Sid Vale
Living Rivers Project 2013-14

Report and Action Plan

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Devon Wildlife Trust
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Contents

How to use this report

This report has two purposes.

i) To provide a detailed account of actions made possible by a grant from the Keith Owen Fund (SVA) between April 2013 and March 2014. Please refer to **sections 1 - 6 i**nclusive.

ii) To recommend future actions to enhance the health and freshwater wildlife value of the River Sid and its tributaries. Please refer to **section 7** which can be read in isolation from the rest of the report if preferred.

Report photography: Sam Davies, Andrew Taylor and Scott West (unless otherwise stated)

Front cover: A female beautiful demoiselle *(Calopteryx virgo)*. This damselfly can be seen along faster flowing sections of the River Sid and its tributaries.

1. INTRODUCTION: LIVING RIVERS AND THE PROJECT PARTNERSHIP

The first year of the Living Rivers project has been made possible by a grant from the Keith Owen Fund (SVA). It has been designed to initiate long term improvements in the ecological status of the River Sid and its tributaries, for the benefit of both people and freshwater wildlife.

Living Rivers has brought together, for the first time, a small group of local organisations– the Sid Vale Association, Devon Wildlife Trust and Devon Biodiversity Records Centre. These partners have complementary aims and all benefit from the generous help of local people as volunteers, members and donors. Many individuals provide regular support not just to one of the partners, but to two or three. This close alignment of interests was the catalyst for the Living Rivers project.

The work programme for this first year has been delivered by Devon Wildlife Trust and Devon Biodiversity Records Centre staff and volunteers, with help and guidance from Sid Vale Association members. It is intended that the recommendations contained in this report should be taken forward by the SVA and the local community, with ongoing support from the Keith Owen Fund and other donors. Advice and assistance from DWT and DBRC will continue to be available on request.

Sid Vale Association and the Keith Owen Fund

The Sid Vale Association was founded in 1846 and is the oldest Civic Society in Britain. The Living Rivers project has been designed to further one of its key aims - to "protect develop and improve for the benefit of the public the beauties amenities and heritage of the Valley of the River Sid in East Devon and its environs".

Support for Living Rivers has been provided by the Keith Owen Fund (SVA), which was set up in 2007 through a generous bequest from an SVA supporter. Keith Owen wished his fund to be used to support local projects which encouraged volunteering and sustained the ambience and way of life which he had enjoyed in Sidmouth and its surroundings during his lifetime. The Living Rivers project aims to meet four of the fund's objectives:

- to preserve and enhance the life and community of Sidmouth and its environs for both residents and visitors.
- to encourage people to give of their time and talents to voluntary initiatives and activities.
- to promote the conservation of heritage and countryside.
- to encourage a sustainable environment.

Devon Wildlife Trust

Founded in 1962, Devon Wildlife Trust (DWT) has more than 30,000 members and hundreds of regular volunteers. In pursuit of its vision of "a Devon richer in wildlife" it is involved in land and marine management, wildlife surveying, conservation policy and education. DWT has 48 nature reserves around the county including several in East Devon's Exe, Otter and Axe catchments. In recent years it has also been involved in a variety of other conservation initiatives in East Devon but again in the Sid's neighbouring catchments, not in the Sid Vale itself. Through the Living Rivers project DWT has been able to fill this gap in its activities, and this report's recommendations are designed to help the Sid Vale community to achieve significant enhancements in its freshwater environment over the coming years.

Devon Biodiversity Records Centre

Devon Biodiversity Records Centre (DBRC) is one of a national network of Local Environmental Records Centres. DBRC's database of over 3 million wildlife records is typically updated with

2,000-5,000 new records per month, all of which are validated and verified. It acts as the central reference point for anyone who wants to know about wildlife in Devon.

DBRC is run on a 'not for profit' basis and is supported by a large partnership of organisations and individuals. Its staff are ably assisted by full time trainees and a county-wide army of volunteers. DBRC hopes that the Living Rivers project will help to engage a new generation of wildlife recorders here in the Sid Vale.

Local stakeholders and the wider Sid Vale community
Devon Wildlife Trust and Devon Biodiversity Records Centre have been in contact with school communities, landowners, wildlife recorders and many more local people during year one. Great interest has been shown in the project, and if this enthusiasm can be harnessed there is every reason for optimism about the future health of the Sid catchment.

