



The Taw River Improvement Project

A Catchment Restoration Fund Project







The Taw River Improvement Project (TRIP) is a Catchment Restoration Funded Project, which was administered by the Environment Agency. The project was written and delivered by the Westcountry Rivers Trust in association with the North Devon Catchment Partnership.

The project was delivered over three years (2012-2015), with the primary aim of delivering targeted action to make significant steps towards achieving Water Framework Directive (WFD) waterbody objectives set out in the 2009 River Basin Management Plans.

This report documents the works delivered under the TRIP and describes how these works were targeted to ensure that efficient on the ground management was delivered effectively throughout the catchment.

Although the TRIP has completed its final year, the work that has been delivered and the valuable information and data that has been collected will provide a solid foundation to build upon in the future. This not only provides wider benefits to the society and the environment, but also provides a valuable tool to aid in building a sustainable future for the catchment as whole.

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Image: River Taw at Taw Green by Nick Paling



The Catchment Restoration Fund

The Department for Environment, Food and Rural Affairs (Defra) created the Catchment Restoration Fund (CRF) in 2012 to help achieve the Water Framework Directive (WFD) status objectives set out for waterbodies in the 2009 River Basin Management Plans (RBMPs).

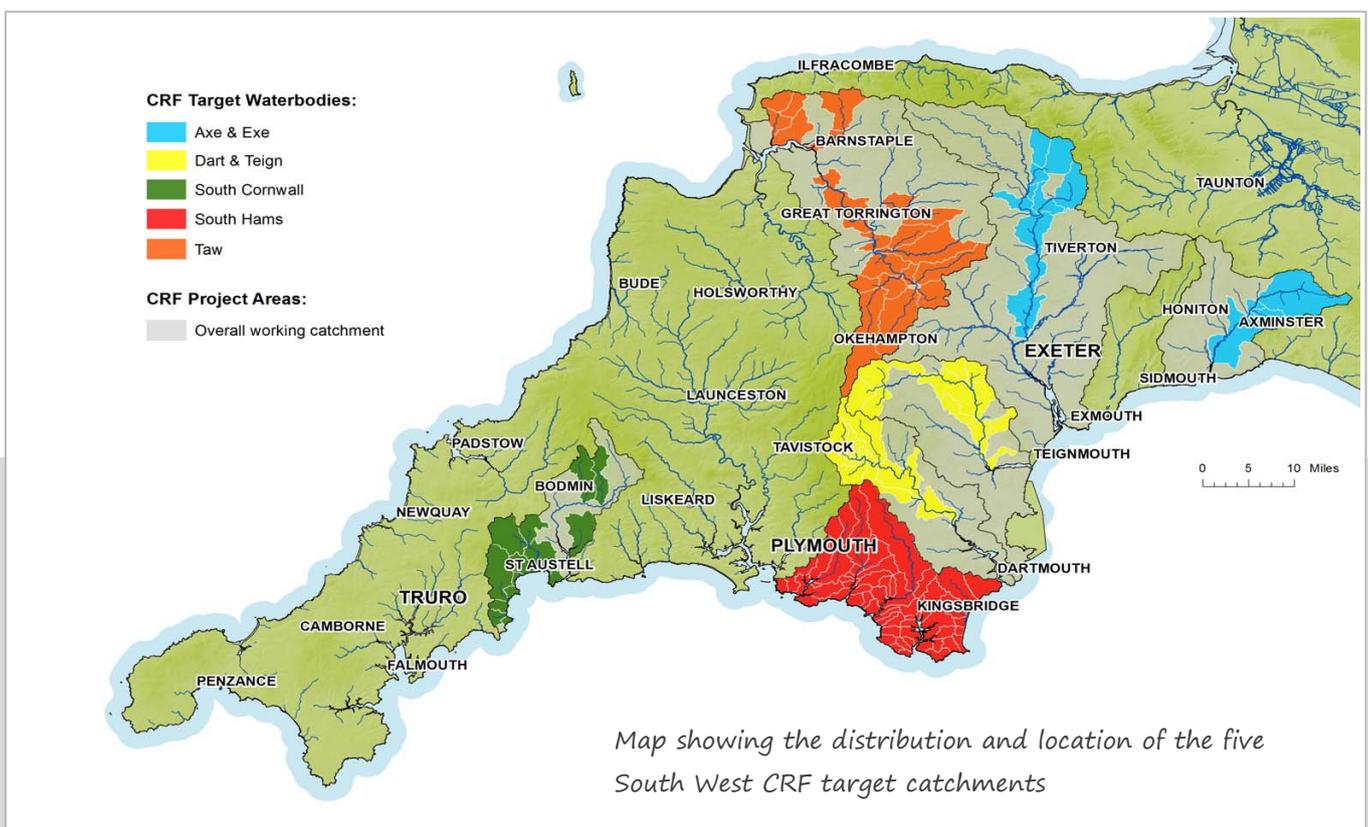
The fund was allocated for projects in England to be delivered in 2012/13, 2013/14 and 2014/15. The CRF was administered by the Environment Agency to support third sector organisations to deliver catchment-level projects designed to fulfil the following objectives:

- Restore natural features in and around watercourses;
- Reduce the impact of man-made structures on wildlife in watercourses;
- Reduce the impact of diffuse pollution that arises from rural and urban land use.

While the South West of England has some of the UK's most iconic and beautiful rivers, many of them are experiencing pressures, both current and historic, that limit their ability to function naturally and which cause them to become ecologically degraded.

In 2012, responding to these problems, the Westcountry Rivers Trust (WRT) secured CRF funding to deliver over £4 million of river restoration and catchment management work over three years on river catchments across the South West. These river and catchment restoration projects have been delivered on the rivers of the South Hams, the Axe and Exe, the Dart and Teign, the Rivers of South Cornwall and the Taw.

These river improvement projects were specifically developed using a rigorous evidence-led, partnership approach to mitigate the pressure acting on these rivers and improve the health of these precious and vital river ecosystems.





River Catchment Overview

The Taw Catchment

The Taw catchment covers over 1,200km² of North Devon and the main River Taw stretches for over 100km up to Dartmoor National Park at its source. In addition, several tributaries in the north and east of the catchment have their sources in Exmoor National Park.

The Taw Catchment, which lies within North Devon's UNESCO Biosphere Reserve, can be divided into three main areas; the Lower Taw, Upper Taw and the River Mole sub-catchment. The whole area supports numerous areas of conservation importance from both sources in Dartmoor and Exmoor National Parks, down to the sea where the river empties into the Taw and Torridge estuary, a Site of Special Scientific Interest.

The Taw has a varied landscape, including rare Culm grasslands, marshland, parts of the two National Parks of Exmoor and Dartmoor, and woodlands. Much of the countryside in the catchment is recognised for its environmental and cultural value including an Area of Outstanding Natural Beauty (AONB).

The Taw catchment is largely agricultural with small market towns inland, such as South Molton, Chulmleigh and Witheridge, and larger urban centres at Barnstaple and Bideford on the Taw-Torridge Estuary to the north.

Pressures on the Catchment

Intensive farming can often give rise to physical pressures on the river corridors through sediment input caused by erosion, and chemical pressures through the use of pesticides and fertilisers.

The Taw catchment is largely composed of agriculture, many riparian fields are pasture for grazing animals, where

River Taw

Catchment Size:	1,200 km ²
Source	Dartmoor
Mouth	Taw & Torridge Estuary
Designations	SSSI, SAC, AONB
Species	Freshwater Pearl Mussel, Atlantic Salmon, Trout, Otter, Eel, Lamprey
WFD RFF	Fish, Phosphate

unprotected banksides can become heavily eroded by regular livestock access; this therefore causes increased sediment input into the watercourse.

Due to the geology of the Taw catchment this sediment issue can become exacerbated, the meandering river causes thick carved channels, causing subsequent sediment loads. This can adversely affect water quality and therefore WFD status.

The Taw catchment has within it a high percentage of wooded areas next to the watercourses which can bring about other issues, including increased levels of in-channel woody debris and sediment input from heavily managed and felled coniferous plantations.

Conversely, if woodlands are well managed they can be of benefit to water quality by acting as efficient buffers.



Heavily eroded banks (River Mole 2012)

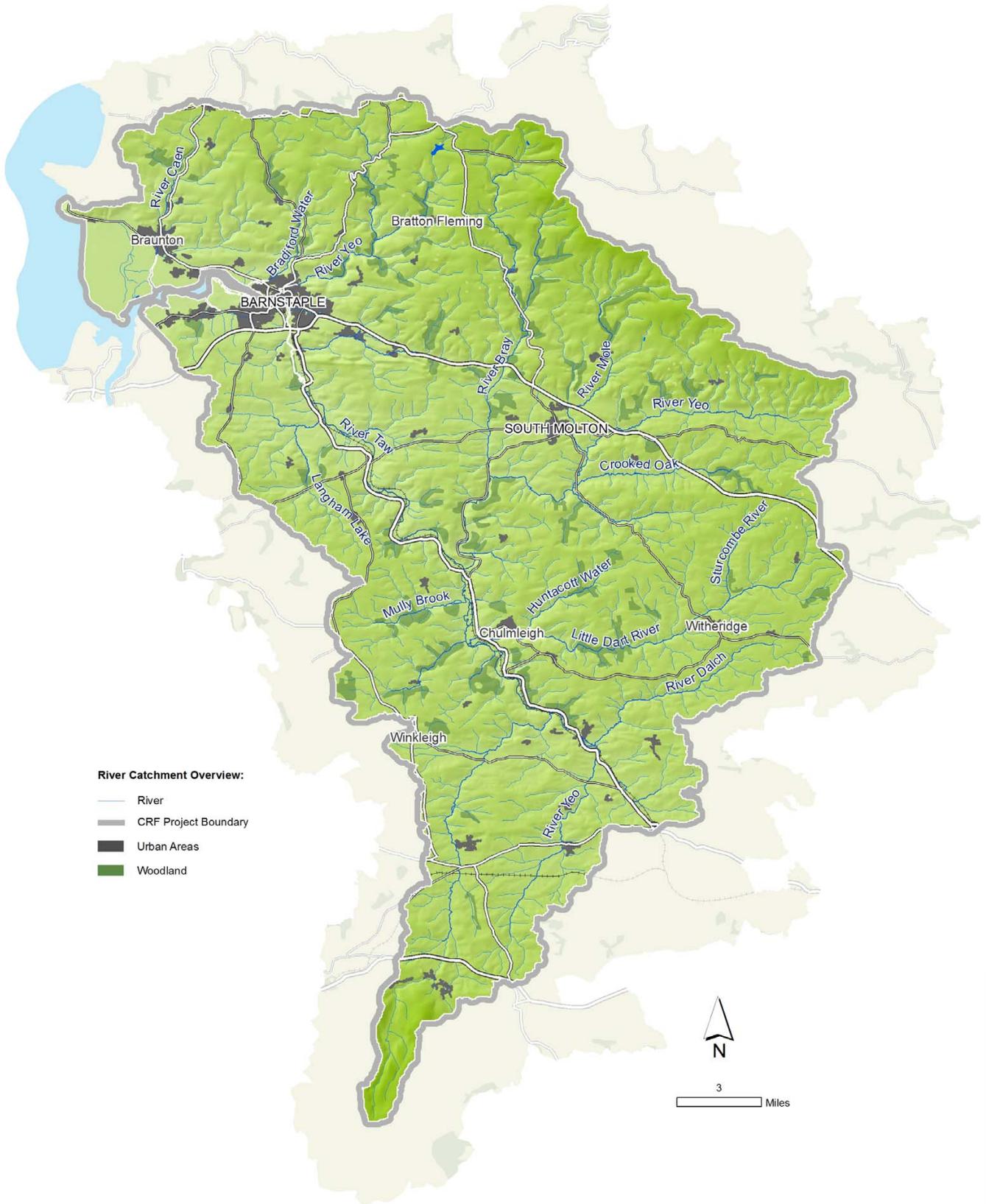


Well used animal access point



River Catchment Overview

Map showing an overview of the small streams, tributaries and rivers of the Taw river catchment.

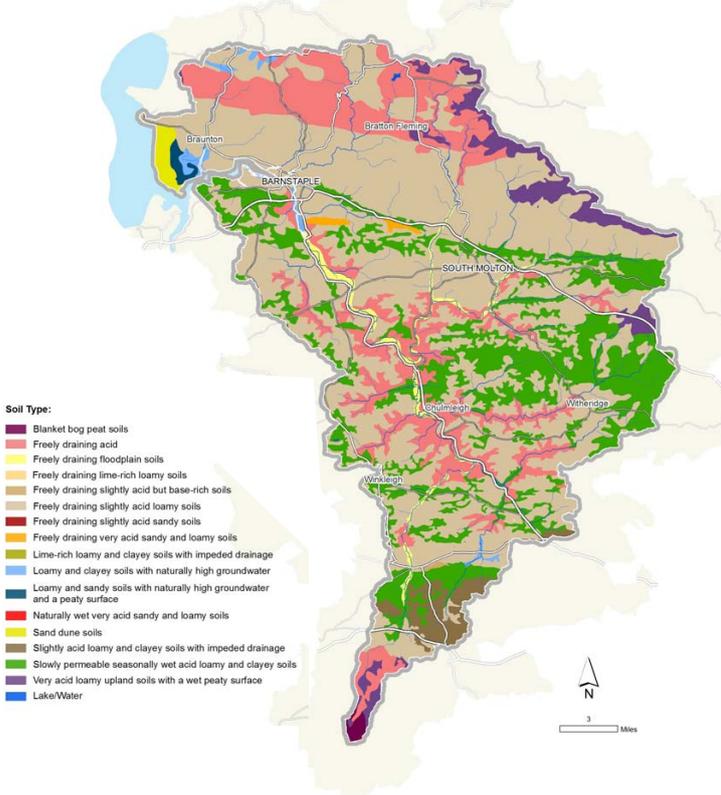




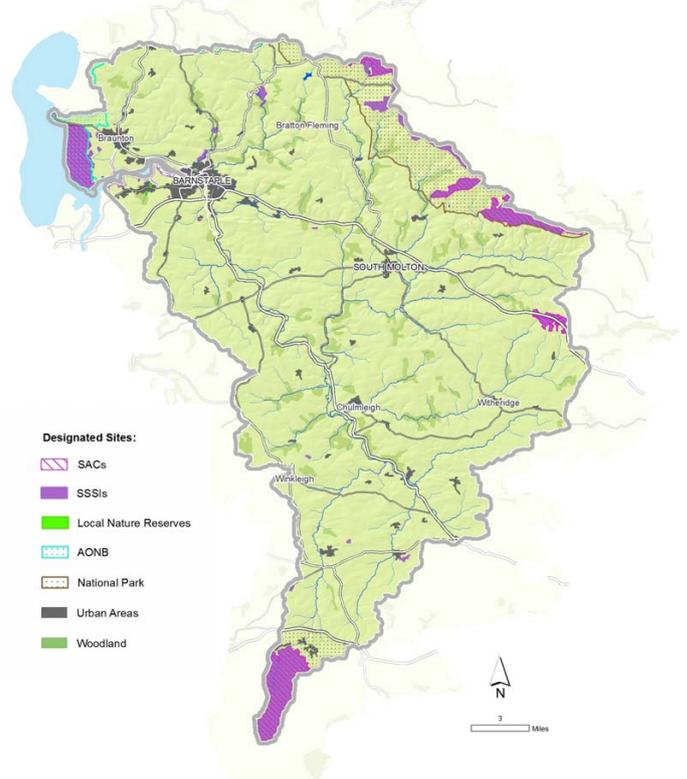
River Catchment Overview

Landscape Characteristics of the Taw Catchment

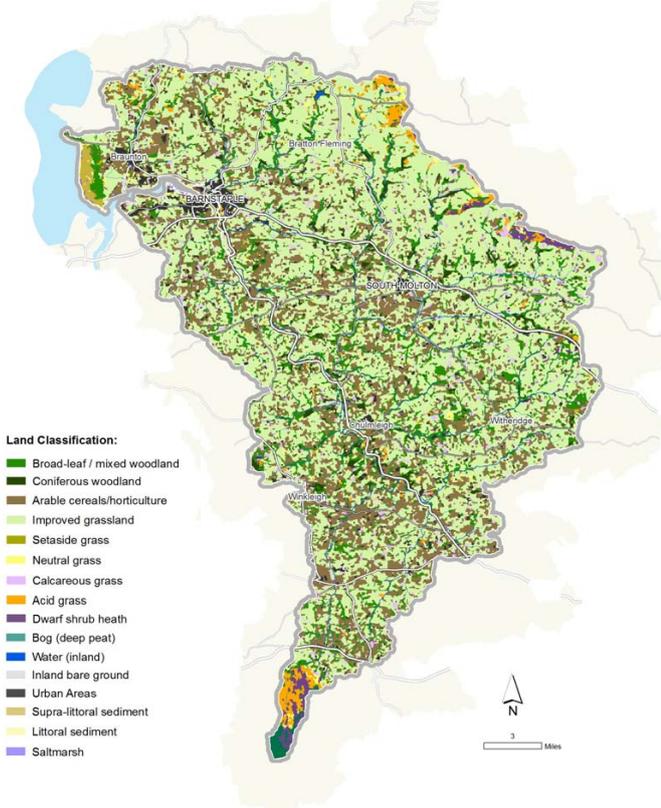
Distribution of soil type



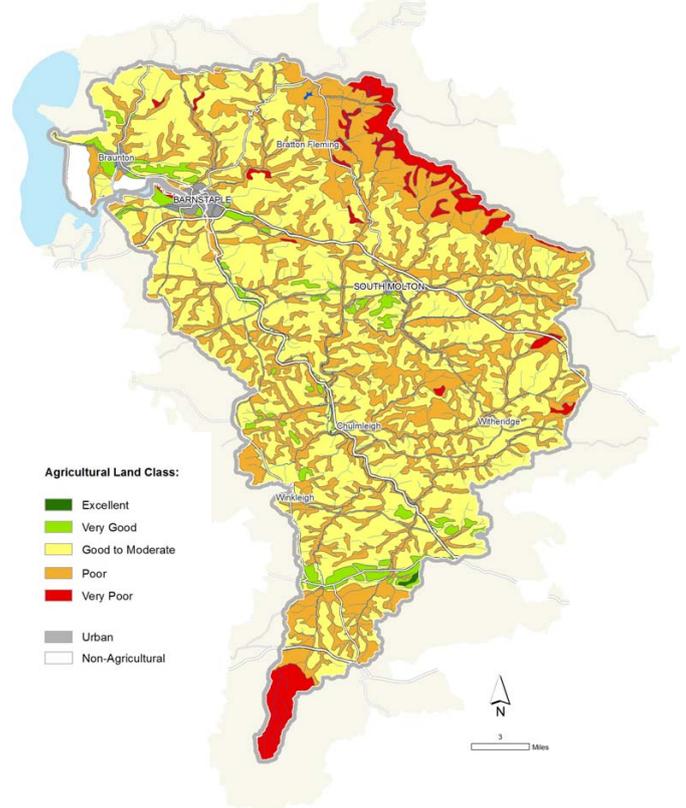
Designated Sites & Protected Areas



Land Classification



Agricultural Land Class





WFD Classification

The most important set of evidence that we can use to assess the condition of the waterbodies in the Taw river catchment is their Water Framework Directive (WFD) classification. The associated Reason for Failure information collected by the Environment Agency also helps us target interventions to mitigate pressures acting on these waterbodies. This data is shown on the following two pages.

