**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 photographs  State 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 | |
| **Improvement in spawning habitat for fish and other aquatic species** | | Increase in fish abundance following habitat creation works (gravel augmentation at 15 sites; gravel loosening at 15 sites; and gravel washing at 10 sites) | | Semi-quantitative Fry index electro-fishing survey as fish abundance indicator @ site, above (control sites) & one below each intervention site, in accordance with standard methods.  Fixed point photography @ each site where physical works are completed (woody material, habitat improvement). | | All pre and post  Electrofishing, summer 2012, 2013, 2014  Fixed point photography pre and post habitat creation | | WRT staff | | Good baseline data along the Haddeo. Existing data through other WRT projects & Environment Agency electro-fishing at sample sites in addition to the CRF ones). | | Through project with in-kind volunteer support (habitat works) | | Haddeo (WB GB108045015090)  Fish (Moderate) to (Good) | | Priority: High | | Yes | All electrofishing data (including EA data) uploaded to a GIS database.  Time-series of photographs |
| Confidence: Medium (only 1 pre and 2 post) | |
| **Improvement in instream cover and habitat for fish and other aquatic species** | | Increase in fish abundance following habitat creation works (selective coppicing and introduction of woody material (25 stems) | | Semi-quantitative Fry index electro-fishing survey as fish abundance indicator @ site, above (control sites) & one below each intervention site, in accordance with standard methods.  Fixed point photography @ each site where physical works are completed (woody material, habitat improvement). | | All pre and post  Electrofishing, summer 2012, 2013, 2014  Fixed point photography pre and post habitat creation | | WRT staff | | Existing data through other WRT projects & Environment Agency electro-fishing at sample sites in addition to CRF ones) – the new sample points upstream will be important in determining the outcome of these actions. | | Through project with in-kind support from the local college | | River Pulham (WB GB108045020910)  Fish (Poor) to (Moderate) | | Priority: High | | Yes | All electrofishing data (including EA data) uploaded to a GIS database.  Time-series of photographs |
| Confidence: Medium (only 1 pre and 2 post) | |
| **Improvement in instream cover and habitat for fish and other aquatic species** | | Increase in fish abundance following habitat creation works (selective coppicing and introduction of woody material (50 stems) | | Semi-quantitative Fry index electro-fishing survey as fish abundance indicator @ site, above (control sites) & one below each intervention site, in accordance with standard methods.  Fixed point photography @ each site where physical works are completed (woody material, habitat improvement). | | All pre and post  Electrofishing, summer 2012, 2013, 2014  Fixed point photography pre and post habitat creation | | WRT staff | | Existing data through other WRT projects & Environment Agency electro-fishing at sample sites in addition to the CRF ones). | | Through project | | River Batherm (WB GB108045014860) Fish (Moderate) to (Good) | | Priority: High | | Yes | All electrofishing data (including EA data) uploaded to a GIS database.  Time-series of photographs |
| Confidence: Medium (only 1 pre and 2 post) | |
| **Reduction in intrusion of livestock and bank side erosion; & reduction in agricultural runoff through an improvement in farming practices** | | Mitigate bank erosion; and reduce/ mitigation substances which have an adverse impact on water quality and aquatic species prior to entering affected watercourses. | | Fixed point photography @ each site where physical works are completed (fencing, restrictions on drinking areas for livestock).  Farm demonstration workshops & soil tests will be made available to farmers throughout the catchment. | | Fixed point photography pre and post habitat works  Informal one-on-one conversations with 4/5 farmers in spring 2014  25 soil tests per year  Diatom sampling @ farm & D/S where a water quality issue was identified | | WRT staff  Ben Goldsmith (UCL) – reporting on data sampled by WRT for diatoms | | First data collected upstream of the ‘identified’ WFD sample point where failure was recorded in 2009 – so investigating source through this monitoring. | | Through project | | River Batherm (WB GB108045015070)  Phytobenthos (Poor) to (Moderate) | | Priority: High | | Yes | Time-series of photographs  Database of farm advice and grants, specifics what is granted. |
| Confidence: Medium (expected outcome within the timescale of the CRF programme) | |
| **Improve migratory fish passage for all species on the Exe, and improvement in instream cover and habitat for fish and other aquatic species** | | Change in fish population statistics (particular focus on salmon & trout) in habitats above 3 weirs (Pynes SX 917 626, Exwick SX 905 505 and Cowley SX 908 537) | | Semi-quantitative Fry index electro-fishing survey as fish abundance indicator upstream and downstream of the weirs & @ habitat sites, undertaken in accordance with standard methods.  Fixed point photography @ each site where physical works are completed (weir easement, selective coppicing and introduction of woody material). | | All pre and post  Electrofishing, summer 2012, 2013, 2014  Fixed point photography pre and post habitat creation | | WRT staff | | Existing data through other WRT projects & Environment Agency electro-fishing at sample sites in addition to the CRF ones). | | Through project | | River Exe (WB & GB108045015060)  Fish (Moderate) to (Good)  *Improvements in water quality from upstream reaches should benefit Phytobenthos, currently failing (Moderate) in 3 Exe waterbodies* | | Priority: High | | Yes | All electrofishing data (including EA data) uploaded to a GIS database.  Time-series of photographs |
| Confidence: Medium (insufficient time within CRF to assess post weir works, but WRT has secured funds to assess success in 2015). | |