An overview of the project team that has delivered this work is provided in Appendix 1.

Living Rivers Project: Partner Involvement	**Year 1**	**Projection - future years**
Project delivery		
Sid Vale Association		
Wider Sid Vale community		
Devon Wildlife Trust		On request
Devon Biodiversity Records Centre		On request
Project funding		
Keith Owen Fund (SVA)		
Other funders		Possible - to be identified

Key	
Partners playing lead roles	
Partners providing support	

2. THE PURPOSE OF THE LIVING RIVERS PROJECT

The local context
The Sid is a very compact river system with rich biodiversity and relatively few landholdings. This manageable size and the Sid Vale's long history of enthusiastic community engagement combine to create a rare landscape-scale conservation opportunity: for local people to maximise the health and freshwater wildlife of an entire Devon river catchment, from source to sea.

Year one of the Living Rivers partnership was designed as the first step in this process, to give the people of the Sid Vale greater knowledge and enthusiasm to help them carry out real physical improvements in the future. To this end the project has delivered the following three interconnected activities over the period April 2013 - March 2014.

- A walkover survey of the catchment to assess its current ecological status, and to identify priorities for future conservation work to benefit both people and wildlife.
- A detailed appraisal of one specific issue, the barrier presented to migrating fish by Sidmouth's School Weir.
- A programme of educational activities to engage the enthusiasm of children at three of the Sid Vale's schools.

The national context
While the project has been driven entirely by local need, it also supports national priorities for the freshwater environment. The government's policy paper "The Catchment Based Approach" advocates the voluntary involvement of communities in delivering improved water quality and hence in helping the UK to meet its targets under the European Water Framework Directive. The fact that Defra issued this policy in May 2013 might indicate that the benefits of working at the catchment level have only recently been realised by national decision makers. If so the Sid Vale Association, whose area of interest, activity and influence was defined as the boundaries of its river catchment back at its formation in 1846, was then almost 170 years ahead of its time.

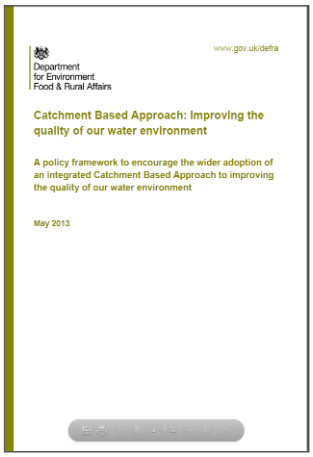
Defra's Catchment Based Approach

"The water environment is affected by every activity that takes place on land as well as through our actions in abstracting, using and returning water to rivers, the sea and the ground."

"Greater engagement and delivery by stakeholders at the catchment level…is particularly important when trying to address the significant pressures placed on the water environment by diffuse pollution from both agricultural and urban sources, and widespread, historical alterations to the natural form of channels."

"Better co-ordinated action is desirable at the catchment level by all those who use water or influence land management."

"Engagement and collaborative working sit at the heart of a viable Catchment Based Approach".


www.gov.uk/defra

Department for Environment Food & Rural Affairs

Catchment Based Approach: Improving the quality of our water environment

A policy framework to encourage the wider adoption of an integrated Catchment Based Approach to improving the quality of our water environment

May 2013

These extracts from Defra's 2013 policy paper support the Living Rivers approach – to engage the local community in enhancing the Sid catchment's freshwater environment.