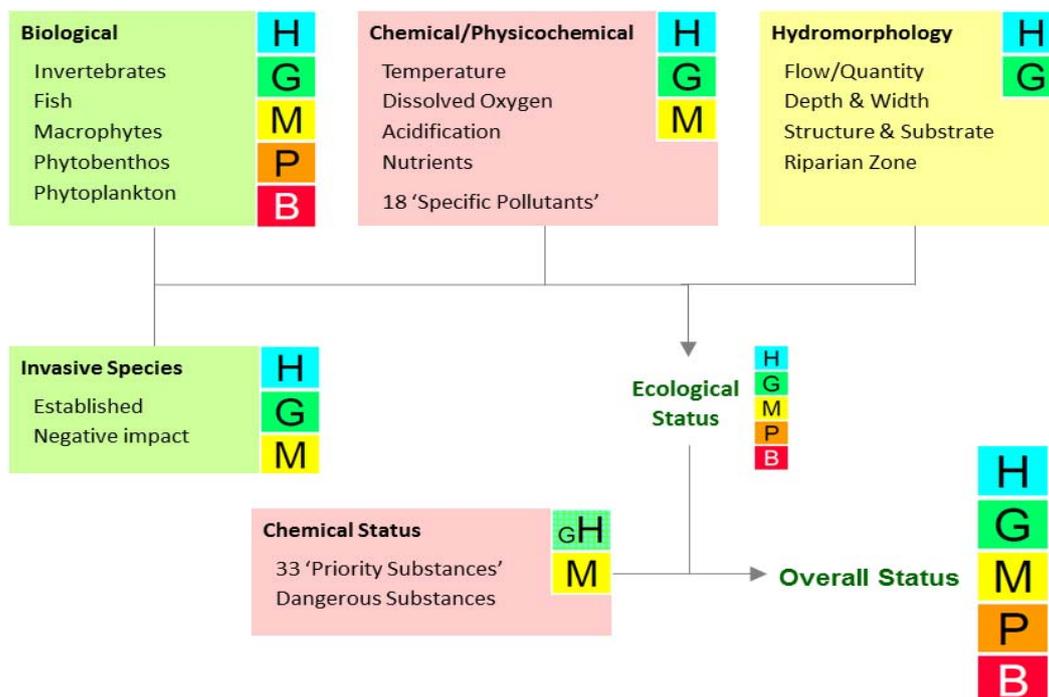
WFD condition assessments are currently undertaken by the Environment Agency using methodologies agreed with the UK Technical Advisory Group (UK TAG) and recommendations for remedial catchment management interventions are made through River Basin Management Plans (RBMPs).

For surface waters, such as rivers and lakes, the 'overall status' of a waterbody is comprised of an ecological and a chemical component. The ecological status of a waterbody is primarily measured using a series of biological parameters and is recorded on the scale high, good, moderate, poor and bad (with moderate or worse being regarded as failure).

To determine a WFD classification the degree of disturbance to each quality element is assessed against a 'reference value or set of values' for that element. A reference value for a biological quality element is a value identified from the range of values the quality element may have when subject to no or only very minor alteration as a result of human disturbance (i.e. when it is in a reference, or high status, condition).

In addition to the biological characterisation of waterbody condition, classifications are also supported by assessments of three further components of the environment: 1) morphology (physical structure); 2) hydrology (flow and water levels), and 3) chemistry (including general water quality, physico-chemistry, and chemical pollutants.). Annex V of the WFD identifies these components as 'elements supporting the biology'.

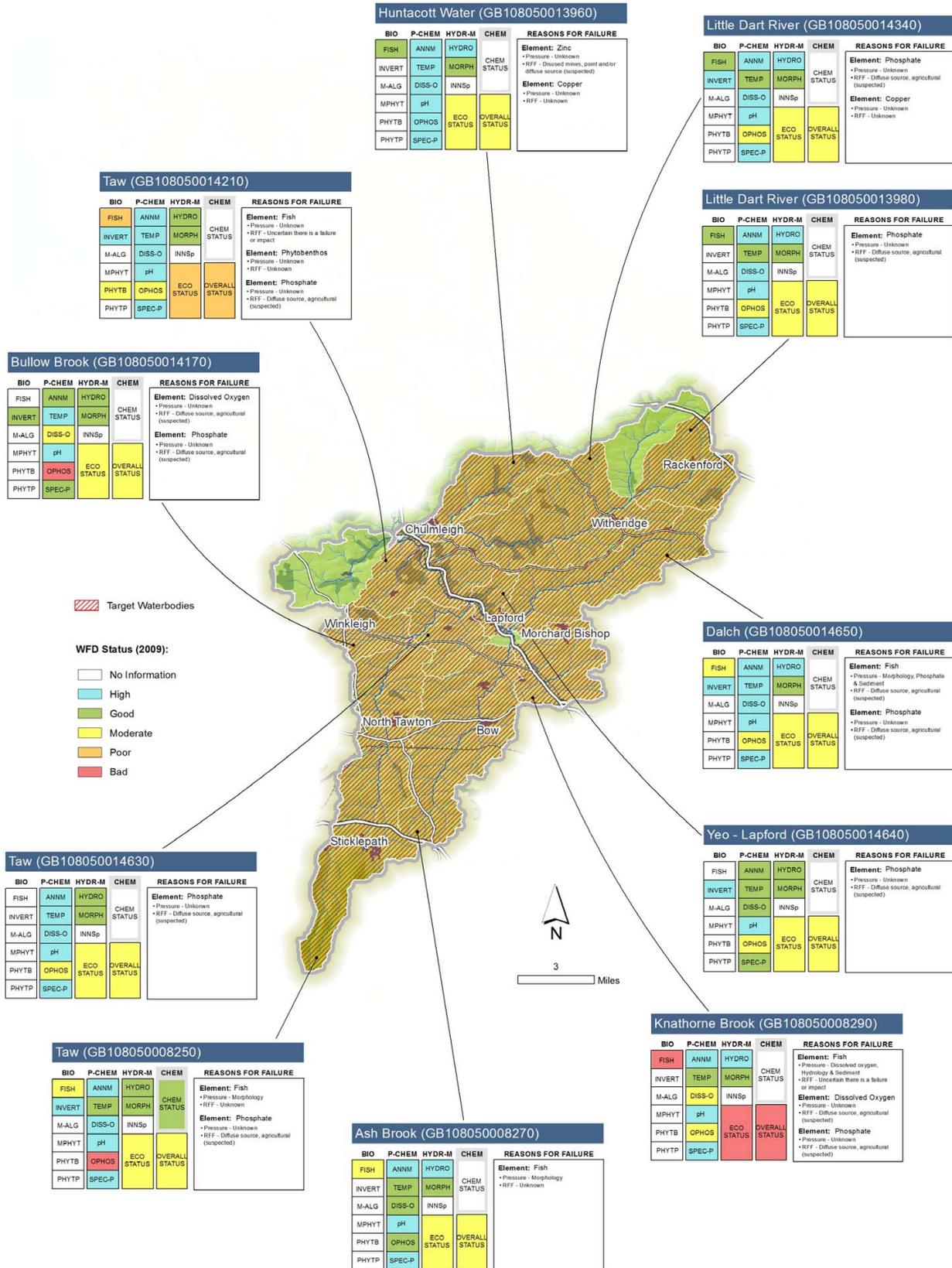
The schematic below shows how Overall WFD status is determined. Once the individual elements have been assessed the lowest classification recorded for any of the parameters will form the final WFD classification for that waterbody (this is referred to as 'one out, all out').





Upper Law Catchment Report Card 2009

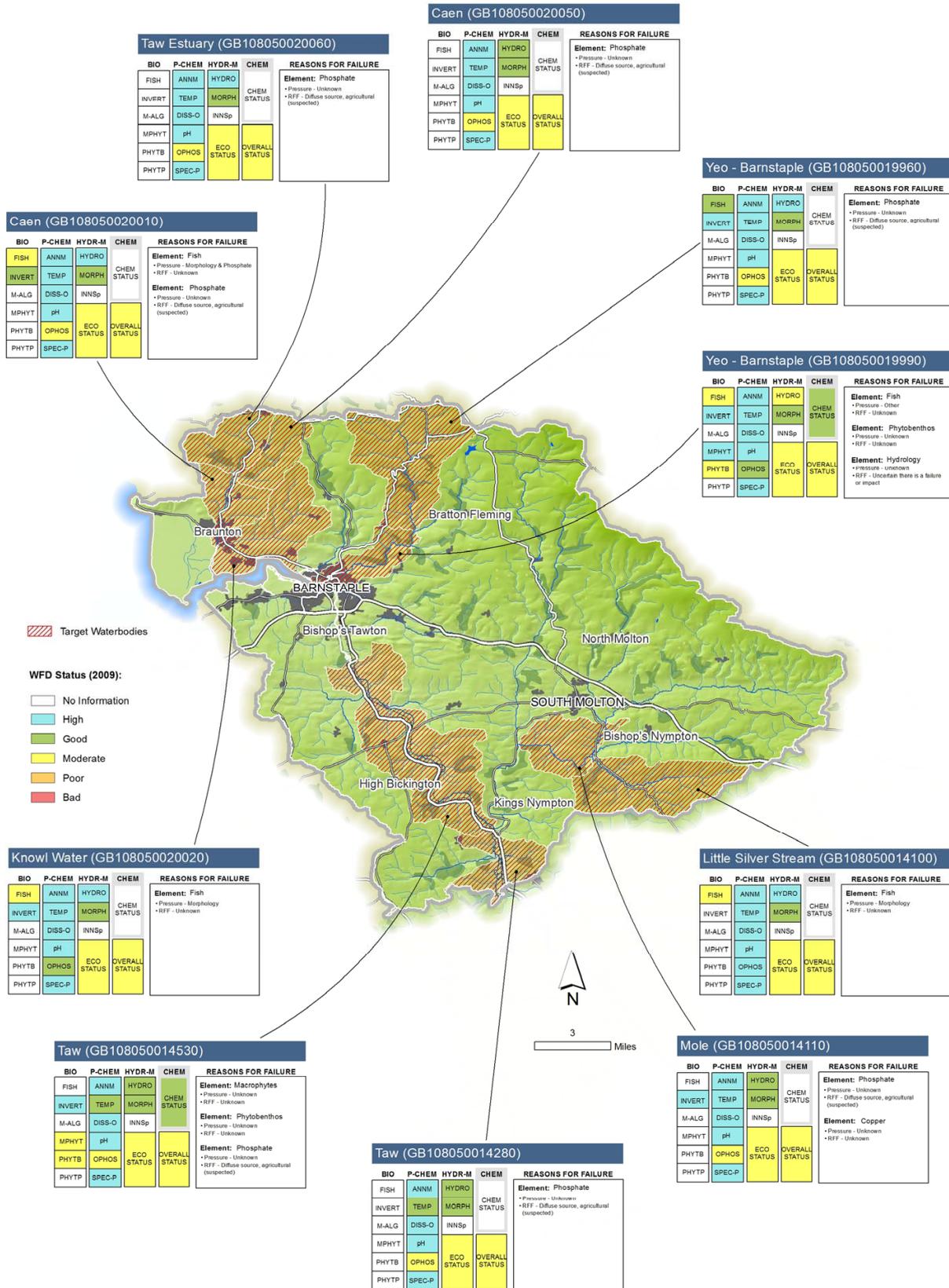
Map showing 2009 WFD Classifications and Reasons for Failure





Lower Taw Catchment Report Card 2009

Map Showing 2009 WFD Classifications and Reasons for Failure





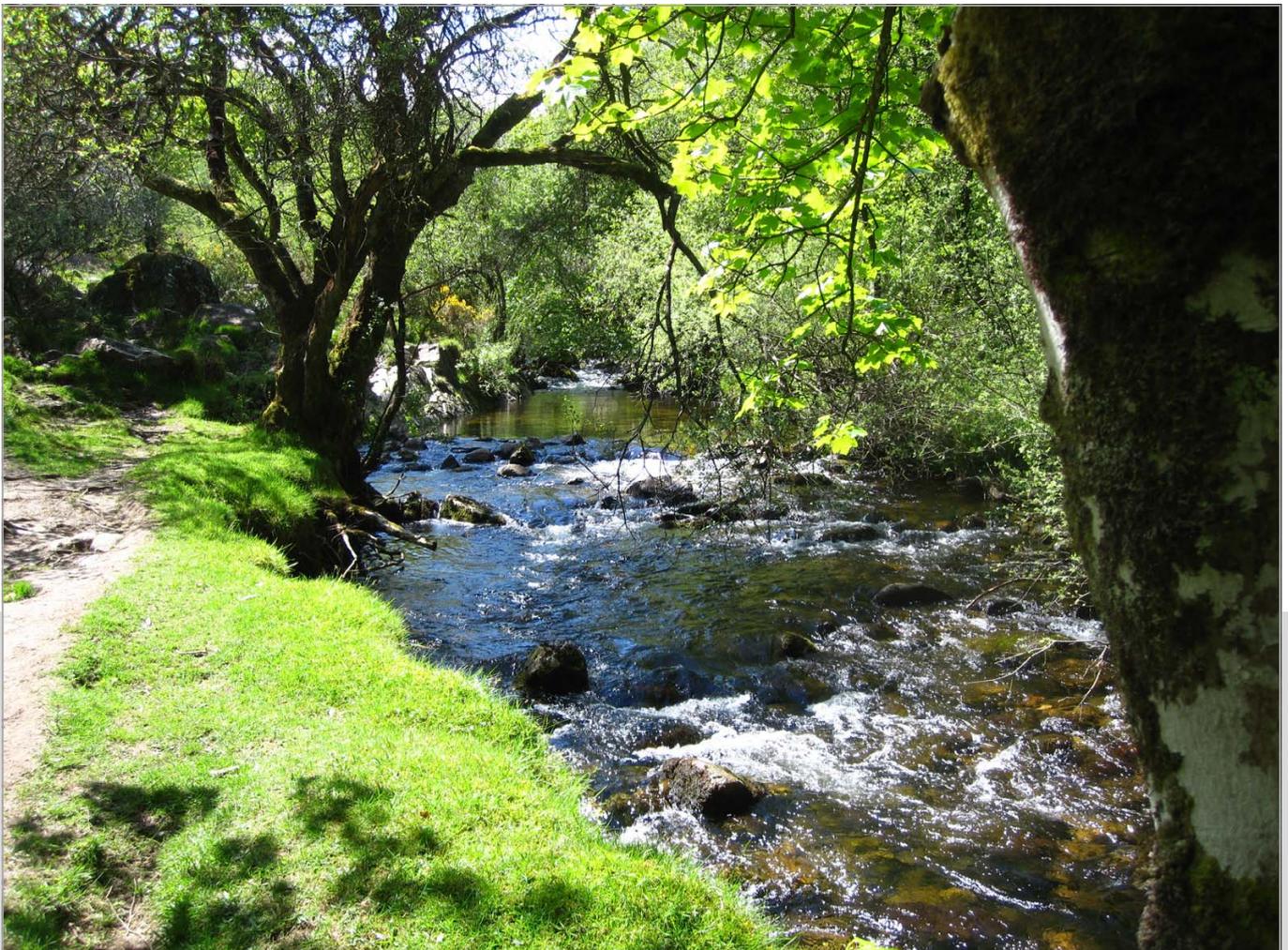
The Taw River Improvement Project (TRIP)

The main aim of the Taw River Improvement Project (TRIP) was to improve the catchment's overall status and water protection objectives under the Water Framework Directive (WFD).

In 2009 WRT led the Taw Access Over Weirs Project which was designed to address some of the multiple river connectivity issues on the Taw. In 2012 the Taw River Improvement Project (TRIP) was written which aimed to continue some of the successful work completed in 2011, while also addressing the catchment's other WFD reasons for failure, such as Phosphate.

This project was led by WRT and its active partnership working with a number of land management focused organisations including Devon Wildlife Trust, FWAG South West, Silvanus Trust and the North Devon Biosphere Reserve. Other partners that were part of the steering group include Natural England, Tarka Country Trust, the River Taw Fisheries Association, South West Water and the Environment Agency.

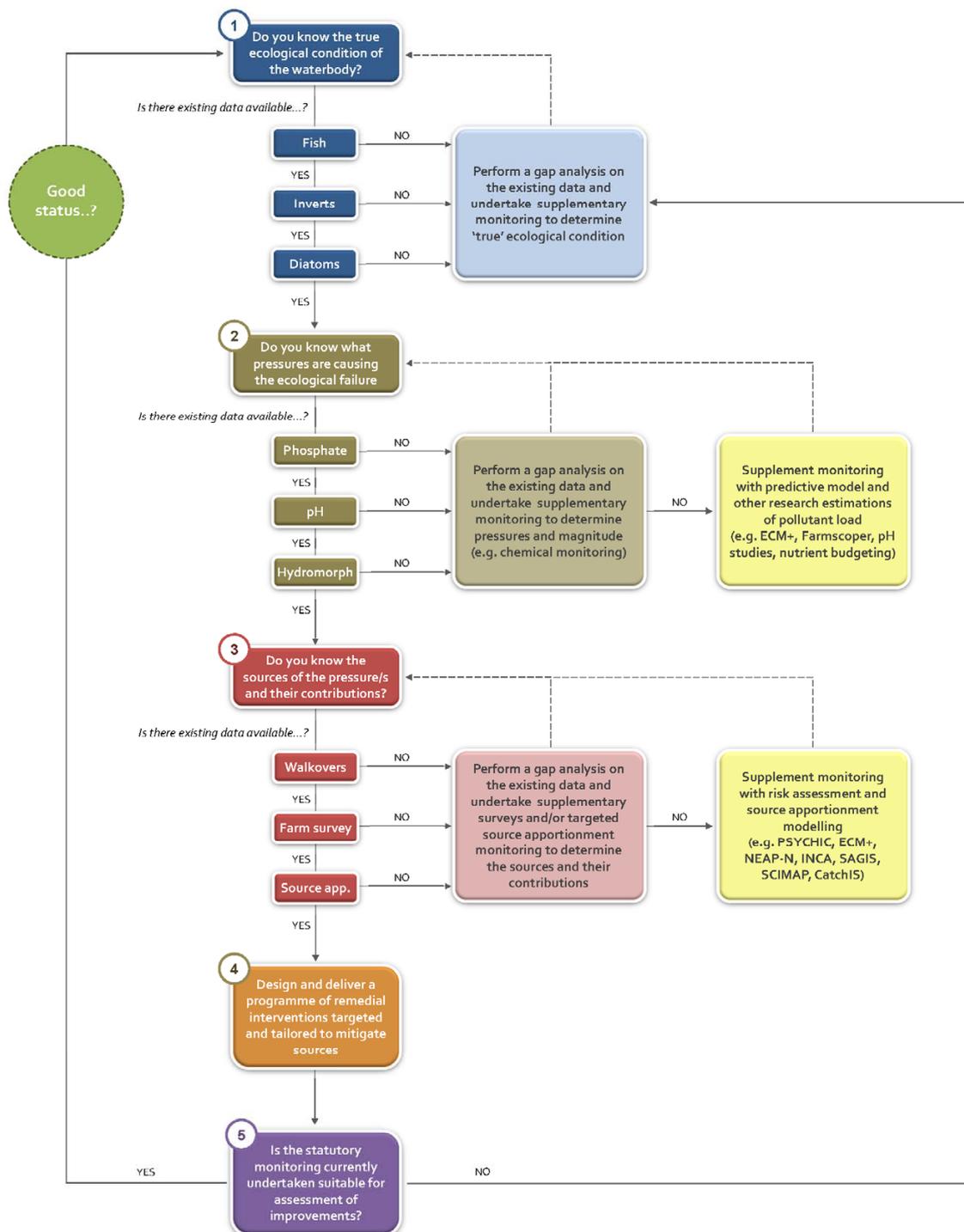
Some benefits of the TRIP include improving water resource management; helping to improve water quality; improve the ecological health and biodiversity of the river and surrounding habitats; improve the leisure environment for recreation and angling; conserve and restore fish populations; contribute to flood attenuation and management and increase capacity for carbon sequestration within the catchments.





