projects WRT have been involved in | Through project | ‘Fish’ in all relevant failing waterbodies in the South Hams area | Priority: High | Yes | Model calibration from stakeholder input workshop |
| Confidence: High |
| **Reduce impact of pH on biodiversity (feasibility study)** | Reduction in the adverse impact that acidified moorland (creates low pH levels) has on ecological health of waterbodies in the South Hams area. | Real time data loggers measuring pH, to indicate acidity,at sample points (map provided) across the South Hams area | pH loggers deployed measuring 10-15 min samples Pre: pH loggers deployed in June 2013 Post: Data collection over a year June 2014 | WRT (data collection) in association with University College London (data analysis) | 10 year partnership project with the Environment Agency on “Effects of pH on salmonids physiology & river biodiversity” and related data sets/ studies | Through project | Investigation into solutions to reduce ‘pH’ (a failure in multiple waterbodies in the South Hams area. | Priority: Medium (investigative only) | Yes | Dataset from data loggers, ‘pH’ is the metric. |
| Confidence: High |