3. CATCHMENT OVERVIEW

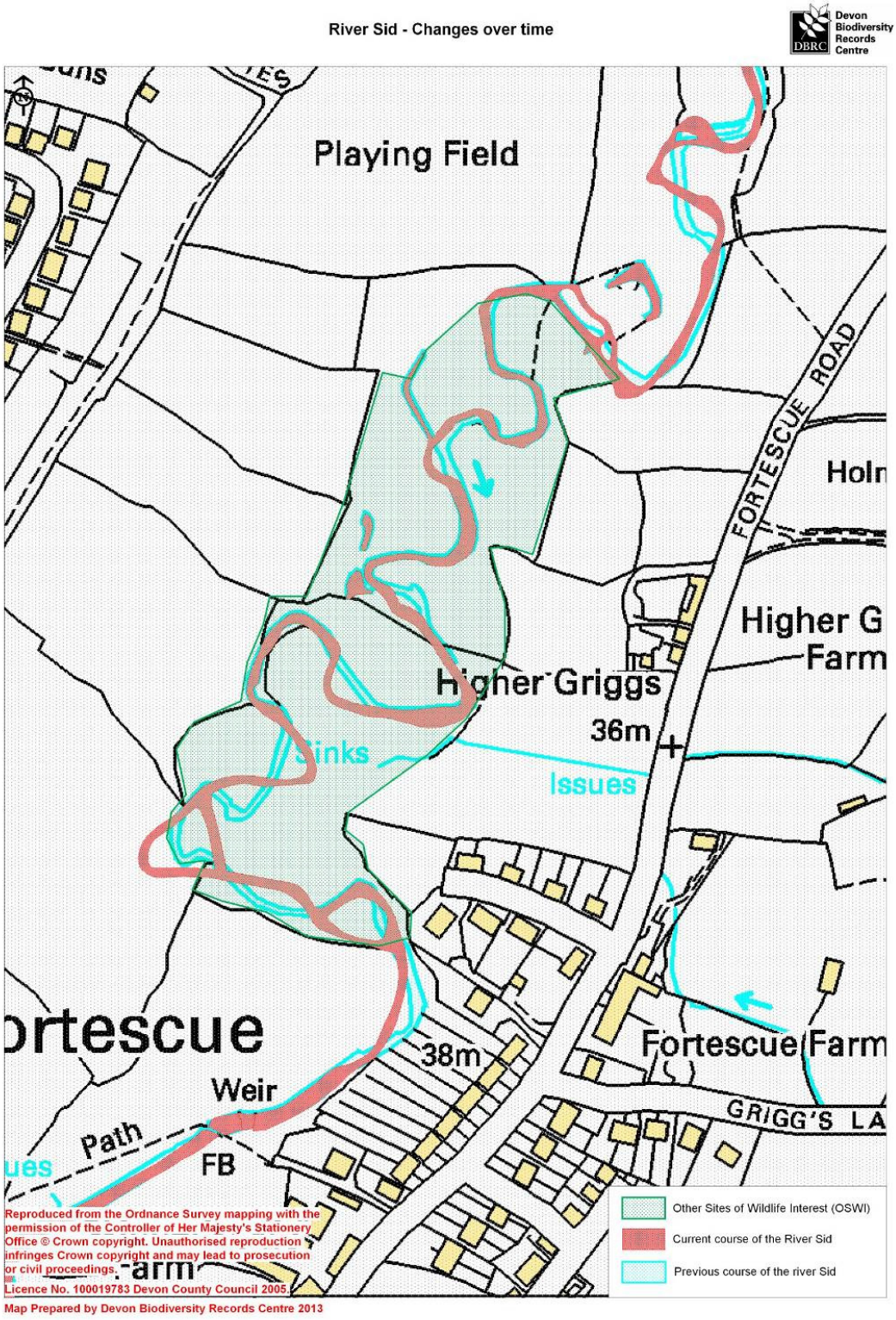
Geography of the Sid catchment
The River Sid rises at Crowpits Covert (OS grid reference SY138963) below the road from Ottery St. Mary to Seaton. From its source 206 metres above sea level the river flows southwards for 10.5 km. The Sid has three main tributaries, the Roncombe Stream, the Snod Brook and the Woolbrook, and is also fed by numerous springs flowing from East Hill.