This report

This Catchment Restoration Funded Project report has been written from a WFD Reason for Failure point of view. This is because all of the work conducted within the project was designed to address specific environmental pressures, aiming to restore freshwater habitats to their natural condition and target waterbodies failing to reach good ecological status under the WFD. Therefore the report has been divided into specific chapters relating to each reason for failure, where a full account of the investigations and works conducted to address those failures have been made.



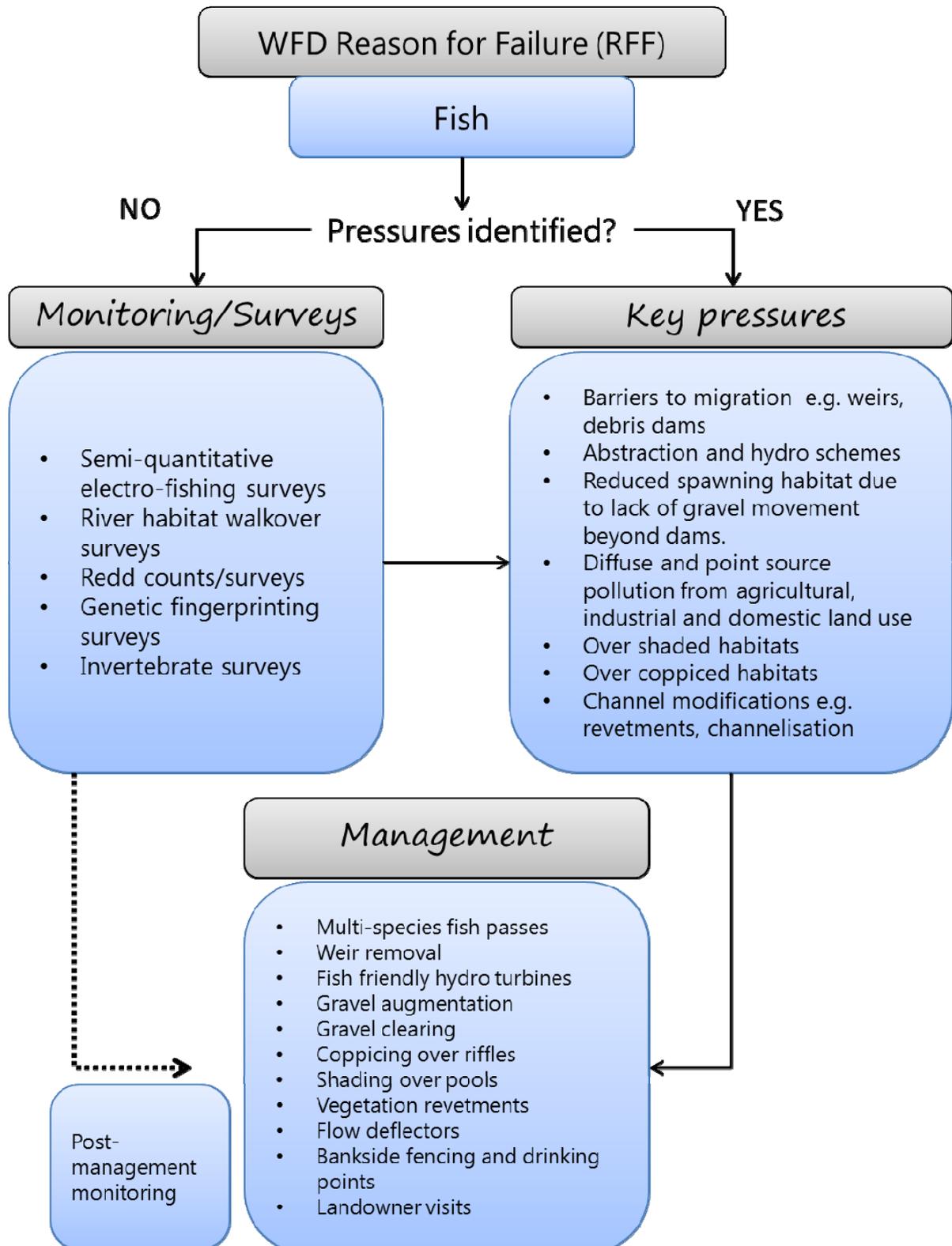


FISH



Targeting interventions for fish

Flow diagram to illustrate how CRF works within the TRIP were targeted and driven by WFD.





Identification of pressures & Reasons for Failure

Investigative monitoring: a key component of fisheries management

Monitoring is a key component of fisheries management. It is used to investigate the pressures which are causing the failure of a waterbody to reach WFD objectives and it is used throughout a management programme to assess its effectiveness. Monitoring is most effective if it is conducted regularly so that data can be collected even once a management project has ceased, as this ensures future management can be targeted efficiently and effectively.

Electrofishing surveys are the primary method to assess fish population densities, diversity and distribution within a river. Electrofishing is especially effective at monitoring the impact of a barrier on fish movement and the effectiveness of the intervention once the barrier has been removed or mitigated. Redd counting is another survey method which can be very useful in investigating the impacts of barriers and their mitigation.

The biological and physiochemical components of water quality can be measured in a number of ways. Biological methods commonly adopted include diatom, macrophyte and invertebrate sampling, which uses indicator species to assess the levels of nutrient enrichment or pH aberration within a river. In addition to the biological measures of river ecological health, the physical and chemical properties of the water are assessed through the taking and analysis of monthly water samples to determine whether the water is able to support the good ecological health of the river.

Barriers to Migration and Abstraction

Many fish, particularly species that are highly migratory, require different riverine environments for the different phases of their lifecycle. Anadromous species in particular, such as salmon and sea trout, migrate in order to reproduce; therefore barriers to migration such as weirs, culverts and structures related to abstraction (such as hydro-electric machinery) can be significant factors underpinning failures in WFD fish status.

Other barriers, such as dams, not only inhibit migration, but they can also have a negative effect on the morphology of the river and the natural movement of substrate or bed-load material. Where dams are present, rivers downstream can become starved of substrate material and gravel (depletion) and therefore fish spawning potential in this downstream reach is decreased.

Habitat management, such as; weir removal, the installation of multi-species fish passes, fish friendly hydro turbines and the introduction of gravels below dams, are all effective but site specific options to adopt.

These methods, combined with appropriate monitoring, can be highly effective management tools that help to maintain or improve the connectivity within a river and improve the breeding potential for migrating fish.

Management options include:

- Multi-species fish passes & easements
- Habitat enhancement
- Weir removal
- Gravel augmentation/rehabilitation





Lack of habitat management

Rivers have historically been managed for many reasons; such as fish, firewood and industry. In recent years many of these management drivers have declined and, as a result, river management has also declined. This loss of management can have a significant impact on river ecology and therefore on fish populations.

A healthy river system requires a patchy mosaic of shaded and open areas. Shading stabilises water temperature and provides protection for many fish species from predation. However, there is also a need for open unshaded areas as they play a key role providing sunlight to areas where juveniles fish occur. Light is needed to sustain the benthic community of the river, it encourages epiphytic algae to grow which communities of scrapers and grazing invertebrates are reliant on, therefore providing valuable feeding grounds for juvenile fish.

In the past woody debris in the channel was thought to cause negative effects such as flooding and increased bankside erosion. However, if woody debris is secure, correctly sited and does not cause increased potential for erosion or flood risk, it is more commonly accepted to have many ecological and hydrological benefits.

Modifications, such as revetments and channelization, can have significant negative effects on the river fauna. These homogeneous habitats often lack riparian vegetation to provide shelter leading to a loss of suitable habitat to support fish and other aquatic species.

Management options include:

- Coppicing of riparian trees & woody debris management
- Vegetation revetments to protect banks
- Flow deflectors to create heterogeneous flow



Poor land management & diffuse pollution

Land management practices, such as intensive farming, can place pressures on river health through sediment inputs caused by erosion and chemical pressures through the use of pesticides and fertilisers. These pressures can negatively impact macrophyte, invertebrate and fish communities, which, in turn, has a knock-on effect on the health of the whole ecosystem.

Fish populations, especially salmonid species, are extremely dependent on the supply of clean and well oxygenated water. For example, the accumulation of silt in spawning gravels can smother eggs and fry, while also impacting on the invertebrates which they feed on.

Management options include:

- Landowner engagement to give advice & grants
- Bankside fencing & alternative livestock drinking points
- Gravel cleaning



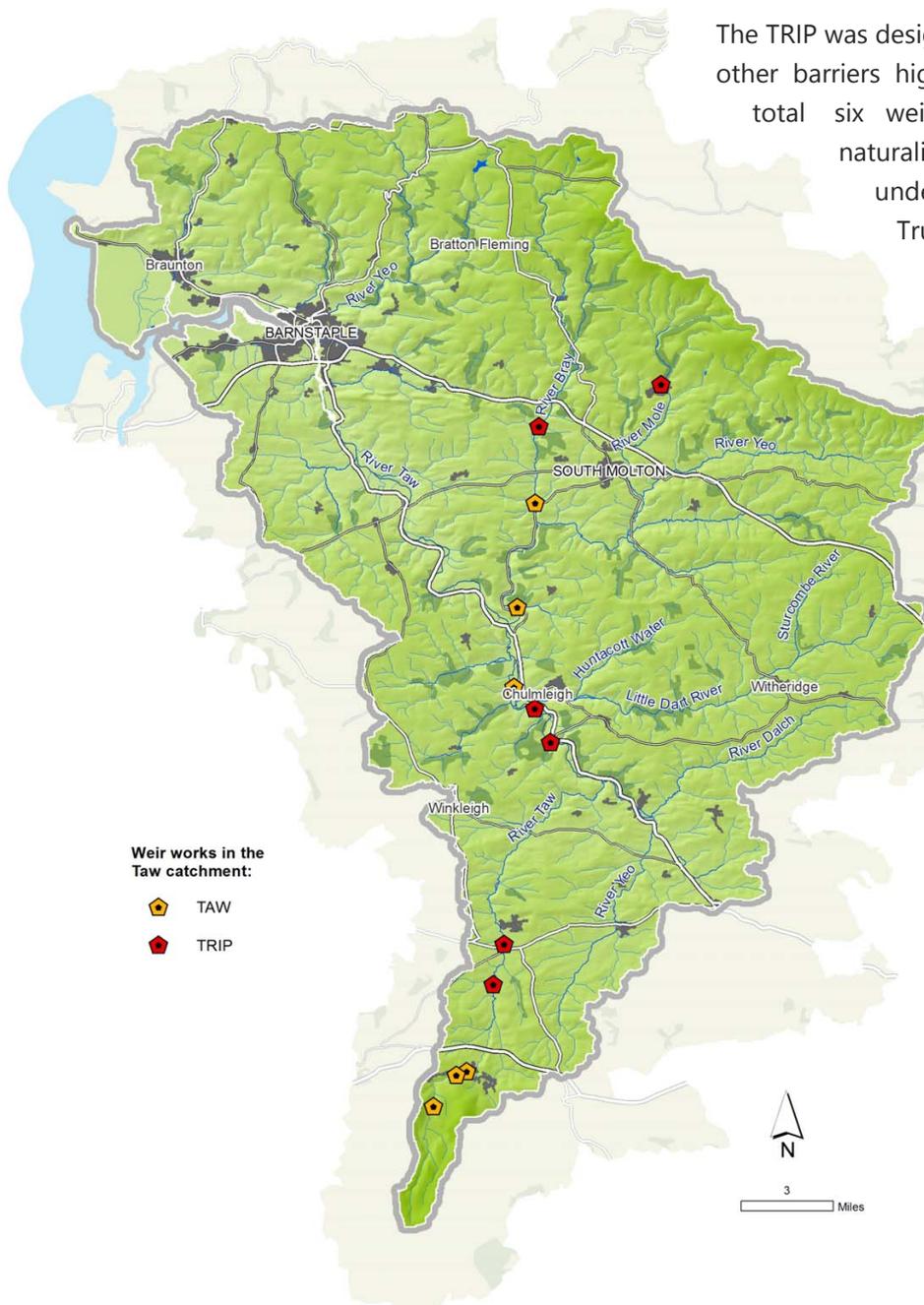


River Taw barriers to fish migration

Rivers often have more than one barrier along its length and the cumulative impact of these may have a critical impact on the successful spawning migration of all migrating fish, including Atlantic Salmon. A large majority of studies on single barriers emphasise that when passage is required at several barriers, cumulative effects of even slightly reduced passage can be substantial (Holbrook et al., 2009)

Over the past few years, Westcountry Rivers Trust has been working in partnership with the River Taw Fisheries Association and the Environment Agency to deliver a series of works to improve fish passage for all migratory species of fish within the River Taw catchment. The Taw Access over Weirs (TAW) Project began in 2009 with a catchment approach to identifying the worst fish migration obstacles, and a collaborative partnership approach to fundraising and delivery. The value of this project was the assessment and remediation of the cumulative impacts of all 12 migration barriers on the main stem of the Taw system, as well as weirs on multiple smaller tributaries.

The TRIP was designed to continue and address the other barriers highlighted in the TAW Project. In total six weirs have either been removed, naturalised or had easements installed under TRIP. The Westcountry Rivers Trust is therefore securing improved migration for salmon and other fish all the way up to the moorland and reconnecting fish populations with good quality spawning and nursery habitat throughout the upper reaches of the Taw river system. Details of these extensive weir works are found in the case studies on the following pages of this report:



Map showing the weir works completed under the TAW and TRIP project, successfully reconnecting and opening the whole main stem of the Taw river system for upstream migration



North Wyke Weir Removal

North Wyke was a concrete weir, which over the years had begun to deteriorate badly. Water scouring around and under the weir had left the weir a complete obstruction to migratory fish in all but the highest flows. Water flowed under the weir during the majority of flow states.

Five WFD waterbodies make up the main stem of the River Taw. Two of these are failing for fish. The largest waterbody area is the upper reaches of the Taw, which is most valuable for salmonid spawning. This waterbody is currently a moderate fail for fish and the North Wyke Weir removal is in this waterbody.

It is for the above reasons that North Wyke weir was assessed and made a priority for complete removal and river re-naturalisation. A complete removal is usually the best solution when addressing river barriers, as it is a maintenance free and therefore a long term solution.

The Westcountry Rivers Trust project contracted Halcrow Group to design and engineer an appropriate method of removal and re-naturalisation. Castleford Engineering were then contracted to remove the weir.

The weir was removed and the banksides stabilised and covered in a 100% biodegradable coir matting to encourage a complete riverine re-naturalisation.

WATERBODY	The Taw
CATCHMENT	Taw
WFD STATUS	FISH (MODERATE)
INVESTIGATION	Barrier assessment
PRESSURE	Barrier to migration
MANAGEMENT	Weir Removal
DATE:	May 2013



Before: North Wyke Weir



In Progress: Banksides re-engineered and coir matting laid



In Progress: The removal of North Wyke weir



After: North Wyke weir removed and signs of bankside vegetation reestablishment.



Rashleigh Weir Fish Pass

Rashleigh Weir is a large stonemasonry weir which was an obstacle to multiple fish species including salmonids (at low flows) and eels.

Rashleigh Weir is strategically located as a gateway to the upper Taw and an EA technical assessment found that its location may be part of the cumulative reason for all fish failures upstream. It was therefore deemed a priority structure for easement under the TRIP.

Originally, a technical fish pass design was suggested, however due to land ownership issues on the RHB this design could not go forward and an alternative and more cost effective option was developed. This allowed the remaining budget to address other weirs in the catchment in addition to the original three weirs which were planned to be mitigated under the TRIP.

Design

Halcrow Group were contracted by WRT to design the alternative easement for Rashleigh Weir. An adherent nappe and low flow enhancement was then installed by Castleford Engineering. The easement now allows multiple fish species including salmonids to migrate upstream even at low flows. A bristle elver pass was also installed alongside the nappe, which was protected by a cover to prevent predation.

WATERBODY:	The Taw
CATCHMENT:	Taw
WFD STATUS:	FISH (POOR)
INVESTIGATION:	EA Technical Assessment & WIP
PRESSURE:	Barrier to migration
MANAGEMENT:	Fish easement
DESIGN:	Adherent nappe, low flow enhancement & eel pass
DATE:	September 2014

Before: Rashleigh Weir before works.



After: Rashleigh Weir adherent nappe and elver pass on RHB.



North Molton Weir

North Molton weir is a concrete weir which posed a complete obstruction to migration during all but high flows. The weir's leat supplies water to a local fish farm, and therefore a removal of the weir could not be an option.

The abstraction by the leat has caused a 1km depleted reach, these low levels impact the whole river system leaving the river susceptible to low flows, increased siltation and reducing the quality of the valuable spawning grounds upstream. It is for these reasons that the TRIP made North Molton a priority barrier.

Design

Fishtek designed a technical super-baffle fish pass which was approved by the EA's National Fish Pass Panel. The pass was designed to split the flow between the river and the leat allowing fish to migrate upstream in all flows. Fishtek also designed an elver pass to be installed within the fish pass.

Castleford Engineering were contracted to install the fish pass onto the left hand side of the weir. The stonework and bankside engineering were designed to fit into the natural surrounds.

WATERBODY:	River Mole
CATCHMENT:	Taw
WFD STATUS:	Fish (NO DATA)
INVESTIGATION:	Barrier Assessment
PRESSURE:	Barrier to migration & depleted reach
MANAGEMENT:	Fish Pass
DESIGN:	Technical super baffle fish pass and eel pass
DATE:	July 2014

Before: Weir during low flows



After: Fish pass and elver pass working during low flows



North Tawton Weir Reduction

North Tawton is a concrete and stone weir. The weir crest height is too high and causes an obstruction to migration during low and medium flows.

Although the plans have been drawn by Fishways and approved by the Environment Agency, the works have been delayed by the Planning Committee. The project was opposed by a single stakeholder as they would like to install a hydropower system in the future.

The Westcountry Rivers Trust are currently in discussion with the planning committee, and it has been agreed for the works to go ahead. The proposed hydropower scheme would create over 1km depleted reach, which would consequently have a detrimental impact on the whole river ecosystem upstream. Works plan to be completed in summer 2015.