| **Improvement of river habitat on the River Culm & tributaries** | | Increase in fish abundance following habitat creation works (selective coppicing and introduction of woody material (25 stems) | | Semi-quantitative Fry index electro-fishing survey as fish abundance indicator @ habitat sites, undertaken in accordance with standard methods (control sites depend on funding for the Sheldon Stream).  Fixed point photography @ each project site where physical works are completed (woody material, habitat improvement). | | All pre and post  Electrofishing, summer 2012, 2013, 2014  Fixed point photography pre and post habitat creation | | WRT staff | | Existing data through other WRT projects & Environment Agency electro-fishing at sample sites in addition to the CRF ones). | | Through project | | Directly addresses:  River Culm (WB  GB108045015000)  Fish (Poor) to (Moderate)  Also: likely indirect improvement in Phytobenthos (Poor) to (Moderate); through CRF & Catchment Sensitive Farming programme. | | Priority: High | | Yes | All electrofishing data (including EA data) uploaded to a GIS database.  Time-series of photographs |
| Confidence: Medium (only 1 pre and 2 post) | |
| **Improve migratory fish passage for all species on the River Culm** | | Change in fish population statistics in habitats above baulk passes installed at two weirs (Whitehall and Smithincott) | | Semi-quantitative Fry index electro-fishing survey as fish abundance indicator upstream and downstream of weirs, in accordance with standard methods.  Fixed point photography @ each weir easement site. | | All pre and post  Electrofishing, summer 2012, 2013, 2014  Fixed point photography pre and post habitat creation | | WRT staff (2012 baseline & 2014 survey)  EA electrofishing did it summer 2013. | | Existing data through other WRT projects & Environment Agency electro-fishing at sample sites in addition to the CRF ones). | | Through project | | River Culm (WB GB108045014980)  Fish (Poor) to (Moderate) | | Priority: High | | Yes | All electrofishing data (including EA data) uploaded to a GIS database.  Time-series of photographs |
| Confidence: Medium (only 1 pre and 2 post) | |
| **Reduction in intrusion of livestock and bank side erosion; & reduction in agricultural runoff through an improvement in farming practices** | | Mitigate bank erosion and mitigate substances which have an adverse impact on water quality prior to entering failing watercourses.  Diatom sampling to assess water quality failures | | Fixed point photography @ each site where physical works are completed (fencing, installation of alternate drinking points for livestock).  Farm demonstration workshops & soil tests  Diatoms - Kelly et al. (2001) method. 5 stones scrubbed per sampling point | | Fixed point photography pre and post habitat works  25 soil tests per year  Diatom sampling (part of farm test) | | WRT staff (FPP & soil testing)  Ben Goldsmith (UCL) – reporting on data sampled by WRT for diatoms | | Existing data collected through other WRT projects; Environment Agency WFD data (e.g. existing electro-fishing sample sites which complement the CRF sampling sites). | | Through project | | Blackwater (WB GB108045008850)  Phosphate (Poor) to (Moderate) | | Priority: High | | Yes | Time-series of photographs  Database of farm advice and grants, specifics what is granted. |
| Confidence: Medium (expected outcome within the timescale of the CRF programme) | |
| **Improve access to salmonids to the headwaters of the River Axe** | | Change in fish population statistics in habitats above 2 weirs (Clapton weir and at Manor Farm, Seaborough) | | Semi-quantitative Fry index electro-fishing survey as fish abundance indicator upstream and downstream of weirs, in accordance with standard methods.  Fixed point photography @ each weir easement site. | | All pre and post  Electrofishing, summer 2012 & 2014  Fixed point photography pre and post habitat creation | | WRT staff | | Existing data collected through other WRT projects; Environment Agency WFD data. | | Through project | | Axe (WBs GB108045014840 & GB108045008870)  Also: likely indirect improvement in Phytobenthos (Poor) to (Moderate); through CRF & Catchment Sensitive Farming programme. | | Priority: High | | Yes | All electrofishing data (including EA data) uploaded to a GIS database.  Time-series of photographs |
| Confidence: Medium (only 1 pre and 1 post) | |
| **Reduction in direct run-off from forestry tracks to the river** | | Improvement in water and sediment quality after installation of sediment traps/ diverters | | Redox potential within the salmon spawning sediments (gravels) within the river using pH samplers as a trial method.  Fixed point photography @ each site where physical works are completed (woody material, habitat improvement) | | All pre and post.  Electrofishing, summer 2012, 2013, 2014 (Same site on Haddeo, stated earlier in table)  Fixed point photography pre and post installation of sediment traps/ diverters  Diatom sampling to assess water quality | | WRT staff  Plymouth University (redox pH trial) | | Environment Agency have diatom data for lower Haddeo & flow data for catchment to assess flow curve longevity & influence of reservoir release | | Through project | | Trial as part of the CRF project  May benefit Phytobenthos, which is currently failing (Moderate) in both Haddeo waterbodies but as trial method, unknown impact/s | | Priority: Medium (investigative trial) | | Yes | - pH  - Redox potential  - Diatom survey data  Time-series of photographs |
| Confidence: Medium (only 1 pre and 2 post; trialled method) | |
| **Reduction in direct run-off from forestry tracks to the river** | | Improvement in water and sediment quality after installation of sediment traps/ diverters | | Redox potential within the salmon spawning sediments (gravels) within the river using pH samplers as a trial method.  Fixed point photography @ each site where physical works are completed (woody material, habitat improvement) | | All pre and post  Electrofishing, summer 2012, 2013, 2014 (Same site on Pulham, stated earlier in table)  Fixed point photography pre and post installation of sediment traps/ diverters | | WRT staff | | No existing research/ data collection into sediment/ gravel. | | Through project | | Trial as part of the CRF project  May benefit Phytobenthos in River Pulham (WB GB108045020910); but not stated as failing | | Priority: Low (investigative trial, waterbody not failing) | | Yes | - pH  - Redox potential  - Diatom survey data  Time-series of photographs |
| Confidence: Medium (only 1 pre and 2 post; trialled method) | |