The River Sid downstream of Sidford bridge

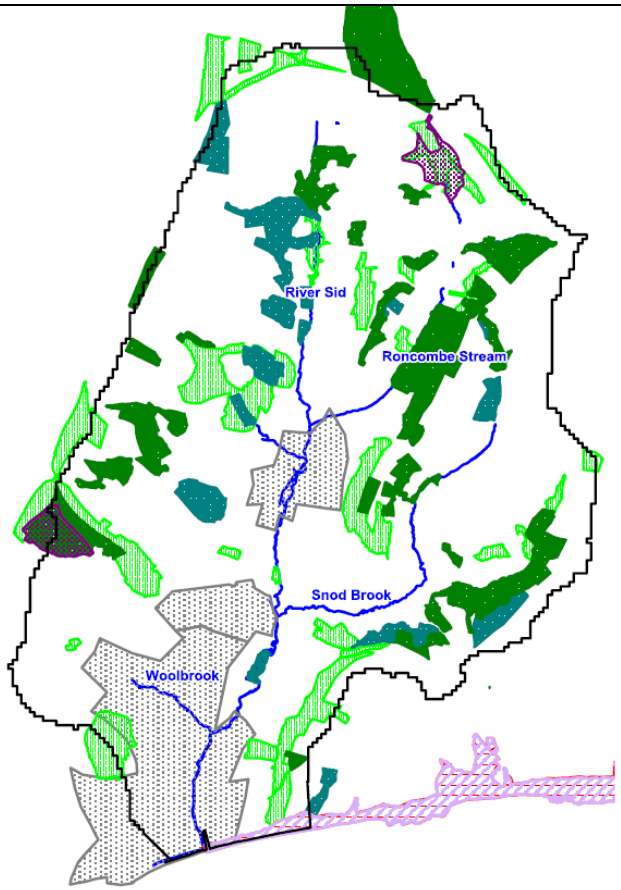
The river and its tributaries descend steeply from their headwaters creating a “flashy” catchment, the depth and volume of its watercourses responding quickly to periods of heavy rain. The Sid starts to level out below Sidbury and then flows past Sidford into the Byes, a popular parkland landscape on the northern fringe of Sidmouth. Although the river has slowed considerably at this point its channel is at its most dynamic, carving a spectacular series of meanders whose positions are constantly changing (see Map 1). Continuing into more densely populated parts of the town, the Sid is confined to artificial channels and culverts in many places before flowing out into the sea through a shingle bar below the Ham.

Most of the land surrounding the Sid and its tributaries is agricultural, consisting of improved pastures and arable land, although the steep slopes of the upper reaches have some dense semi-natural woodland and conifer plantations, and the grazing land is less improved. The river is

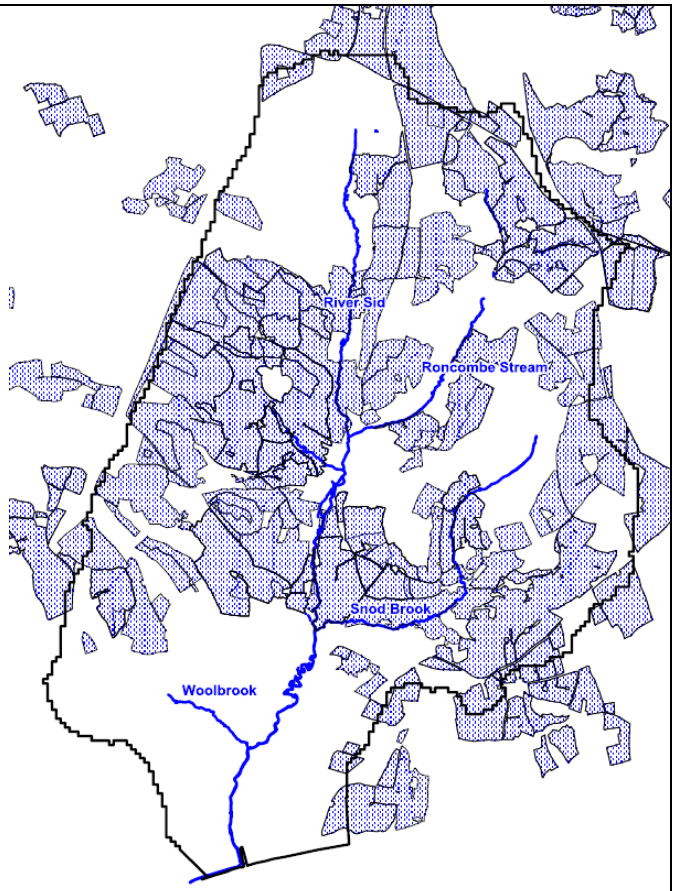
generally narrow (between 1m and 7m in width), with dense bankside tree and scrub cover for much of its length. There is considerable evidence of human activity in the river channel, with strengthened banks and weirs particularly in evidence in downstream areas.