Design

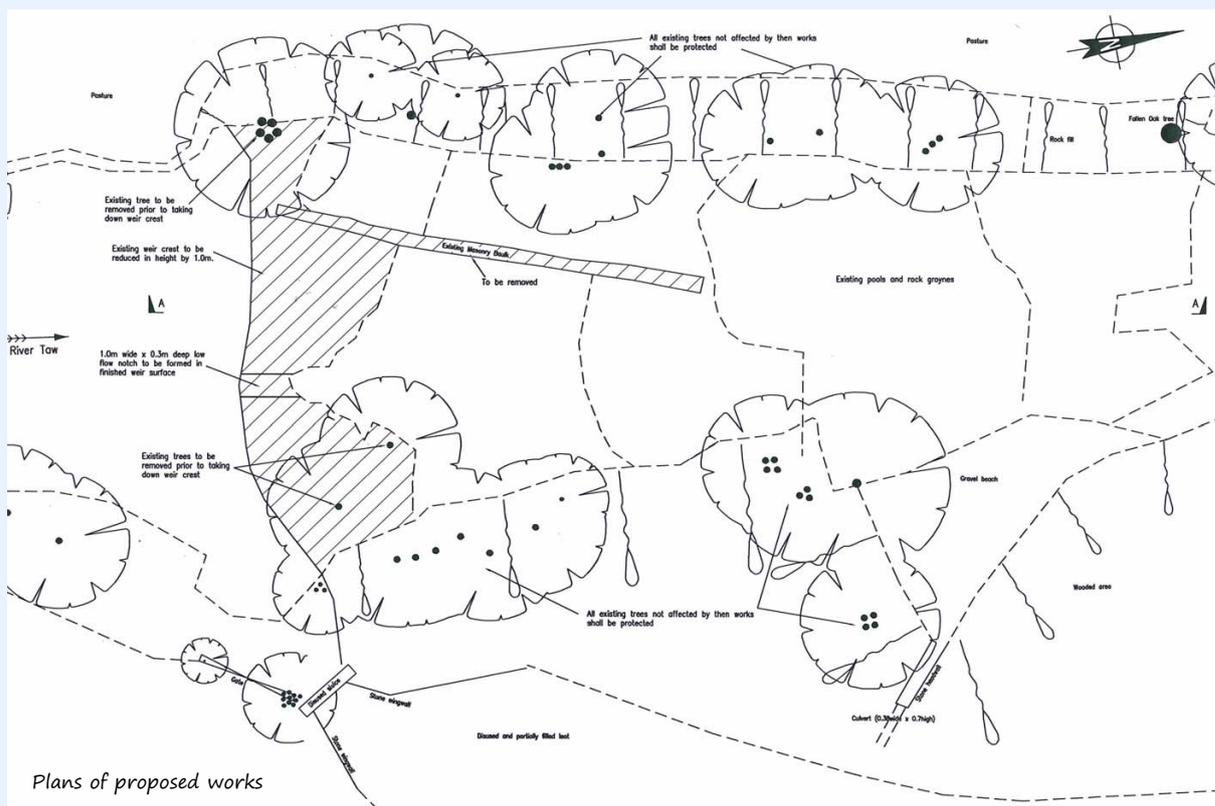
Due to the conservation interest of the weir, a total removal was unfortunately not an option at this site. Fishway Engineering Ltd were contracted to design an alternative option.

In order to encourage upstream migration during all flows, the proposed alternative option will reduce the existing weir crest by 1.2 metre. The installation of a 1m x 0.3m deep low flow notch in the finished weir face has also been proposed.

WATERBODY:	The Taw
CATCHMENT:	Taw
WFD STATUS:	FISH (MODERATE)
PRESSURE:	Barrier to migration
MANAGEMENT:	Barrier easement
DESIGN:	Weir crest reduction
DATE:	2015



Before: Existing North Tawton Weir (looking d/s) ->



Plans of proposed works



Filleigh Weir Fish Pass

Filleigh weir is a stone/masonry weir with a high heritage value. The weir was historically identified as a migration obstacle. Following this an easement was built on the LHB side of the weir.

However, a more recent EA technical assessment was conducted which deemed the structure to be a priority for an easement enhancement to update it to current standards. Missing stones on the crest and around the weir indicated signs of some degradation, which also required improvement works.

This weir easement is extremely important as it will allow access to very valuable spawning habitat upstream. A removal was not an option at this site due to its heritage value.

WATERBODY	Bray
CATCHMENT	Taw
WFD STATUS	Fish (GOOD)
INVESTIGATION	EA Technical Assessment
PRESSURE	Barrier to migration
MANAGEMENT	Fish Pass
DESIGN	Technical super baffle fish pass and eel pass
DATE	Sept 2014

Design

Fishtek Consulting were contracted to survey and draw up plans for a technical super-baffle fish pass and eel pass.

Castleford Engineering installed the fish pass and eel pass inside the existing fish easement, this not only reduced the impact of the construction process but also ensured that the fish pass was in keeping with the existing weir. Improvements to the weir's stonework were also made.



Before: Filleigh Weir with evidence of missing stones on crest



Before: Stone weir and original fish easement on LHB.



After: Installed super-baffle fish pass and eel pass on LHB. New stonework can also be observed on the weir crest and base of apron.



Eggesford Weir

Eggesford is a concrete and stone weir which is embedded into the foundations of a grade 2 listed road bridge. The 2007 EA technical assessment highlighted Eggesford as 1 of 3 priority strategic weirs requiring action and it remains on the EA priority list for improvement. When all three strategic barriers are improved, it will open up the Upper Taw catchment and Eggesford is the last requiring remedial action.

An existing fish pass under the bridge does not function well due to an outdated design leaving too much physical water power in the pass. The bridge at Eggesford has a flood relief channel which allows water to flow around it during most flows. This can cause a split and reduced competing attraction flow at the site which can delay migrating fish.

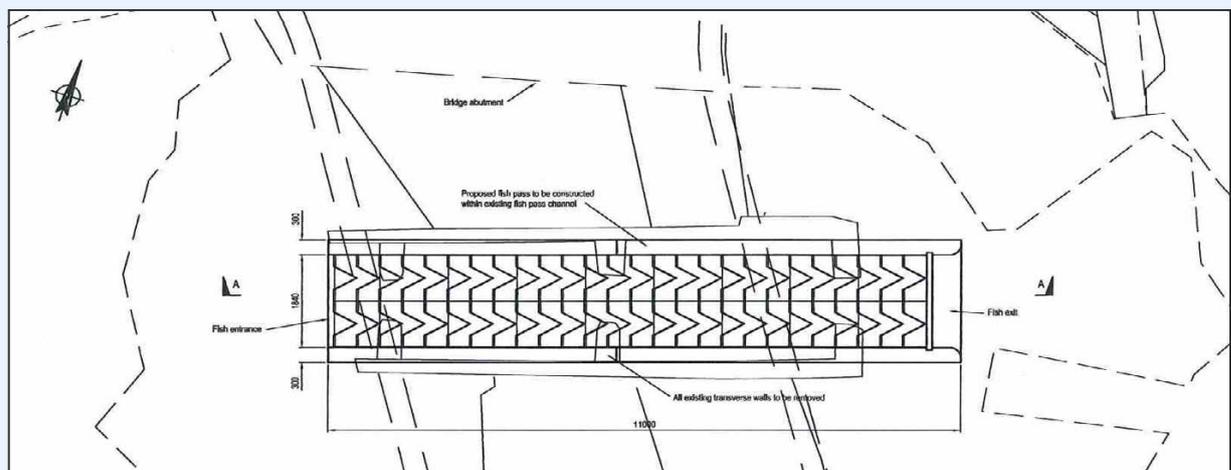
Unfortunately, there have been issues with identifying the owner of the weir, which consequently has delayed work progression. The Westcountry Rivers Trust is currently in discussion with the EA to find a solution to conduct complete proposed works. The existing fish pass attraction flow has been enhanced in low river flows.

A design is in place to retrofit a technical fish pass in the currently ineffective pool fish pass, but this awaits confirmation of delivery for the wider benefit of the river.

WATERBODY	The Taw
CATCHMENT	Taw
WFD STATUS	Fish (Moderate)
INVESTIGATION	EA Technical Assessment
PRESSURE	Barrier to migration
MANAGEMENT	Fish Pass
DESIGN	Technical super baffle fish pass and eel pass
DATE	Sept 2014



Below: Proposed Technical fish pass



Design

There are two parts to improving fish migration at this location.

Part 1 is to retrofit a technical fish pass in the existing footprint of a pool fish pass in the centre of the weir. The existing structure lends itself to a super-baffle fish pass being inserted at the correct gradient into the walls already present and will significantly improve the efficiency of salmonid migration.

Part 2 works around the main river site on the flood relief channel to enhance the attraction flow within the main river (restrict low flows in the relief channel), provide an eel pass in the slower moving side channel, and enhance habitat in the relief channel for eel and lamprey.



Restoration Measures: Fish Habitat

Gravel Cleaning

Land use management can often give rise to physical pressures on the river corridor through sediment input caused by erosion, and chemical pressures through the use of pesticides and fertilisers. These common pressures can negatively impact macrophytes, invertebrates and fish abundance, which, in turn, can have an effect on the whole ecosystem. Fish populations, especially salmonid species are extremely dependent on the supply of clean and well oxygenated water. The accumulation of silt in their spawning gravels, and soil derived pollution that has a toxic effect on the fish directly, or on the invertebrates in which they feed on, are all causes for declines in fish diversity.

Many of the Taw's waterbodies are failing to reach good ecological status because of fish. The above waterbodies are all historically valuable spawning grounds for salmonid fish. A combination of information and data was used to target the gravel cleaning works. Local knowledge from partners and stakeholders, particularly EA bailiffs helped to identify key areas for habitat improvement work. Walkover surveys were also conducted to gather some baseline information on the catchment.

Method

The 83 gravel cleaning sites were undertaken from the 17th September 2014 to 26th September 2014. The sites were cleaned by a two man team working from a quad bike with a water pump attached to the quad. This allowed them to access any part of the river.

A variety of methods were adopted to conduct the works, each method was tailored for each site. The contractors were advised to work downstream to avoid siltation of cleaned areas. All pools were left, and where possible only riffle sites were cleaned.

Most works were conducted by hand using rakes and forks to release fine sediment. The water pump was used for more vigorous cleaning of compacted gravels.

In addition, to this work, a further 80 sites were addressed in the Mole sub-catchment through RTFA securing alternative funds.

Right: gravel cleaning contractors adopting the raking and water pump method to loosen and clean compacted gravels

Taw Waterbodies	Site	No of Sites *
Upper Taw	Bondleigh to Taw Green	25
Lapford Yeo	Up and downstream of Yeo Bridge	10
Little Dart	Up and downstream of Bradford Bridge	5
Sturcombe River	Confluence with L Dart to Crowdhole Bridge	7
Little Silver Stream	New Mill upstream to Rowcliffe Farm	6
Crooked Oak	Confluence with Mole up-stream to Eastwood	27
Total sites *		83
INVESTIGATION	Habitat walkover surveys, information provided by partners with local knowledge	
PRESSURE	Sediment input causing silted and compacted gravels	
MANAGEMENT	Gravel cleaning and weeding	

*Note: 1 site = 20m²stretch





Restoration Measures: Light & flow

Coppicing & Woody Debris

A lack of diversity in riparian shade/light regimes can negatively affect a river's potential to support fish populations, consequently reducing its WFD status. A river system with a patchy mosaic of shaded and open areas will have a more functional mix of habitat types. Shading stabilises water temperature and provides protection for many fish species from predation. However, some open sections are equally as important for providing sunlight to areas where juveniles are growing. Light is needed to sustain the river's benthic community, it encourages algae to grow that communities of grazing invertebrates are reliant upon, therefore providing valuable feeding grounds for juvenile fish.

Although excessive amounts of loose woody debris in a water course can increase the potential for debris dams and flood risk, if managed correctly woody debris can add many ecological benefits to the river system:

- Provides shelter and food for a variety of fish and invertebrate species
- Increases channel diversity through bed scouring and improves spawning gravels
- Provides bank protection, reduces erosion

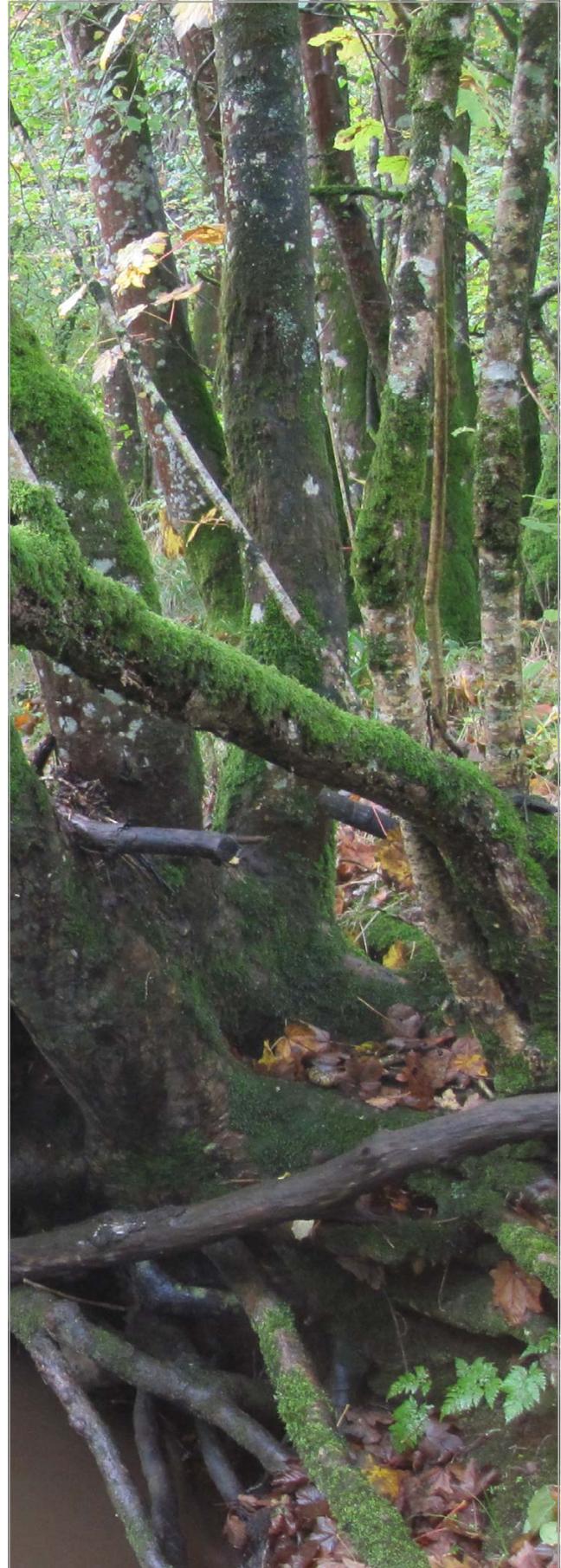
Action

Sites targeted for action were identified using EA evidence, WRT fisheries-habitat walkover surveys and using information from the local Fisheries Associations. Coppicing management was divided into two areas.

- Fisheries Management—coppicing aimed to improve fisheries habitat
- Land management—coppicing conducted prior to fencing being installed and/or aimed to reduce erosion and stabilise banksides, which also indirectly benefits fisheries habitats (see Phytobenthos section).

Fisheries coppicing aims to provide a patchy mosaic of shaded and open areas. The contractors were advised by WRT to coppice over highlighted riffle sites, and leave the pools shaded for resting fish. All debris dams were assessed by WRT and removed if they posed a risk to obstruction or flooding.

At suitable sites, woody debris was secured into the banksides or river bed to improve habitat diversity and river morphology. All contracts specified that works near or in the watercourse must be compliant with PPG5 and CDM.





Restoration Measures: Light & flow

Debris Dam Management



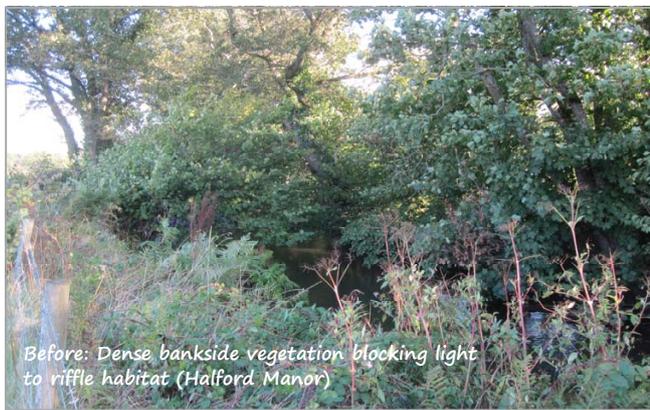
Waterbodies	No. of Sites
Taw, Bridge Reeve	1
Taw, North Tawton Weir	1
Bray	1
Upper Taw (Taw Angling Club)	6
Little Dart near Bradford Bridge	2
Little Dart, Cheldon Bridge to Leigh Bridge	4
Little Dart downstream Leigh Bridge	3
Little Dart Affeton	1
Little Dart upstream Cheldon Bridge	2
Crooked Oak at Eastwood	3
Crooked Oak—Site 2	2
East Nymph, Lapford Yeo	5
Upper Taw, Higher Rowden	4
Total Sites	33





Restoration Measures: Light & Flow

Coppicing



Waterbodies	Km of Bank
Crooked Oak, Eastwood	2
Upper Taw, Halford Manor	1.4
Little Dart, Stonemill Farm	0.98
Taw & Little Dart, Lower Leigh Cross Farm	2.3
Upper Taw, Higher Rowden	1.25
Upper Taw, North Wyke	0.45
Upper Taw, Taw Bridge	0.5
Total Kms	8.8



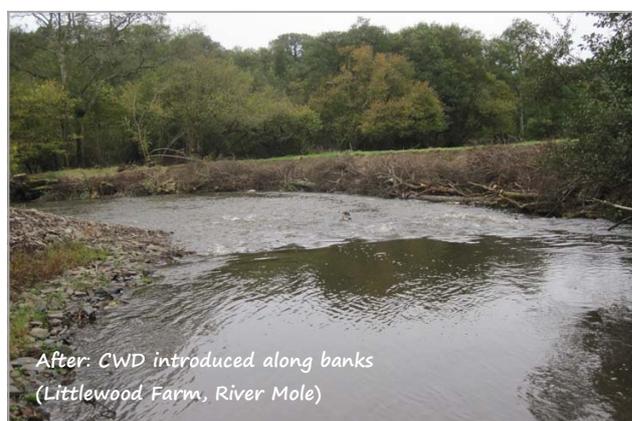
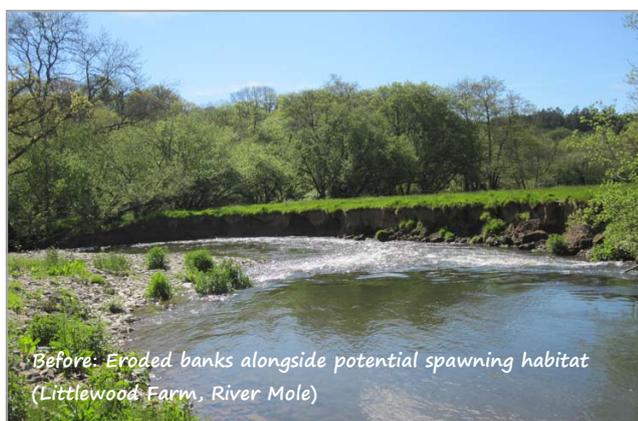
Restoration Measures: Light & flow

Introduction of Woody Debris

The Westcountry Rivers Trust adopted a variety of course woody debris (CWD) introduction methods under TRIP, where native woody species such as alder, thorn, oak and willow were used as natural bankside revetments.

These were attached to the banks by alder and willow stakes and the brush was wired around the CWD to create habitat diversity for multiple species of fish and invertebrates.

Waterbodies	m of bank
Satterleigh Barton, River Mole	15
Grilstone, Molland Yeo	25
Littlewood Farm, River Mole	167
Town Barton, Little Dart	27
Total Metres	234





Monitoring

River Habitat Walkover Surveys

Habitat Walkover Surveys use a fast but detailed method to assess the provision of fish habitat in a river system and to determine its condition. Walkover surveys 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.

Prior to the start of TRIP 50 km of the Taw river catchment had been surveyed by WRT, this data was invaluable when writing the project and targeting works. A further 8 km were surveyed within TRIP on the Little Dart (see output map on page 58).

This archive of catchment wide baseline data not only provides a tool to inform works on the ground, but is also a way of monitoring any changes in the catchment during and/or after the project.

Redd Observation Surveys

Historically Redd counting has taken place on the Taw and Torridge Catchments by the local EA bailiff and has proved to be a very useful fishery management tool.

Unfortunately the Taw has few to very little redd records. However, the observations made by bailiffs and fishermen over the years are recognised as a valuable tool for targeting future works and we would like to take the observations and document them for future comparison.

Overall, when conducted properly, and under the correct conditions, redd counting can provide useful additional evidence which, when combined with other measures, can help us to assess salmonid spawning abundance within a river catchment.



Electrofishing Surveys

Under the TRIP, WRT conducted 20 semi-quantitative electrofishing surveys in 2013, and 30 surveys in 2014.

The only comparable Electrofishing surveys are those carried out by the Environment Agency (EA) on the Taw. Although the EA conduct an annual electrofishing programme on the Taw, it is usually only on a few waterbodies. However, approximately every 6 years the EA conducts a catchment wide fully-quantitative electrofishing survey (the last EA catchment wide survey conducted in 2012 surveyed 50 sites).

The semi-quantitative survey is not intended to replace the existing EA sampling and monitoring programme mentioned above. The strength of this survey is to enable a quick, affordable, baseline semi-quantitative catchment wide view of the fry life stage only. Electrofishing surveys aided as a tool to inform appropriate habitat restoration works, and were also used to assess the effectiveness of those works against the Water Framework Directive (WFD) driven criteria.



Anecdotal Reports

Anecdotal records have been invaluable when targeting and monitoring for the outcome resulting from our works.

For example, within two weeks of Filleigh fish pass opening, 30 sea trout were reported in an upstream pool before the 'usual' fish run. It has therefore been very important to establish and maintain good connections with all the project stakeholders, as many were crucial in the successful delivery of the TRIP.

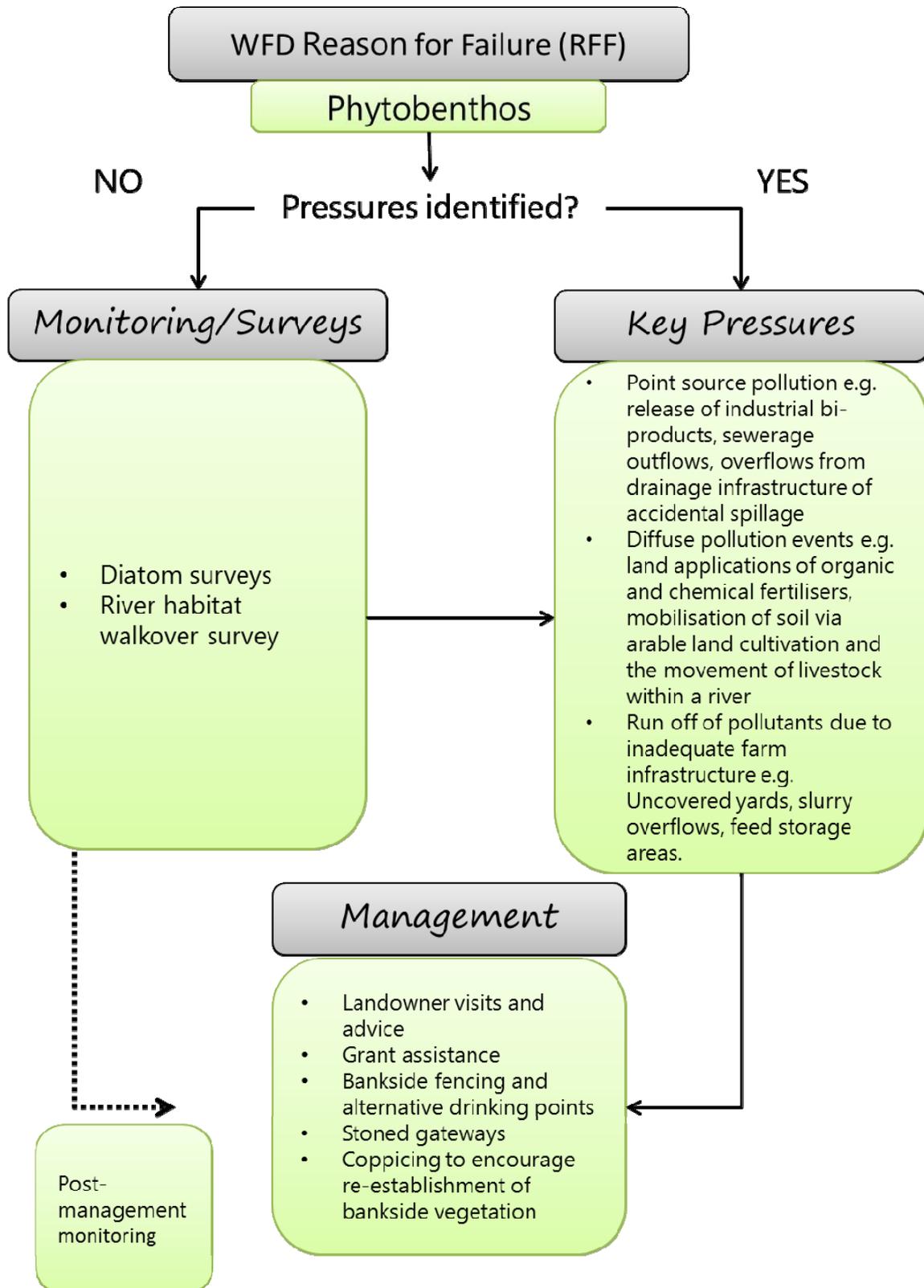


PHYTOBENTHOS



Targeting interventions for Phytobenthos

Flow diagram to illustrate how CRF works within the TRIP were targeted and driven by WFD.





Phytobenthos

Phytobenthos are a benthic (they live attached to substrates such as rock/stone or large plants) sub-group of diatom algae. Most are unicellular, but they can exist as colonies in the form of filaments or ribbons.

The assessment of phytobenthos in a river is a well-established method for assessing water quality. It is widely accepted that a detailed evaluation of the structure and function of phytobenthic (diatom) communities in a river can provide robust evidence for assessing its ecological condition.

The criteria for the assessment of diatom communities for WFD classification were developed through the Diatoms for Assessing River Ecological Status (DARES) Project. This project assessed diatom assemblages at a series of reference sites and developed a model that allows the composition of the benthic diatom assemblage in a river to be predicted. Comparison of the predicted assemblage with that found through sampling allows the ecological condition of the river to be assessed.

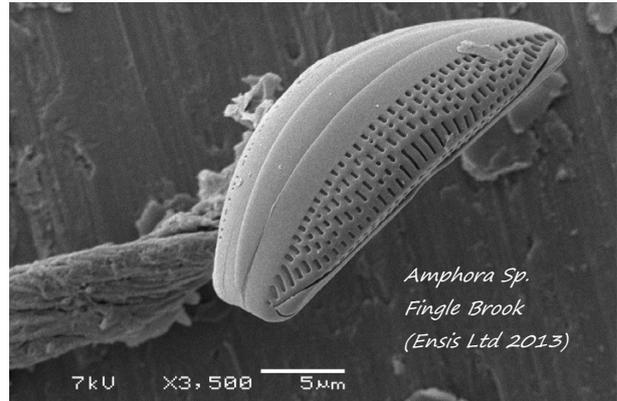
Pressures

Phytobenthic community composition can be affected by a wide array of pressures, but they are particularly sensitive to changes in the pH and nutrient levels in the water and can be used to identify rivers impacted by these types of pollution.

Pollution of this type can be derived at specific locations along a river (point sources) or from the cumulative effects of many small, highly dispersed and often individually insignificant pollution incidents (diffuse sources).

Highly localised point sources of pollution occur when human activities result in pollutants being discharged directly into the aquatic environment. Examples include the release of industrial by-products, effluent produced through the disposal of sewage, the overflows from drainage infrastructure or accidental spillage.

Diffuse pollution can occur when large amounts of slurry, manure, chemical phosphorous-containing



fertilisers or agrochemicals are applied to land. If these processes coincide with high rainfall events, it can lead to run off or leaching from the soil and to the subsequent transfer of contaminants into a watercourse.

In addition, the intensive cultivation of land or the over disturbance of soil by livestock (poaching) can mobilise fine sediment, which may transfer to drains and watercourses by water running over the surface. Other diffuse sources include pollutants mobilised from farm infrastructure such as uncovered yards, slurry pits, feed storage areas and dung heaps.

Monitoring

Waterbodies failing to reach good ecological status for Phytobenthos were monitored, and rivers that lacked biological data were investigated with diatom surveys. TRIP conducted a catchment-wide biannual diatom sampling programme, with surveys carried out in Spring and Autumn. The samples collected were analysed according to accredited UKTAG standards and the diatom results played a vital role informing and targeting the farm advice.





Investigation & Monitoring: Phytobenthos

As part of the water quality investigations for phytobenthos and phosphorous failures on the Taw, a diatom sampling programme was conducted.

Assessing water quality using traditional spot samples of water, whilst providing necessary data regarding contaminant concentrations, is often limited by the lack of temporal resolution. Using biological indicators can overcome this and provide important supplementary information regarding long-term water quality at a site.

Diatoms represent key biological quality elements that can be used in the assessment of surface water status. As primary producers in many food chains, diatoms are sensitive to an array of environmental factors and in particular changes in nutrient (phosphorus) levels. By studying diatom assemblages at sites, nutrients inputs can often be detected where assemblages are dominated by nutrient tolerant taxa, since nutrient sensitive taxa are more likely to be found in areas, which do not receive excess nutrient inputs. As such, the use of diatoms as indicators of nutrient (phosphate, P) inputs to surface waters has become an important component of assessing water quality in line with the WFD (M. Kelly, 2013).

Against this background, this study used diatom assemblages to assess nutrient (P) inputs in sub-catchments of the River Taw catchment, which are known to be failing to meet good ecological status under the WFD, largely owing to failures for Phytobenthos and P. The study is part of a wider package of research which aimed to investigate Reasons for Failure (RFF) in relation to nutrient inputs, with findings from this study contributing to assessment of water quality status and identifying key source areas (see Phosphorous chapter for further details).

Diatom sampling was undertaken at 15 locations across the rivers Little Dart, Taw and Yeo (Figure 1), to encompass sites which have failed to meet WFD standards for P and phytobenthos (diatoms) (Taw waterbody GB108050014210). Samples were taken in winter and summer 2012-2013 and were prepared and analysed following protocols outlined in Kelly et al (2001).

Methodology

A Trophic Diatom Index (TDI) score was obtained for each site based upon the taxa assemblage. An Ecological Quality Ratio (EQR) (the ratio of observed TDI to reference TDI) was derived for each sample site and

compared to EQS to determine water quality status (UKTAG, 2014).

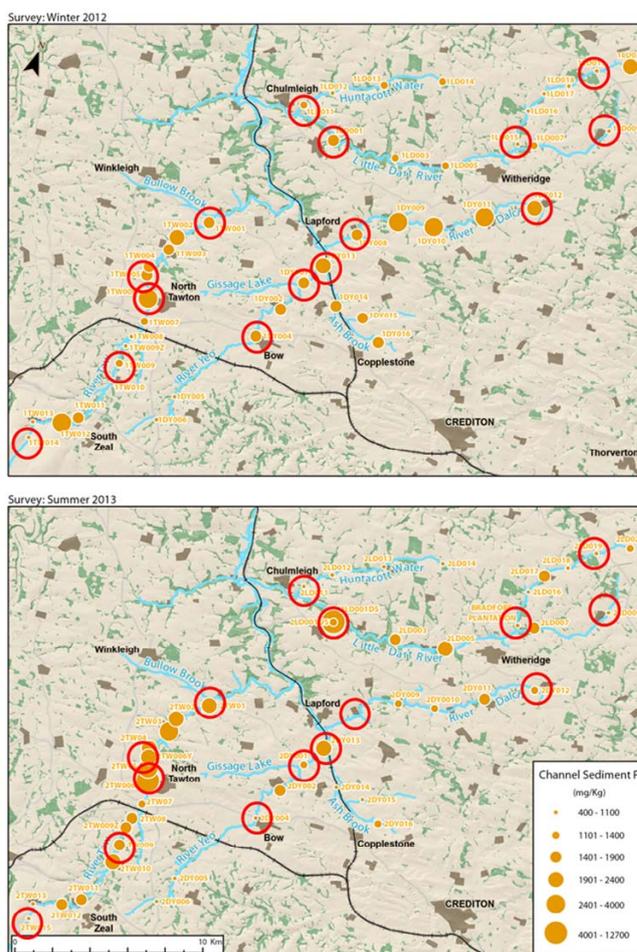
Findings

The River Taw samples showed a notable decreasing EQR score gradient with movement downstream reflecting both increasing inputs from agriculture and known point sources from industry.

Similarly, a marked decline in classification status in the River Dalch during the summer months may also reflect point sources in the upper catchment but could also be attributed to the release of stored sediment P to the water column.

In contrast, general improvements in EQRDARES scores in the Little Dart sub-catchment during summer was likely to reflect lower diffuse inputs, potentially highlighting the dominant role of DWPA.

Diatom sampling locations in the River Taw catchment (Blake et al., 2014)



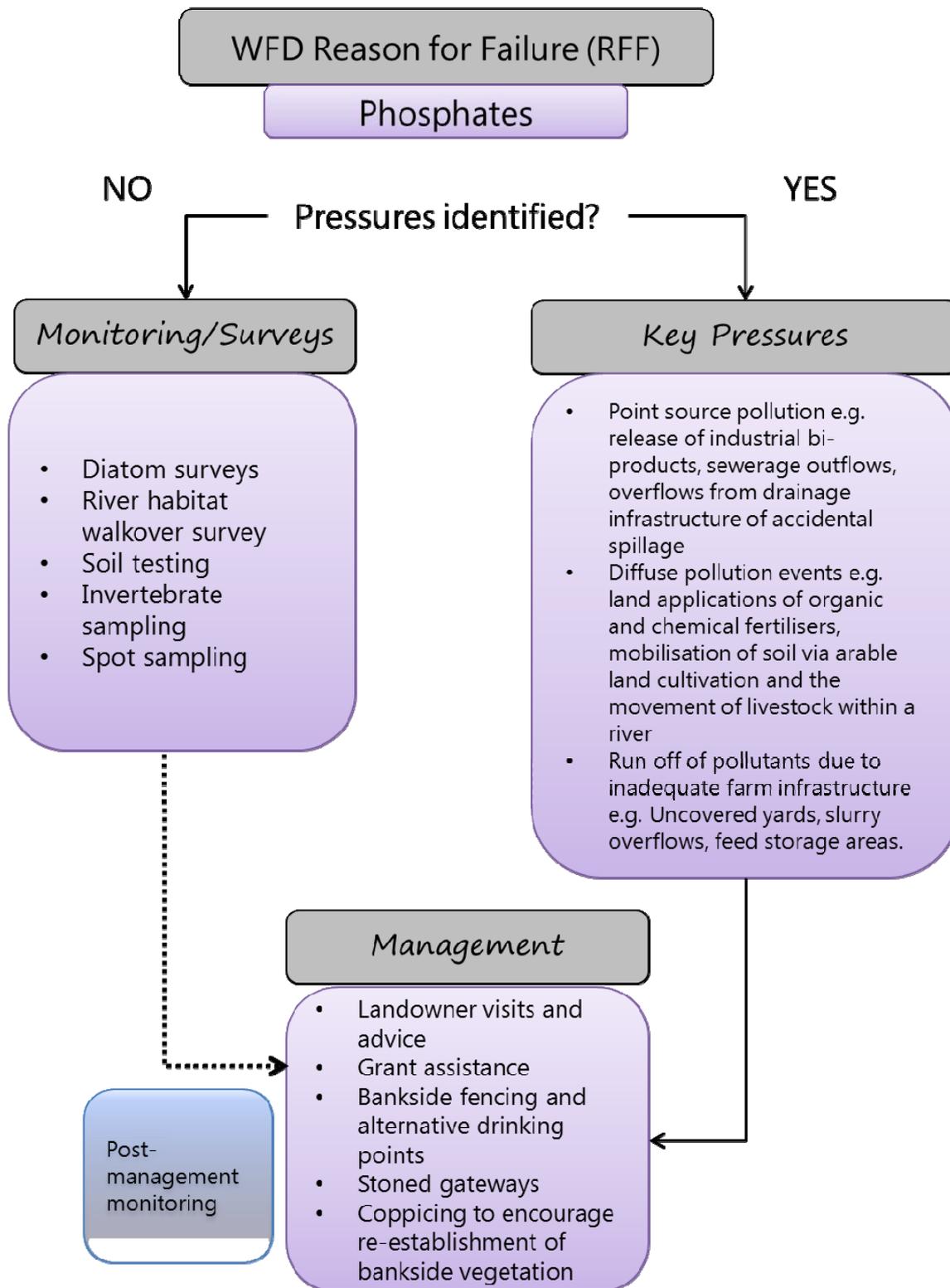


PHOSPHORUS



Targeting interventions for Phosphorus

Flow diagram to illustrate how CRF works within the TRIP were targeted and driven by WFD.





Phosphorus

Pressures

Numerous waterbodies in the River Taw catchment are currently failing to achieve good overall status, in part, owing to elevated phosphorus (P) concentrations. Phosphorus is often the growth limiting nutrient in freshwater systems such that biologically available forms of P are naturally in short supply and quickly become exhausted by biological uptake.

Freshwater systems are sensitive to changes in the natural balance of available P, which is commonly affected by human inputs, particularly those derived from agricultural practice and sewage treatment works (STWs). In addition, the Taw catchment receives industrial effluent from a dairy processing plant. Diffuse input of P via runoff from agricultural land and direct point source inputs from effluent discharges can potentially increase the bioavailable pool of P (eutrophication), leading to excessive algal growth and associated ecological impacts. In turn, impact upon ecosystem function disrupts the flow of services and benefits to society (such as those associated with recreation and health) and can lead to increased cost of water treatment.

The Water Framework Directive (WFD) (2000/60/EC) has set stringent Environmental Quality Standards (EQS) for 'reactive phosphorus' in surface waters aimed at reducing nutrient enrichment and associated impacts upon biota. Consequently these standards are driving efforts to reduce P inputs to surface waters through appropriate management of agricultural practice and point sources. It, therefore, follows that there will be an overall reduction of P inputs to surface waters. However, because P is strongly associated with sediments, many

watercourses may have an historic 'sink' of P in sediment storage zones, which could provide an additional source of bioavailable P if the sediment is re-mobilised and the particle-bound P is released into solution. P cycling in freshwater systems is, therefore, complex and successful management requires a sound understanding of the catchment system on a site-specific basis.

Targeting Phosphorus Sources

The assessment of phosphorus inputs involves, not only the measurement of excess nutrient concentrations, but also the identification of P delivery pathways to the river and the factors which are likely to influence P mobility and availability to biota. This enables mitigation measures to be targeted to prevent P delivery at source and indicates the potential for system recovery.

As part of the TRIP, Westcountry Rivers Trust commissioned a scientific panel to undertake rigorous assessment of P dynamics within the Taw catchment with the following principal aims:

1. To assess physicochemical and biological status in relation to nutrient inputs
2. To determine the key sources of phosphorus delivery to the catchment
3. To identify factors which control P cycling and bioavailability
4. To identify areas for mitigation targeting

The field research was carried out by members of WRT, Plymouth University Catchment & River Science Group and Rothamsted Research.