Map 1: the rapidly changing course of the River Sid in Sidmouth's Byes area. The river's course in 1989 is shown in blue, its 2013 course in red.



Map 2: sites of recognised conservation importance in the Sid catchment



Map 3: approximate land area subject to ELS and HLS agri-environment agreements, 2014

Special Area of Conservation (SAC)
Site of Special Scientific Interest (SSSI)
Local Nature Reserve (LNR)
County Wildlife Site (CWS)
Other Site of Wildlife Interest (OSWI)
Unconfirmed Wildlife Site (UWS)
Town/village
Agri-environment schemes

Wildlife sites and agri-environment schemes in the Sid Vale

Land areas of known importance for wildlife are designated and identified in a number of ways. Map 2 shows that the Sid Vale has one coastal site recognised as being both nationally and internationally significant, the Sidmouth to West Bay SSSI / SAC. There are also two Local Nature Reserves and numerous County Wildlife Sites, as well as Unconfirmed Wildlife Sites (i.e. possible County Wildlife Sites awaiting assessment) and Other Sites of Wildlife Interest (sites falling outside County Wildlife Site standards but which still have significant ecological value).

It can be seen that the Sid Vale has quite extensive areas of wildlife interest (confirmed and potential). However our own project is concerned primarily with the river corridors, and relatively

few of the catchment's officially recognised wildlife sites include freshwater habitat. Most of the middle and lower Sid and nearly all of the Snod Brook run through land that has no conservation designation. This does not mean that the river itself has low wildlife value; rather it is a reflection of the fact that current schemes focus mainly on land rather than water, and much of the surrounding land here is used for relatively intensive agriculture. In other words, the Sid and its tributaries derive relatively little of the protection that is afforded elsewhere by conservation designations.

Map 3 shows the areas of the catchment that are currently (as at 2014) subject to agri-environment management schemes, Entry Level Stewardship (ELS) and Higher Level Stewardship (HLS). Participation in environmental stewardship is no guarantee that the land is of exceptionally high wildlife value. However it does indicate a willingness on the part of the owner to manage the land in accordance with the grant giver's environmental cross compliance guidelines. Thus it is encouraging to see that good lengths of the middle / upper Sid and its tributaries are alongside ELS/HLS holdings; this suggests that many of these landowners will be enthusiastic about working in partnership with the SVA to maximise the future health of the catchment's freshwater habitats.

Note: the land boundaries shown for ELS and HLS agreements have been obtained from publicly available sources. They are approximate and are subject to change as current ten-year agreements expire. The New Environmental Land Management Scheme (NELMS) will shortly replace ELS and HLS but its scope – and hence the extent to which it will benefit the Sid catchment – is not yet clear.

Good Ecological Status

In 2009, as part of its obligations under the European Water Framework Directive, the Environment Agency carried out an assessment of the Sid catchment in order to determine its ecological status. Each European waterbody is to be rated on a five point scale ranging from "Bad" through "Poor", "Moderate" and "Good" to "High". The EU target is for all waterbodies to achieve at least "Good" ecological status by 2027.

In 2009 Sid was assessed by the Environment Agency as having already met the Good Ecological Status target. The classification is encouraging but should not be treated as grounds for complacency; of necessity it was based on a single high-level snapshot of the catchment's condition at one particular point in time. Furthermore some known problems are not properly reflected by the rating, for example the numerous barriers in the river channel that prevent and impede the passage of the migratory fish that should be key components of this ecosystem.

Good Ecological Status should therefore be seen as a starting point, not as "mission accomplished". Given the catchment's manageable size and the Sid Vale community's track record of enthusiastic and effective conservation action, there is considerable scope to improve the quality of the Sid's freshwater environment still further for the benefit of both people and wildlife. With this in mind the Sid Vale Living Rivers project was devised to:

- Carry out a more detailed assessment of the river catchment and its ecology, identifying any opportunities to consolidate and improve its ecological status.
- Engage local people with the Sid catchment's freshwater environment, and pave the way for them to play an active and positive role in its future conservation and enhancement.

Details of how these tasks have been delivered so far are provided in the sections below.