Excess algal growth where phosphorous concentrations have been elevated by agricultural and domestic waste inputs



Investigations: Phosphorus

Field research to investigate phosphorous WFD reasons for failure within the Taw catchment was comprised of six complimentary packages:

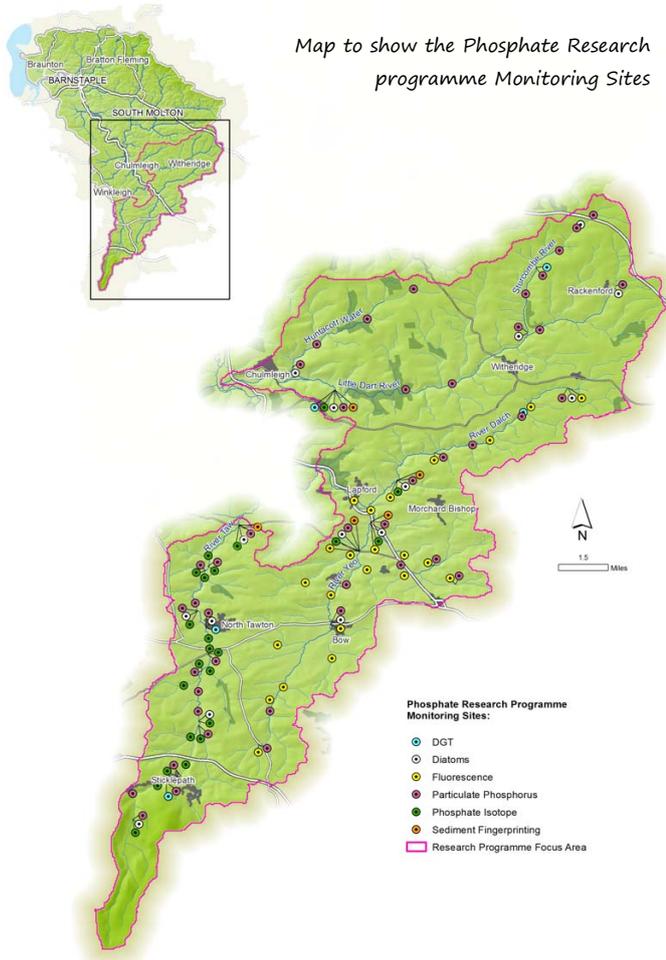
1. Ecological status was assessed using diatom indicators at numerous sampling locations (see Phytobenthos chapter for details).
2. The distribution of particulate P in Taw river sediments was investigated to identify spatial and temporal trends in sediment P loading
3. Source apportionment of fine sediment and the associated organic matter was assessed using geochemical fingerprinting techniques
4. The role of channel stored sediment as a source and sink of P was assessed using diffuse gradient in thin film (DGT) technology
5. Sources of dissolved P were investigated using isotopic source tracing
6. Fluorimetry was used to identify organic source inputs



Deploying a DGT device in the Taw catchment to determine the contribution of particulate-bound phosphorus to the reactive (bioavailable) pool of phosphorus in the water column



A sonde fitted with fluorimeters was deployed in the River Taw catchment for detection of protein-like fluorescence (agricultural and domestic waste sources) and Optical Brightening Agents (confined to domestic waste sources) to identify organic inputs and determine key source types (agricultural versus domestic)



Findings

The combined results highlighted key areas where reactive phosphorus concentrations were consistently above environmental quality standards.

Importantly, the temporal variability across sampling campaigns together with source apportionment results provided useful information with regard to the dominant sources of P in relation to domestic, agricultural and industrial waste.

The findings, therefore, enabled key areas and sectors to be targeted for further investigation and mitigation practice.



Management: Phosphorus

Reducing diffuse water pollution from agriculture (DWPA)

Phosphorus concentrations in surface waters can often become elevated above natural background levels owing to inputs from agricultural and domestic waste sources. Diffuse water pollution from agriculture (DWPA) can be responsible for significant P inputs to watercourses and managing such inputs is complex given the difficulty of identifying key source areas.

Diffuse water pollution is likely to be wet-weather driven and inputs of P are often associated with soil loss from agricultural hillslopes under eroding conditions. Agricultural soils can be rich in P owing to the application of fertilisers and manures to improve fertility and consequently soil erosion can result in the loss of particle-bound P to surface waters.

In addition, inputs from slurry stores and farm yards and direct defecation by cattle can also contribute to elevated P concentrations in watercourses. It is, therefore, important for farmers to carry out best practice to minimise soil and nutrient loss, which not only reduces environmental impacts, but also provides financial savings for the farm. With careful planning and changes to land management, this can be achieved to good effect.

Farm Advice

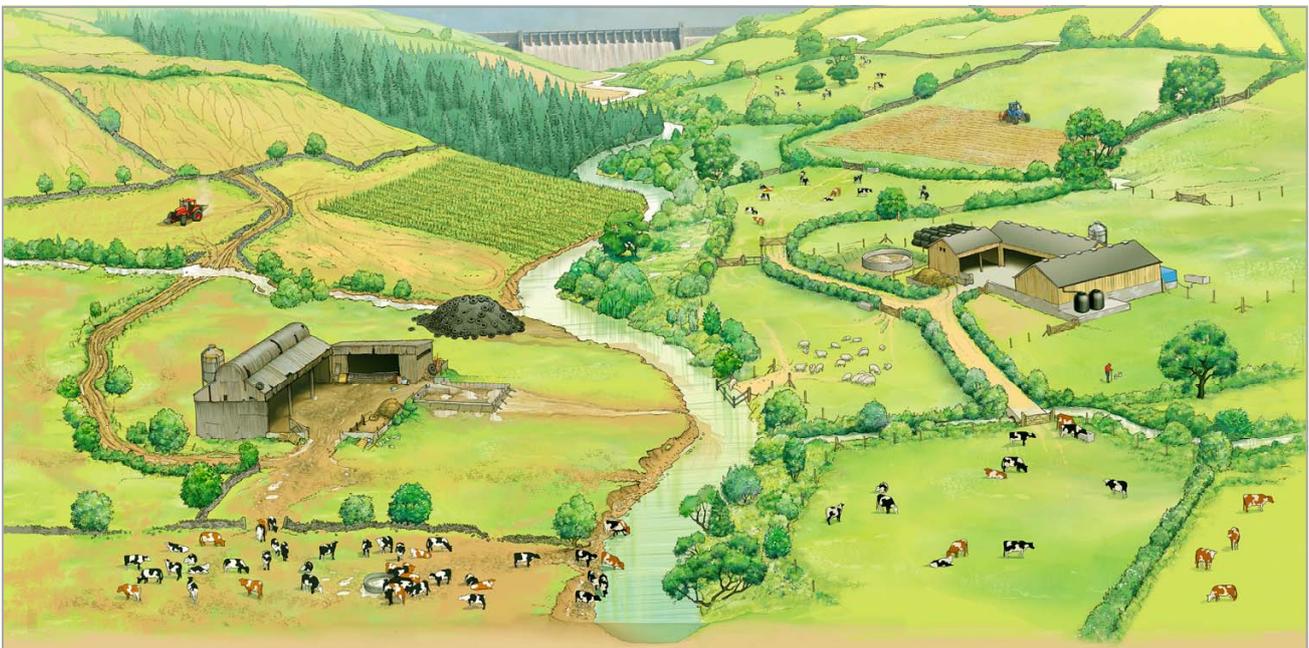
All waterbodies failing (or indicated to be failing though investigations) to reach good status for Phosphorous and Fish were targeted for farm visits and advice. These

integrated land advice packages were delivered by experienced WRT, FWAG South West and Devon Wildlife Trust farm advisors, which covered many aspects of a farmers practice. The advisor identified where the adoption of good practice or best practice may minimise the risk that an activity will have a negative impact on the environment, and where it may enhance the provision of a particular ecosystem service and improve WFD.

In addition to broad advice on good practice, the advisors also produced a targeted and tailored programme which, through the provision of free soil tests, included specific advice on pesticide, nutrient and soil management on the farm to mitigate any potential environmental impacts (see output map on page 58 for distribution of works).

A proportion of the TRIP budget was allocated for a farm capital grants scheme. Funds were available to contribute towards 60% of the total cost of advised farm improvements. Works covered by the grant scheme would generally include:

- Riparian fencing and preparatory tree work
- Introducing riparian buffer zones
- Alternative or improved livestock drinking points
- Soil tests
- Improvements to slurry or manure stores
- Culverts
- Farm track improvements (not gravelled)
- Gate relocations





Farm Advice & Delivery: Phosphorus

Over three years, TRIP delivered extensive farm/habitat advice and grant assisted works throughout the Taw catchment. This was achieved through WRT and their partners individual knowledge and skills being able to work together and deliver a range of works designed to address the specific phosphate issues on the Taw. It also incorporated the delivery of the Catchment Sensitive Farming Programme as a Partnership in North Devon.

Under TRIP, 35 farm plans were provided by WRT resulting in numerous improvement works equating to over £113,000. In addition, partners **FWAG SW** delivered 55 soil tests and 35 nutrient management plans. Two advisors from **Devon Wildlife Trust (DWT)** were funded under TRIP to deliver habitat improvement advice. In total DWT delivered advice to 55 farms, and 10 farms received grassland improvement work; this work also fed into DWT's **Working Wetland's Project**. The **Sylvanus Trust** delivered 39 woodland visits and advice, and introduced 14 new woodland planting schemes. Finally, the **Tarka Country Trust** delivered advice to 19 landowners of floodplain grazing marshland, 16 of these received grant aid to conduct works to benefit this habitat and the river. Further details about the partner involvement can be found on pages 44-46 and within the Partnership chapter.

The below table shows which waterbodies received grant assisted farm improvement works under TRIP. The total outputs include works delivered by WRT and their partners.

Farm Works Outputs (WRT, FWAG & TCT)

Catchment	No. of Farms	Fencing (m)	Drinking Points	Crossing Points
Dalch	2	1,770	2	3
Upper Taw and Yeo	1	1,630	2	2
Mid Taw	2	870	2	0
Yeo	2	1,660	7	
Knathorne	4	2,300	2	1
Little Dart	5	7,495	4	5
Upper Taw	6	2,380	6	7
Main Stem	16	18,870	17	24
Total Outputs (WRT, FWAG & TCT)	38	36,975	42	42

***Note:** Coppicing conducted as a preparatory measure before the fencing is installed. However, coppicing will always be conducted in way which will provide multiple benefits to the river ecosystem, including fish habitat improvements.



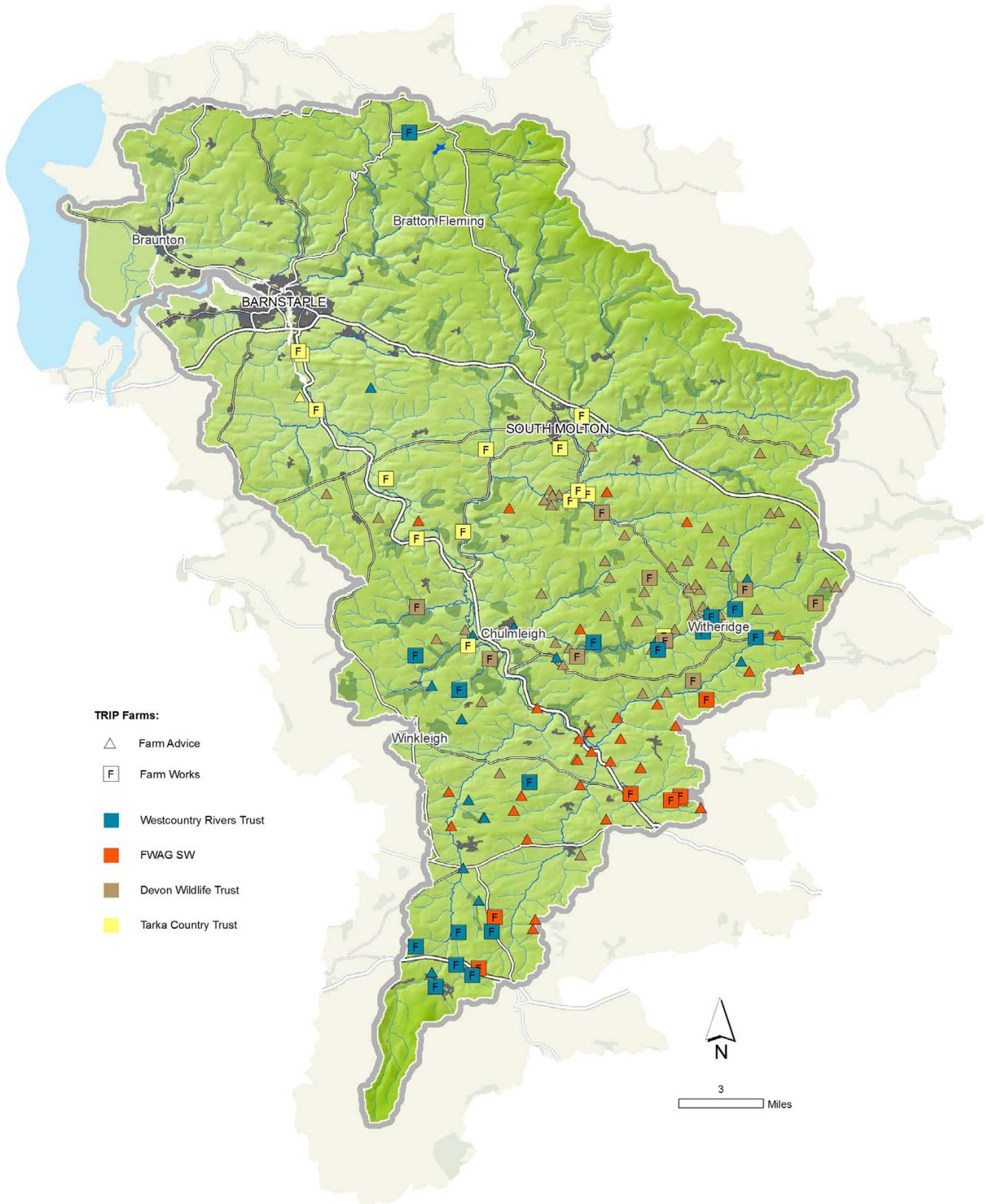
Catchment **County Wildlife Site and Non-Country Wildlife Site works** (Devon Wildlife Trust)

Little Dart - Site 1	Fencing of CWS to facilitate grazing (reserve site) and exclude livestock from river
Little Dart - Site 2	East Lutworthy CWS - Clearing bramble and willow scrub - CWS
Little Dart - Site 3	Lower Lutworthy Moor CWS - Clearing dense gorse and scrub trees- CWS
Little Dart - Site 4	Scrub removal and fencing works etc at Cheldon House CWS
Little Dart - Site 5	Scrub, fencing, casting up, hedge-laying of non-CWS
Little Dart - Site 6	Fencing, water supply, gates and culverts and pond of non-CWS
Little Dart - Site 7	Woodland fencing on CWS to enable grazing
Little Dart - Site 8	Grassland restoration by Green Haying of non-CWS
Little Dart - Site 9	Grassland restoration by Green Haying of non-CWS



Taw Farm Advice & Works Delivery Map

Map showing the farm advice and grant assisted works delivered throughout the Taw catchment by all TRIP partners





Grant Assisted Works for Phosphorus: Before & After



Before: Unprotected stream
(An Upper Taw farm)



After: Newly fenced stream
(An Upper Taw farm)



Before: Heavily poached gateway and unprotected ditch
(An Upper Taw farm)



After: Fenced ditch, stoned gateway and a culvert to encourage drainage
(An Upper Taw farm)



Before: Poached animal drinking point
(An Upper Taw farm)



After: Fenced stream to prevent animal access to stream (An Upper Taw farm)



Grant Assisted Works for Phosphorus: Before & After



Before: Muddy poached gateway
(An Upper Taw farm)



After: New fence and double gate
(An Upper Taw farm)



Before: Muddy poached ditch
(Upper Taw)



After: Sheep netted fence
(Upper Taw)



Before: Poached field on a steep gradient
(Little Dart)



After: Sheep netted fence
(Little Dart)



Devon Wildlife Trust—Working Wetlands



Background

Devon Wildlife Trust (DWT) were funded partners throughout TRIP to work with landowners to provide advice and small grants for watercourse protection and wetland habitat management. Devon Wildlife Trust (DWT) have been working in the Taw catchment for a number of years prior to TRIP, and have built a good reputation with the local landowners which helped facilitate efficient on the ground action. The work was delivered under TRIP by DWT's Working Wetlands Project team, a 7 year wetland restoration project. Under TRIP the DWT also worked with landowners to create new habitats and connect existing areas with potential wildlife value. DWT mainly focussed their attention on the sub-catchments of the Little Dart, and Dalch whose WFD status were both moderate.

Delivery

During the TRIP DWT delivered work across 31 different landholdings, which included 25 different County Wildlife sites and made improvements to around 285ha (target was 50ha). The DWT also worked on 13 sites that were not County Wildlife Sites, totalling around 53ha (target was 50ha).

In addition, throughout the two year project DWT contracted a total of eleven capital grants through the TRIP project totalling £36,500. All of the works undertaken incorporated interventions designed to improve the management of County Wildlife Sites (CWS) or sites of other significant wildlife interest as well as contributing significantly to the improvement of the WFD status of the watercourses.

Scrub control projects were undertaken to open up grassland habitat and encourage species diversity. Fencing and new water supplies were provided, which will enable more targeted grazing management or the reintroduction of grazing to abandoned Culm sites.

Two additional TRIP funded capital grants were completed during the final quarter. These included a scrub clearance project totalling £2,400 on Witheridge Moor CWS where scrub was encroaching onto open Culm grassland, reducing the quality of habitat and jeopardising the survival of the threatened marsh fritillary butterfly. The clearance work has opened up the site and together with traditional burning management will contribute to the survival of this species.



Scrub clearance on Witheridge Moor CWS (Photo by DWT)

A second project was undertaken at Hardingsleigh in the Little Dart River catchment where fencing has been erected to enclose a 1.5 ha wet rush pasture County Wildlife Site on the banks of the river. New fencing has enabled the farmer to graze this important habitat, which following the expiry of his Countryside Stewardship agreement had begun to scrub up.

The fencing has also excluded grazing livestock from the adjacent woodland, which will offer additional biodiversity benefits. £4,173 has been spent to stop livestock getting into the main Little Dart River (which is failing on phosphates), reduce sediment entering the water course from livestock disturbance and prevent damage from forestry machinery movements.



Riverside fencing in Hardingsleigh (Photo by DWT)

Community Engagement

To help raise awareness and education DWT held a number of TRIP events. Since April 2013, Working Wetlands staff have been involved in 8 public engagement events, exceeding their original target of 5. These ranged from seminars to more practical events such as hedge laying courses (further details on these events can be found in the Partnership chapter).

In addition to the TRIP events, Working Wetlands contributed to an Interreg project called "The Value of Working Wetlands (WoW)" bringing partners together from across Northern France and SW England to exchange ideas and best practice in supporting wetland farming.



Tarka Country Trust: Floodplain Grazing Marsh Management



Background

Floodplain grazing marsh is seasonally flooded grassland in river valleys, estuaries and coast that is periodically grazed by cattle and sheep and sometimes cut for hay and silage. These floodplains are sometimes managed by a system of ditches or contain natural filled hollows which regulate the water level, these are often full of plants and invertebrates, and are important habitat for other species such as eels.

Floodplain grazing is vitally important in defending us against flooding, and they provide an efficient buffer which intercept sediment, nutrients, pesticides and other materials in surface runoff.

There is only a small proportion of the total extent of grazing marsh left in the UK which is semi-natural and supports a high diversity of native plant species. Almost all areas of grazing marsh on the Taw is extensively grazed and/or cut for hay or silage.

Management

TRIP partners the Tarka Country Trust delivered advice to 19 landowners on the management of floodplain grazing marsh, and of these, 16 of them received grant aid to conduct improvement works that will benefit the habitat. Landowner visits also provided an opportunity to suggest improvements such as covered yards and moving inappropriately-sited manure heaps and even silage stores as well as reverting some key riverside arable fields to permanent pasture.

Much of the grant funded work involved fencing of the riverbank to ensure that nutrients did not get into the river or adjacent watercourses. Alternative water supplies were grant aided as well

Examples of Delivery

Farm 1, South Molton: This farm has stopped grazing cattle on the riverside fields and only run sheep there. They have taken on board the need for keeping livestock off the riverbank and have added an electric line to the fence and completed the fence across past drinkers. Instead of digging in the pipe to extend the pressurised farm water supply to the riverside, they have opted for remote battery operated pumps (solar re-charging) to fill concrete troughs placed in each of the seven fields in which they are running the animals.



Farm 1, South Molton— Solar battery operated fence

Farm 2, Fremington—Good fencing was done here using sweet chestnut coppice products. Several of the worst poached areas have been addressed. There might still be issues here if a lot of animals are run in this one large marsh as this will still provide poaching pressure. The Reserve Manager has been advised to control the stocking density if it remains let to a tenant. Whilst poaching here may not have adverse consequences for the river itself as it is already downstream of the river and most of the estuary, but any intrinsic floristic interest and diversity may be lost if too many animals are left on the site for too long.



Farm 2, Fremington—Fenced grazing marsh

Conclusion

All but one who signed up to the grants have been able to fulfil the planned outcomes. There have been some good links between farms, particularly around Alsweare where five farms have gained, benefitting three rivers: the Mole, the Crooked Oak and the Little Silver. A number of the farms are still cultivating riverside fields for arable crops that still present a high risk of losing valuable topsoil to the river. Given that they are often flat and rich alluvial soils, it is going to need serious incentives through agri-environment schemes to encourage change away from such short-term cropping.



Woodland Management on the Taw

Background

Woodland is a significant habitat in the Taw catchment covering approximately 12,803ha, around 10% of total area. Advice on managing riparian woodland with respect to influence on nearby watercourses was provided by the Silvanus Trust, following guidance outlined in the Forests & Water Guidelines (Forestry Commission [FC], 2003) and Woodland for Water: Woodland measures for meeting Water Framework Directive objectives. The Trust appointed a TRIP woodland officer to carry out 46 site visits with land owner/managers and encourage appropriate woodland management, creation, buffer planting strips. Each visit was followed-up with a full report on current conditions, recommended next steps, support to access grants and invitation to relevant events.

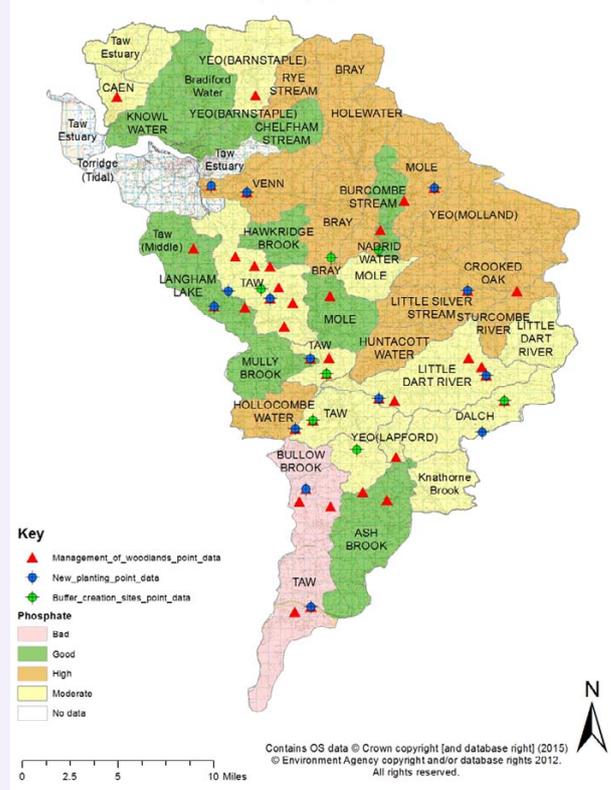
Priority areas to target for the advisory service were selected by mapping unmanaged woodland (FC data of woodland unaided via England Woodland Grant Scheme [EWGS]) correlated with overlaid on areas of phosphate failure (sub-catchments with WFD status 'moderate' to 'bad'). Un-aided woodland was prioritised based on the assumption that unmanaged woodland would be less likely to be providing a positive effect on phosphate capture due to unfavourable woodland morphologies.

Delivery

Advice on the appropriate management of woodland totalling 483.3 ha was provided. Dependent on the morphology of a given section of woodland, advice relating to the control of phosphate migration was based either on the riparian coppicing and woodland and/or on the management of woodland compartments for their value as intermediaries between adjacent agricultural lands and watercourses. Coppicing was often recommended to reduce the likelihood of tree fall due to the top heavy nature and potentially unstable root system of trees growing at the bank edge. Trees being uprooted within the bank could lead to significant sedimentation of watercourses, and introduce phosphates that were previously bound to soil particles within the bank.

If appropriately managed, woodland can decrease diffuse pollution from phosphate input and drift by slowing run-off and trapping sediment. Woodland in the Taw catchment usually occurs within farm land and can intercept agricultural inputs moving through the water table or bound to soil particulates.

All woodland visit sites and sub-catchment status for phosphate



Management advice focused on maintaining/enhancing intermediary benefits often through thinning to encourage a diverse ground flora to flourish, leading to an increase in the surface area of the woodland root system, and facilitating an increase in the physical processes accounting for phosphate fixation and removal.

Woodland Creation: A total of 24 hectares of land for potential new woodland creation was surveyed and 13.4ha confirmed as planted with support from the EWGS woodland creation scheme. Establishing new woodland creates a greater area of cover, and as such brings the benefits of phosphate interception and sediment capture to a larger area.

Woodland Buffer Strips: Seven on-site visits specifically advised upon planting and site suitability of new woodland buffer strips. A total stretch of 13,522 m of riparian edge was assessed with 2,870 m committed to planting at one site. The establishment of riparian woodland buffer strips can act as potential intercepting nutrient "soaks" near surface waters. Buffer strip creation was generally sought by owner/managers suffering erosion issues associated with peak flows in the winter months.



WIDER BENEFITS



Wider Benefits of TRIP

The main aim of TRIP was originally to improve the WFD status of all failing watercourses by restoring their natural features, and reducing the impact of man-made structures and diffuse and point source pollution on watercourses within the Taw catchment. However, although the works delivered under TRIP were primarily driven by WFD, they have provided a multitude of other benefits to the wider environment.

Ecosystem Services

An ecosystem is formed by a community of animals, plants and micro-organisms interacting with themselves and the physical environment in which they live. Within a functional ecosystem the community of living organisms exists in a finely balanced equilibrium of life and death, with each forming a key component of the food web and living in an environment in which the physical elements, such as water, nutrients and other chemicals, are constantly cycling and shifting around (and through) them.

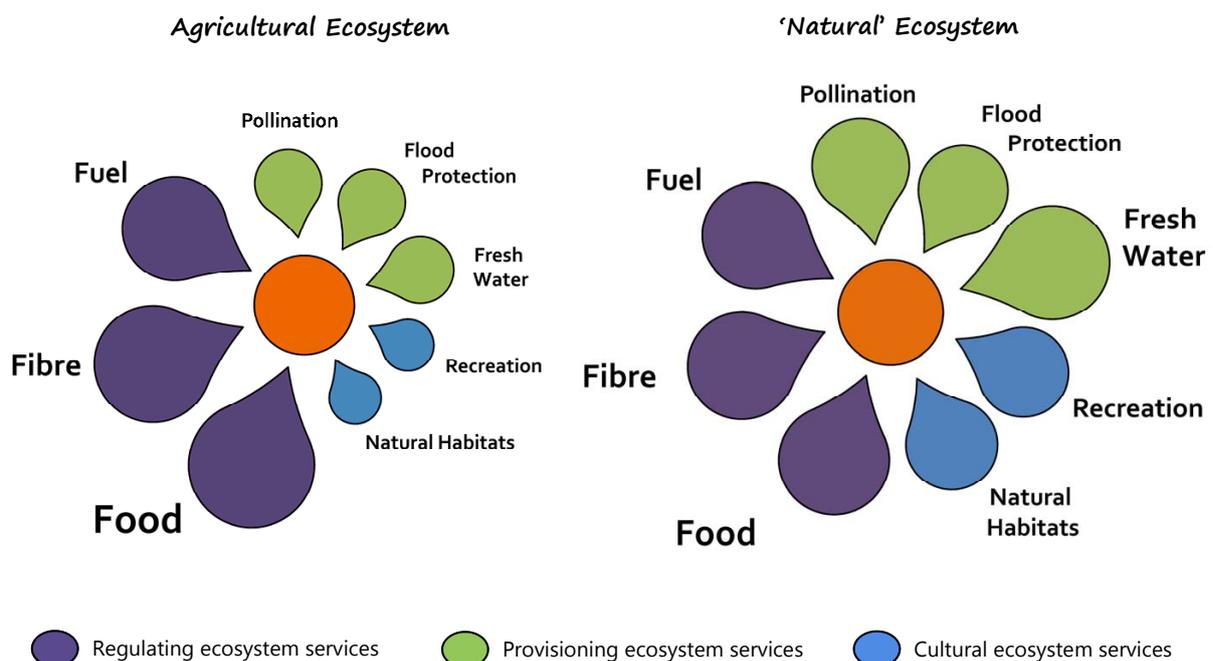
As just one organism in the natural ecosystems that surround us, we also rely on them to provide us with a wide array of the things we need to survive. These benefits, which we call ecosystem services, include the provision of food, flood protection, sufficient clean water, habitats for wildlife, spaces for recreation, clean air and the storage of our greenhouse emissions.

Finding a Balance

Over the centuries our population has grown and we have become increasingly disconnected from the natural ecosystems and services they provide. Many people have moved into towns and cities, resulting in fewer people growing their own food, and most buying their food from shops. The potential problem with this system is that, as the demand for food grows, our natural ecosystems are being put under ever greater pressure to produce food. This is resulting in farmers having to put more and more of their land into higher intensity agriculture to make ends meet.

Much of TRIPs work involves working with landowners, to advise them on how to use their land in a more sustainable way, which not only benefits biodiversity but will also benefit the landowner financially in the future and to improve the way they use the land to restore the natural equilibrium of the surrounding ecosystem.

The ecosystem services provided by a river catchment exist in a delicate balance; some are complimentary and some are antagonistic. If the provision of some services become dominant then the river system can lose its ability to provide others. The key is to find the right balance ...





Wider Benefits: Barnstaple Yeo Biobed

A Drinking Water Protected Area

The Barnstaple Yeo is a tributary of the River Taw catchment, located towards the north Devon coast and adjoining Exmoor National Park.

This is an important sub-catchment for a number of reasons and is designated as a Drinking Water Protected Area (DrWPA) due to it feeding into the Wistlandpound Reservoir and abstraction at Loxhore. This ultimately supplies much of North Devon, including Barnstaple and a large areas of northern Exmoor. Land here is mainly grazed permanent or semi-improved pasture and woodland in steep sided valleys.

Due to the need to protect DrWPAs, regular monitoring is carried out to assess levels of pollutants by South West Water and previous research by WRT discovered a diversity of Agro-chemicals (pesticides, herbicides etc) detected in raw water in this catchment over a period of 12 years.

Obviously these present a potential risk to humans and the wider environment, and set safety level thresholds have been established within the UK.

The frequency of detections on the Barnstaple Yeo dramatically increased in recent years and awareness and targeting efforts have been increased through TRIP and other projects such as CSF as a result to tackle the problem. One such site was included under TRIP

Biobed Improvement

A small livestock holding which has developed and diversified over a number of years into a sizeable yard, effectively as the central base for farm contractor services and other suppliers depots. This included an old but functioning Biobed (facility to safely dispose of pesticide residues through the natural breakdown of products through organic materials).

Although still functional and legally compliant with relevant permits, there was a definite opportunity to upgrade the unit – furthermore, the owner was undergoing some site re-development which meant this Biobed would need to be relocated.

Based on site visits, conversations and a farm plan, a short technical report was commissioned from external consultants by the landowner – and based on this a small capital grant was provided by TRIP which part funded the new build.

A completely new Biobed facility has been installed in the yard; this comprises a bunded concrete wash-down area connected to an indirect Biobed, final treated (clean) water is eventually irrigated over a contained area of adjacent field. Much of the work has been carried out by the contractors themselves (site preparation, plant & machinery etc) over 8 weeks in the winter to start work in the 2015 operating season. There are future plans to relocate the pesticide store & handling area closer to the Biobed for better logistics and reduce travel on site, and to cover the wash-down area to reduce unnecessary clean (rain) water input.



Above—top: Installation of biobed

Above—lower: Installation of bunded concrete wash-down area



Wider Benefits: Freshwater Pearl Mussels on the Tav

Background

The freshwater pearl mussel (FPM) (*Margaritifera margaritifera*) is an internationally threatened species, which occurs in very low numbers in the Tav and Torridge catchments. The most recent surveys of these rivers showed the Torridge population to be around 2000 individuals, the Tav to be <100, and the Mole to be <20 individuals.

The FPM is a useful indicator species of ecological status and water quality because they are dependant upon good fish populations (the larval stages of the freshwater pearl mussel life cycle spend 9 months in the gills of salmonids) and clean water. They are a long lived species (they can live more than 100 years) but in the Tav, and neighbouring Torridge, they have not successfully bred for 50 years. These two catchments are important for the species because they are the most south westerly populations of the species.

Considerable recent work has been undertaken, both before the TRIP (including some survey work on the Mole by WRT) and as part of it, to improve the passage of migratory fish in the Tav, Mole and Bray catchments. Compared to the Torridge and Tav, the Mole catchment is relatively small, rises on un-intensive land (Exmoor), and was considered as offering the best prospects for a species recovery project in Devon.

The sub-catchments of the upper River Mole and upper River Bray have been identified as areas to search for suitable recovery sites. Recovery site or sites could be used for potential re-introduction of captive bred stock, or for the translocation of individuals from a population under immediate threat in Devon.

Delivery

TRIP partners the North Devon Biosphere Reserve managed and delivered a number of actions to help towards understanding to improve water quality to a standard that could potentially support healthy and viable populations of freshwater pearl mussels.

North Devon Biosphere employed two contractors to train volunteers to conduct habitat walkover surveys using the method amended from WRT's "Fisheries Walkover Manual (2013)". This method includes survey techniques to identify potential freshwater pearl mussel habitat within the bank.

The volunteers successfully surveyed the remaining 13.3km of the River Mole, therefore potential freshwater pearl mussel habitat has been mapped from North Molton to Junction Pool.

This information was also supported by a two week long visit from Ian Killeen, an international expert on freshwater pearl mussels.

Following his surveys Ian provided a report which included the results of his habitat assessment and site improvement recommendations. The report was a crucial tool when targeting landowner advice and informing future works.

As part of TRIP's farm advice objectives a freelance farm advisor was contracted to deliver farm advice to landowners close to the existing freshwater pearl mussel populations on the Mole. Site visits were held with farmers at 15 sites on the Mole, and grant aid was given to one farmer for fencing and an alternative drinker.

Overall a much greater knowledge of the current problems for freshwater pearl mussels on the Mole has been gained, and from this a list of recommendations for future habitat and improvement works has been developed.

New ideas on how to get the population breeding have been discussed under TRIP and hopefully will be tested by the Freshwater Pearl Mussel Project covering the Torridge.



Pearl mussel habitat surveys



Training the survey volunteers

PARTNERSHIP & STAKEHOLDER ENGAGEMENT





Partnership & Stakeholder Engagement

The TRIP developed an integrated stakeholder-driven assessment of the catchment prior to, and through out the project. This provided a comprehensive understanding of the challenges the catchment faces and, helped develop a strategic, targeted, balanced and therefore cost-effective catchment management intervention plan.

The TRIP management plan was achieved through engaging with catchment stakeholders by building diverse, engaged and empowered catchment partnerships comprised of environmental practitioners, businesses and community groups.

Once brought together, the partnership developed a shared understanding of the issues in their catchment, which aided in building a consensus about what actions needed to be delivered to achieve this shared vision for their catchment in the future.

Meetings

Over the three year project the TRIP developed a strong partnership that helped steer the project forward in a positive and effective direction. Every six months the TRIP held a Partnership Advisory Group Meeting (PAG) where each project officer would present a project progress update. This offered an opportunity for all the project partners to ask questions, provide feedback and agree any changes to the original bid.

In order to ensure the partnership were regularly updated a project newsletter was sent to partners annually, these provided detailed yet concise updates on project progress and what was planned for the following year ahead.

Date of TRIP PAG Meetings	Venue
13th August 2012	Civic Centre, Barnstaple
25th March 2013	Civic Centre, Barnstaple
2nd September 2013	Civic Centre, Barnstaple
7th April 2014	Civic Centre, Barnstaple
1st September 2014	Fox & Hounds Hotel, Eggesford
3rd February 2015	Civic Centre, Barnstaple

Alongside the regular PAGs, other specific meetings were held which followed on from specific PAG agenda items or meetings to discuss particular project works. All of which have been documented and archived. These include:

- 6 x Agricultural & Biodiversity Land Management sub-committee meetings;
- 1 x Data & Monitoring sub-committee meeting;
- 11 x Fisheries sub-committee meetings;
- 1 x Project Advisors Introduction and Training meeting;
- 3 x Research sub-committee meetings;
- 3 x Fencing Grant Approval meetings

An Active Partnership

One very strong aspect of TRIP's successful delivery was due its active partnership. Some partners were funded to conduct works while others contributed as match. Each partnership brought their own skills and ideas which were vital when delivering specific works throughout the Taw catchment. The following partners delivered work on the ground:

Devon Wildlife Trust—Funded through TRIP to visit landowners and deliver advice and small grants for watercourse protection and wetland habitat management (please see page 44 for details).

Silvanus Trust—Funded through TRIP to deliver landowner advice on riparian woodland management, and provide advice on to landowners on available grant applications, i.e. Woodland Grant Schemes (please see page 46 for details).

Farming & Wildlife Advisory Group (FWAG) South West - Funded through TRIP, FWAG SW delivered farm advice and conducted soil/manure sampling and detailed nutrient management plans.

Tarka Country Trust — Managed a floodplain grazing marsh management programme (see page 45 for details).

North Devon Biosphere — Managed a Freshwater Pearl Mussel (FWPM) habitat investigation programme. Surveys were undertaken by both professionals and trained volunteers to investigate the current conditions of FWPM habitat on the Mole. Information gained will be used to inform future habitat improvement works.