4. CATCHMENT WALKOVER SURVEY

4.1 Catchment walkover: what was it for?

The long-term goal of the Sid Vale Living Rivers project is to engage the local community in a continuing programme of environmental conservation and enhancement works to benefit both people and wildlife. The catchment walkover survey was designed to provide a starting point for this process by identifying stretches of river with high wildlife interest that needs to be protected, as well as potential problem areas – impacted by pollution or other issues - where there is scope to make significant gains in ecological quality.

Opportunities for environmental enhancements and habitat gain fall under a number of headings. This section (4.1) summarises the issues that were being looked for. Section 4.2 describes how the survey was carried out, and the surveyors' findings are provided in section 4.3.

4.1.1 Identifying opportunities to improve water quality

In 2009 the River Sid was classified by the Environment Agency as having Good Ecological Status. It is undoubtedly suffering less pollution than waterbodies in the neighbouring catchments (the Axe to the east and Otter to the west). However the Living Rivers project partners surmised that there could still be scope for improvements, and the walkover survey was designed to identify where those improvements might be needed.

This is a predominantly rural area with low risk of freshwater contamination from industrial sources. On the other hand there is a good deal of agricultural land in the vicinity of the Sid and its tributaries. Modern farming practices can lead (usually inadvertently) to the enrichment of watercourses with nutrients such as nitrates and phosphates. These can be highly damaging to the river's ecosystem for the following reasons.

- Higher nutrient levels can encourage dense algal blooms which out-compete natural aquatic vegetation, and smother the open gravel beds that many fish require for spawning.
- Nutrients deplete the oxygen levels in water, making the river progressively less habitable for the aquatic insect species that make up a vital layer of the freshwater food chain. This can have knock-on effects in terms of food availability all the way up to apex predators such as otters and kingfishers.

The catchment walkover survey aimed to highlight any evidence of the two broad categories of watercourse pollution – point source and diffuse.

Point source pollution enters the watercourse directly from (for example) sewage treatment works, fish farms, industrial units, farm tracks, roads and drains of all kinds. Livestock may also cause pollution by eroding riverbanks and depositing manure directly into streams and rivers, where these are not fenced off from adjacent grazing land.

The impacts of point source pollution can be intensified by drought and water abstraction. When river flows are low but nutrients entering the system from (for example) livestock drinking points remains steady, pollutant concentrations in the river will be higher due to the reduced dilution effect. This can have serious ecosystem impacts in terms of algal blooms and sensitive aquatic life forms as described above.

By definition, **diffuse pollution** is harder to trace and address than point source. It can originate from multiple sources which may be some distance away from the watercourse itself; these sources may be small individually, but their collective impact can be very damaging. This is a

particular issue with regard to phosphorous, a principal component of both natural fertilisers (manure/slurry) and artificial soil additives.

- Phosphate from fertilisers attaches to soil particles and hence is highly mobile. It runs off into watercourses if applied in excessive quantities or shortly before heavy rain, and also leaches through soil into groundwater.
- Roads and farm tracks frequently act as pathways for phosphates and other pollutants. This is s particular issue where they run downhill from bare ground (for example recently ploughed fields and arable land), or from stock gathering points (for example drinking troughs, feeding rings and stock yards lacking adequate provision for dirty water separation).

Whereas the effects of point source pollution can be intensified by drought, diffuse pollution (which typically relies on water transportation in order to reach the river is exacerbated by extreme wet weather. Heavy rain can wash large volumes of soil (and hence nutrients) into rivers, particularly from ploughed fields and land that has been heavily trampled by livestock. The effects are particularly severe when land used for arable crops or high-density grazing is immediately adjacent to the river bank, or connected to the river by pollution pathways such as roads and farm tracks.

4.1.2 Identifying opportunities to enhance habitats for fish and other wildlife

Fish require a succession of different habitats in order to survive and reproduce as they progress through the various stages of their life cycles. Suitable spawning substrates (such as clean, loose gravels for salmon, trout and others) are essential for successful breeding. Compacted gravels and riverbeds smothered in sediment (brought into the river by farm runoff as described above) are serious but unfortunately common problems. It is important to identify stretches of river affected by these issues.

As well as being unencumbered by sediments and pollutants, a typical healthy river capable of hosting good fish populations will meander extensively throughout its length. A bending watercourse will have areas of erosion and deposition providing a “riffle / pool” configuration and frequent variations in water velocity and depth. It will provide scope for in-stream vegetation to grow in some areas, serving as vital cover from predation in fishes’ early life stages. Every zone will favour a slightly different community of plants and/or invertebrates, so that along its length the river provides food and shelter to fish with a range of feeding and survival strategies.