Partnership & Stakeholder Engagement

Community Engagement

In order to inform and involve the wider community about the importance of catchment management and the role of the TRIP, a variety of community volunteer training events were held, these were:

- **Project Introduction** – On the 18th March 2013 North Devon Biosphere held an event to introduce the TRIP and the advisors to the farmers and landowners in the Little Dart and Huntacott sub-catchment. The event was held at Red Lion, Chumleigh.
- **Taw Woodmeet** – The Silvanus Trust held four events on dates the 8th May 2013, 17th October 2013, 13th June 2014 and the 4th February 2015. Each event aimed at delivering woodland management advice and raising awareness about the importance of how correct riparian woodland management can have many environmental and financial benefits. Some events were practical and provided demonstrations and guided walks through well managed woodlands. For example, one event provided a demonstration of using work horses to provide a method of low impact removal of logs to aid in reducing compacted soils and potential soil erosion.
- **North Devon Show** – On the 7th August 2013, the Working Wetlands team, North Devon Biosphere and other partners provided displays, information and advice relating to the project at the regional show.
- **Science Day** – On the 19th September 2013, WRT held an event for 52 attendees at the North Wyke Rothamstead Research Institute. The event provided an opportunity to listen to presentations about the research and monitoring work being conducted under TRIP to understand the WFD reasons for failure within the Taw catchment. WRT also gave an invertebrate sampling and electrofishing demonstration.
- **Soil Management Advice** – FWAG SW held an event delivering advice on soil management of grassland and arable farms. Topics included advice on compaction, tyre and machinery choice, cultivation, harvesting and grazing options.
- **CSF Farmer Workshops** – The workshops were held around 3-4 times a year over the three year period, and organised by the CSF North Devon Partnership. Advice given to landowners on good agricultural practice and an introduction to CSF Capital Grants Scheme was provided.
- **Working Wetlands** – the Working Wetlands team organised and provided a variety of community engagement events. These included guided walks to sites which have been managed under TRIP, a practical course in Hedge laying techniques, and a Working Wetlands Seminar was presented at the Fox and Hounds Country Hotel in Eggesford on the 5th February 2015.
- **TRIP Trip Out** – On the 20th March 2015, WRT held an event where all the TRIP partner organisations were taken on a guided tour of some of the works completed under TRIP. The main aim of the day was to ensure knowledge transfer between all project partners, discuss the scope for potential collaboration in the future and celebrate the TRIP's successes.
- **CRF Conference** – In December 2014, WRT held a two day conference at Exeter Castle where approximately 170 people attended. The 1st day focussed on the Catchment Based Approach, and the 2nd day included a variety of presentations showcasing the works completed under TRIP.
- **River Restoration Centre Visit** – In July 2015 the RRC visited the South West to see some of the work undertaken during TRIP.



North Devon Show



Science Day electrofishing demo



Taw Woodmeet: working horses



WRT Staff Training– Prepared to deliver

To ensure that all the staff working on TRIP were well informed and prepared to deliver the projects as efficiently as possible; the following catchment delivery staff attended a variety of appropriate training courses and professional development events to support them in their particular role. These included:



Dr Laurence Couldrick – Project Manager

- NEC3 contracts, September 2013 – training on how to administer the NEC form of contract.
- First Aid 26/07/2013
- Understanding, Targeting and Delivering Catchment Management, 2 and 3 December 2014 – useful dissemination of project achievements and lessons learnt.



Dave Chapman – Fisheries Habitat Improvement Officer

- NEC3 contracts, September 2013 – training on how to administer the NEC form of contract.
- Understanding, Targeting and Delivering Catchment Management, 2 and 3 December 2014 – useful dissemination of project achievements and lessons learnt.
- IFM Certificate in Electric Fishing – training in competent undertaking of electric fishing surveys.
- River Taw Fisheries Association AGM, March 2015 – Publicise TRIP and promote good river management.



Hazel Kendall – Senior Land & Farm Advisor

- CDM Awareness, June 2012 – training course on CDM regulations, essential for large engineering projects such as fish passage.
- Dartmoor Mires Research Seminar and Fieldtrip, 30 January 2013 – information on upland mires and hydrological restoration works.
- Exmoor Mires site visit, 28 February 2013 – technical information on mire restoration .
- CIEEM Water Environment, Legal Framework course, 14 March 2013 – legal and regulatory.
- Export coefficient modelling (ECM) to support catchment management workshop, 11 March 2013 – use of modelling in stakeholder engagement.
- Electrofishing training, May 2013 – Advanced training course on latest best practice.
- Macrophyte Identification
- NEC3 contracts, September 2013 – training on how to administer the NEC form of contract.
- Rivers Trust Autumn conference, 30 to 31 October 2013 – learning through study of project examples and dissemination of latest knowledge/ techniques.
- Catchment Based Approach (CaBA) launch event, 5 November 2013 - dissemination of latest knowledge/ techniques.
- Catchment Sensitive Farming (CSF) advisors training day, 21 January 2014 – training on catchment sensitive farming techniques and procedure.
- Understanding, Targeting and Delivering Catchment Management, 2 and 3 December 2014 – useful dissemination of project achievements and lessons learnt.
- River Taw Fisheries Association AGM, March 2015 – Publicise TRIP and promote good river management.



WRT Staff Training– Prepared to deliver...continued.



Adrian Dowding – Senior Fisheries Officer

- CDM Awareness, June 2012 – training course on CDM regulations, essential for large engineering projects such as fish passage.
- ISIS Flow Model, February 2013 – training course relating to in-river alterations.
- River Taw Fisheries Association AGM, March 2013 – Publicise TRIP and promote good river management.
- Electrofishing training, May 2013 – Advanced training course on latest best practice.
- NEC3 contracts, September 2013 – training on how to administer the NEC form of contract.
- River Taw Fisheries Association AGM, March 2014 – Publicise TRIP and promote good river management.
- CIWEM Natural Flood Management, September 2014 – Conference relating to the holistic integrated approaches to catchment management.
- North Devon CaBA, October 2014 – Register and generate catchment management work in accordance with TRIP remit.
- Understanding, Targeting and Delivering Catchment Management, 2 and 3 December 2014 – useful dissemination of project achievements and lessons learnt.
- River Taw Fisheries Association AGM, March 2015 – Publicise TRIP and promote good river management.



WRT River Safety Training (2013)



WRT River Safety Training attendees warming up (2013)



WRT Macrophyte ID Training (2013)



Project Summary

Overall the TRIP has been extremely successful in its delivery. All works within each failing WFD waterbody have been informed through sound science and investigation prior and post delivery. This not only guarantees that a more accurate ecological condition of each water body is identified, but it ensures that all works delivered are both efficient and effective.

Although it is evident that the three year TRIP project has been successful in its delivery, three years is a relatively short period to expect significant improvements of water quality. However, we can safely be reassured that works such as barrier easements will improve the rivers connectivity for migrating fish species, and farm works such as fencing will most definitely prevent damage caused by livestock entering the river, and reduces pressure such as bankside erosion. Although these delivery outputs have a small positive impact individually, the cumulative impact throughout the catchment will be significant.

The project has provided a strong baseline to continue working from. We have conducted many investigations and works, all of which have provided valuable information on the current condition of the river, and pinpointed the locations of some specific pressures that still need to be targeted within the Taw catchment.

It is therefore crucial ***that this work is continued into the future***, not only to ensure that the funds provided under the CRF have been spent efficiently, but also because TRIP has provided a management foundation, which, if built upon, will ultimately provide a sustainable future for the catchment.





Summary of TRIP Project Achievements

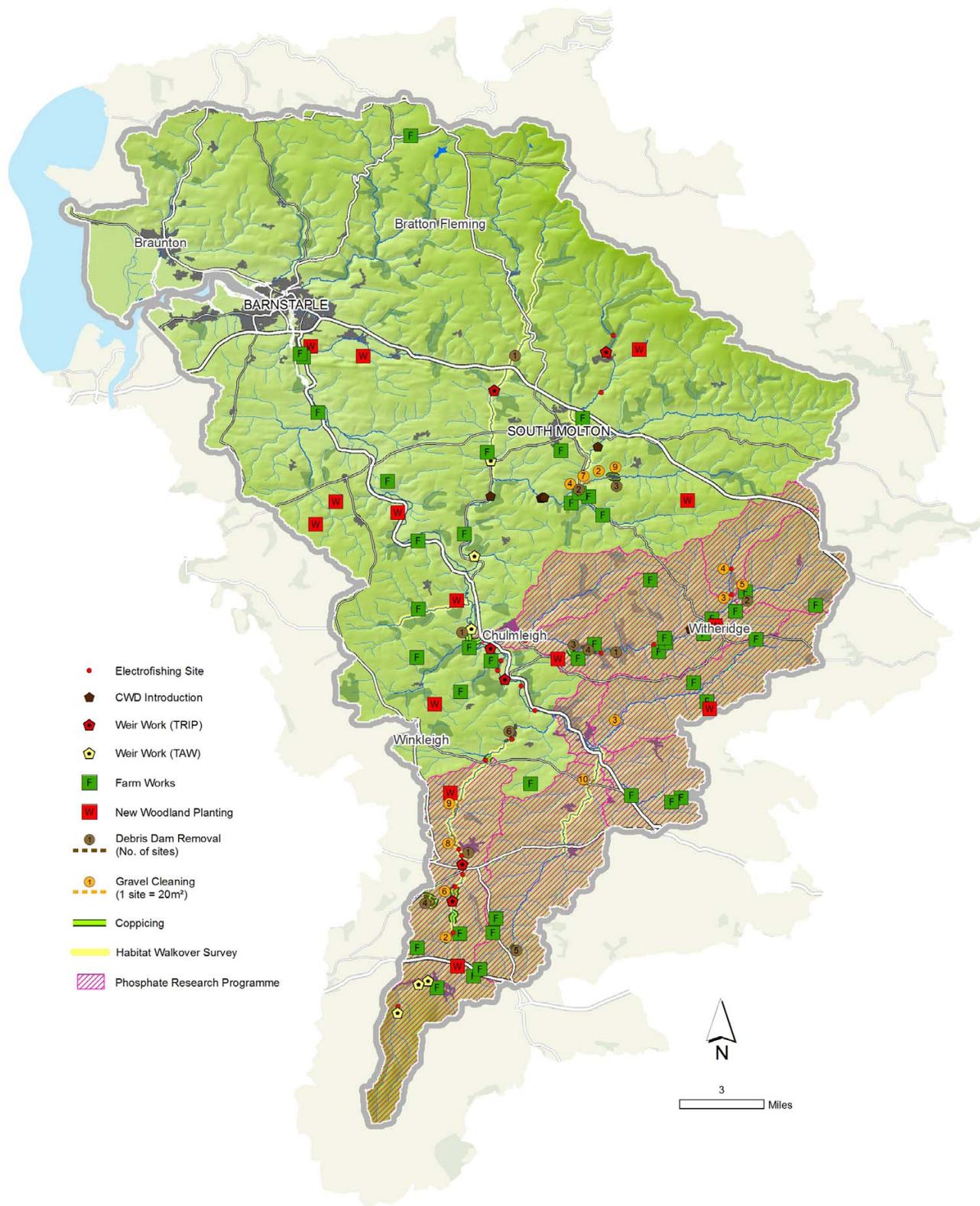
In the original project application a number of targets were proposed. The table is a summary of these targets giving an indication of whether each outcome was achieved within the TRIP Project (Green = complete, yellow = partly complete, red = not complete). These outputs are also summarised on the map over the page:-

Project Outcomes	Outcomes achieved?	Comments
The design feasibility surveys and FDC complete for all Fish Passes by 01/01/13		All preparatory works for all the fish passes have been completed.
One site to undergo gravel augmentation		No suitable sites for gravel augmentation were identified, but multiple gravel sites required management in-situ. Therefore a change to the original project plan was decided. Instead, a gravel cleaning programme was managed which completed 60 sites, resulting in a successful target over delivery.
Completion of report identifying priority sites for creation of in-stream habitat diversity to address river hydromorphology issues.		8km of walkover surveys were conducted and over 160 farms were visited by WRT and their partners, where notes on river habitat would be completed and used to inform river habitat management decisions.
10km Fencing		An over delivery of fencing by WRT and their partners was completed with a total of 37km of fencing installed.
25 sites x River bank shade management		8.88km of river bank was selectively coppiced and 234m of coarse woody debris was introduced. Both of these methods aimed at either providing shading or allowing light to reach riffle sites.
10 x Soil nutrient plans delivered		TRIP partners FWAG delivered 55 soil tests and 35 nutrient management plans alone and this does not include the free soil tests delivered by WRT.
Rashleigh Weir Pass		Rashleigh Weir's adherent nappe and elver pass complete.
North Tawton weir fish easement		Works have been delayed by the Planning Committee. WRT entered into discussion with the planning committee and, after it was been agreed for the works to go ahead, this project has now been completed
North Molton Fish Pass		North Molton's technical super-baffle fish pass and elver pass are complete.
Debris dam management		33 sites had debris dams removed
Wetland Habitat Management		Devon Wildlife Trust delivered wetland management advice and works across 31 different holdings, and Tarka Country Trust delivered floodplain grazing marsh management advice to 19 landowners.
Sustainable Woodland Approach Programme		The Silvanus Trust delivered 46 site visits to encourage and deliver advice on woodland management and best practice.
Electrofishing pre & Post works		Under the TRIP WRT conducted 20 semi-quantitative electrofishing surveys in 2013, and 30 surveys in 2014.



Taw Catchment Delivery Map

Map showing all WFD targeted works delivered catchment wide under the TRIP (2012/13/14)



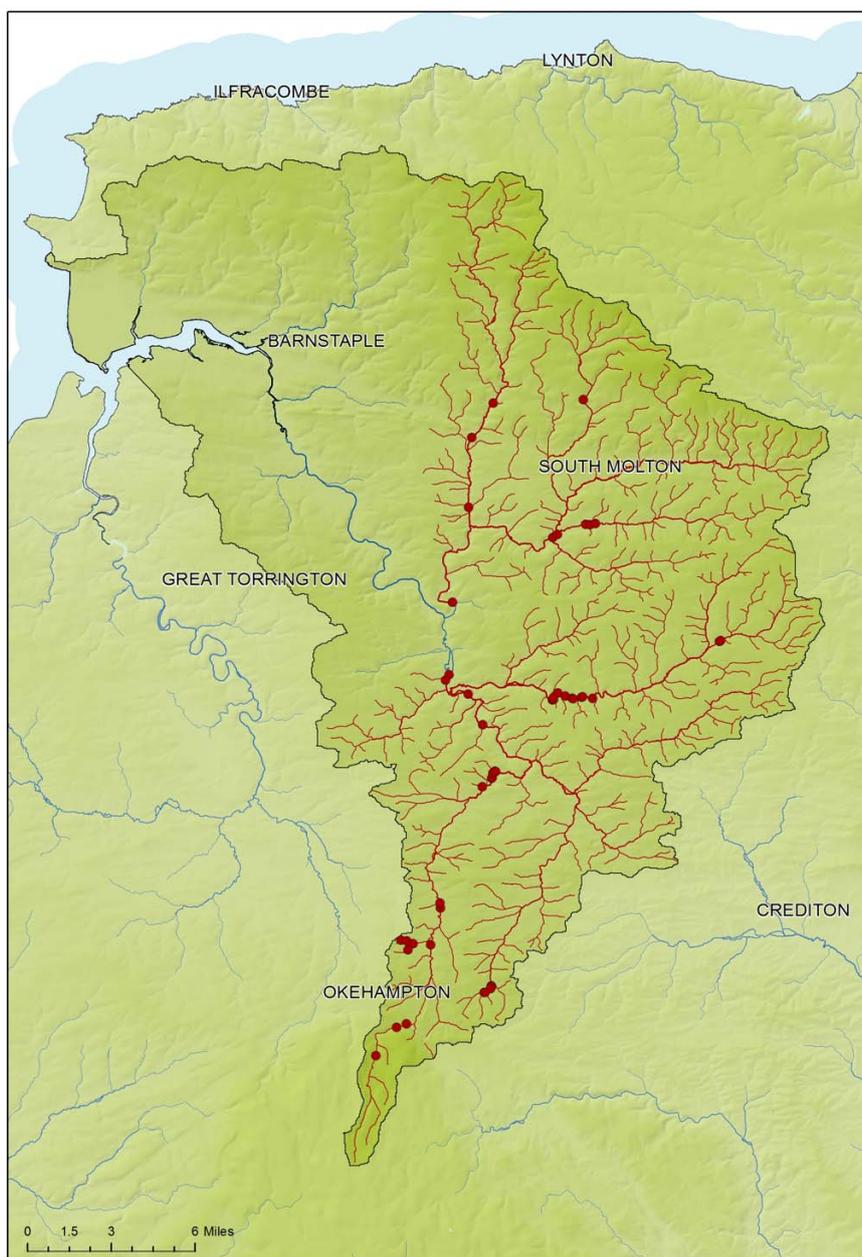


Taw Access Over Weirs Achievements

Map and table showing the river network length that is now opened up to migratory fish access due to barrier and obstacle removal (both weirs and debris) - freshwater habitat = 1,762km and spawning habitat (3rd order +) = 217km.

Project	Upstream habitat opened (km)			
	DRN (all streams)	Rivers 50k (all streams)	Rivers 50k (>=2nd order)	Rivers 50k (>=3rd order)
TRIP/TAW	1,762	901	396	217

* DRN = Detailed River Network



- = Weir/barrier mitigated
- = River length opened up to migratory



Future Works

Future works on the Taw Catchment which have been planned by WRT following the completion of TRIP.

Monitoring

- A catchment wide semi-quantitative electrofishing survey programme is planned for 2015 and 2016. Funding is tentatively secured for this.
- Habitat walkover surveys for the upper Taw have been planned and the application for funding has been submitted for 2015/16.
- The TRIP's phosphorous monitoring and investigation programme has already contributed some valuable data. This contribution not only adds data to an already detailed archive, but it has also provided data on some waterbodies which are completely data deficient.

Physical Works

- During the TRIP, WRT were key partners in the CSF Taw / Torridge Strategic Partnership that steered and delivered Catchment Sensitive Farming on behalf of Natural England in this area of North Devon. At that time there was no dedicated CSFO. Since the conclusion of TRIP, discussions have continued by this Partnership about the potential delivery of the final year of CSF in 2015 – prior to implementation of the new Countryside Stewardship Scheme (CSS) as a result of CAP Reform. It is now known that there will be final year of CSF budget to be delivered on the Taw and a dedicated CSF Officer for the Taw has been recruited by Devon Wildlife Trust to oversee it.
- The Barnstaple Yeo is now receiving investment from 2015-2020 via SWW's Upstream Thinking Project, for the protection of raw water quality. A Catchment Investigation was carried out by WRT in 2011/12 to inform this work and practical approaches will be made from April 2015, with DWT managing the work, but retaining close ties with WRT and other partners due to TRIP experience. Primarily this catchment is important as a DrWPA with SGZ status.
- The North Devon Catchment Based Approach (CaBA) is part of a national Defra initiative towards greater partnership working and stakeholder involvement, and towards the delivery of WFD aims & objectives, plus to collate local input in the drafting of RBMPs. WRT and DWT are joint hosts in North Devon, delivering on behalf of the NDBR – which means that there is a great deal of opportunity to utilise knowledge and experience gathered on the ground from TRIP and other projects towards forming future projects or steering investment. This also works closely with the EA Catchment Co-ordinators, utilising regular contact to update on projects, funding opportunities or developments.
- WRT and Rothamstead Research Centre at North Wyke have applied for a NERC funded agricultural research project on the North Taw. The project will mainly focus on sustainable intensification methods in agriculture.
- In 2015 WRT, alongside DWT and the North Devon Biosphere Reserve, have planned and initiated a freshwater pearl mussel research project which includes the potential for a translocation programme. This is a BIFFA funded project focussing on the Torridge catchment, which will also build upon previous work in the catchment (TRIP & Pearl Mussel Project).





The Taw River Improvement Project (TRIP) is a Catchment Restoration Funded Project, which was administered by the Environment Agency. The project was written and delivered by the Westcountry Rivers Trust in association with the North Devon Catchment Partnership.

The project was delivered over three years (2012-2015), with the primary aim of delivering targeted action to make significant steps towards achieving Water Framework Directive (WFD) waterbody objectives set out in the 2009 River Basin Management Plans.

This report documents the works delivered under the TRIP and describes how these works were targeted to ensure that efficient on the ground management was delivered effectively throughout the catchment.

Although the TRIP has completed its final year, the work that has been delivered and the valuable information and data that has been collected will provide a solid foundation to build upon in the future. This not only provides wider benefits to the society and the environment, but also provides a valuable tool to aid in building a sustainable future for the catchment as whole.

Westcountry Rivers Trust

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