Historically however, many rivers have been straightened in an attempt to alleviate flooding risks, provide hydraulic power for mills and so on. The result is a loss of vital habitats, with featureless stretches of river offering little variety in depth, flow or vegetation. In such cases it may be possible to find opportunities to restore habitat variation by manipulating flows and introducing features such as large wooded debris. The Wild Trout Trust provides detailed advice on such works. By creating greater variation in the depth and structure of the river channel it is possible to realise such benefits as reduced riverbank erosion as well as improved quality and diversity of habitats for fish and other aquatic wildlife.

In extreme cases river channels are modified so drastically – with weirs and other obstacles - that they no longer permit fish to pass upstream. This has obvious implications for migratory species such as salmon and sea trout which need to access rivers’ shallower, gravelly headwaters in order to spawn. But it is also an issue for species such as brown trout which, although more sedentary, still need to move around a catchment in order to find the special conditions they need at different stages of their life cycles. With this in mind the survey undertook to identify and grade all obstacles to fish movement to be found in the Sid catchment.

Here a natural pool has been created above a tree that has fallen across the stream. The resulting waterfall has scoured out a deeper pool below the tree, making one of the habitats required for salmon parr (right). Such features can be reproduced by deliberately installing large woody debris to suitable stretches of otherwise poor river habitat.

4.2 Catchment walkover survey: how was it done?

In preparation for the walkover a large number of maps was prepared by Devon Biodiversity Records Centre. First of all the River Sid and its tributaries were subdivided into 177 short sections. Each section was given a number and its upstream and downstream limits were marked on an aerial photograph for orientation and reference in the field (see Map 4 for an example). An A3 size map was then produced for each section, each covering around 150m-200m of watercourse.

A strategy for contacting landowners for permission to survey the river was agreed with the SVA River Warden. The walkover was carried out over a period of eight days in August 2013 by a team of two surveyors from Devon Wildlife Trust Devon Biodiversity Records Centre. It started at the river mouth and then progressed to the headwaters of the Sid and of its three main tributaries. Permission to survey was sought as necessary and was granted across the great majority of the catchment.

On each river section where access was available, one surveyor (equipped with waders) walked in the channel recording in-stream features (flows, substrate etc.) on the pre-prepared large-scale A3 map. The other remained on land recording bankside features and adjacent land use on an identical map. Support was provided on some sections by DBRC's full time volunteer trainees.

A summary of the types of features noted can be seen in Appendix 2. This shows two sets of pictorial "standardised habitat map keys", one for the use of the in-stream surveyor, the other for the bankside surveyor. In addition to the features for which keys are available, other features were noted as text. Weirs and other obstacles to fish passage were mapped and graded, invasive plants (Himalayan balsam and Japanese knotweed) were recorded where present, and incidental sightings of other interesting species were noted. As an example the maps in Appendix 3 show the actual findings of the two surveyors for a single river section approximately 180 metres in length.

The main walkover was supplemented by two additional two-day investigations, one using "kick-sampling" to assess invertebrate assemblages, and the other using electro-fishing techniques to compare fish habitat quality in different parts of the catchment.

River Sid Overview Map (sections 14-26)

Map 4: The Sid catchment was subdivided into 177 stretches of watercourse for surveying and mapping purposes, each approximately 150-200 metres in length. This map defines the extent of sections 11 to 26.

Devon Wildlife Trust project officer Scott West and a Devon Biodiversity Records Centre trainee surveying a section of the River Sid

4.3 Catchment walkover survey: what did we find?

The purpose of the walkover was to identify ecological issues in the catchment – both good and bad - and to highlight opportunities for wildlife habitat enhancements.

4.3.1 Findings: point-source pollution issues

Relatively few point sources of pollution were identified during the survey.

Some inputs (unidentified by our surveyors) were discovered in the form of pipes entering the river and its tributaries. The locations of these inputs were recorded and might merit further investigation with landowners' cooperation. It is conceivable that some may be outflows channelling effluents from farm yards or septic tanks into the river without the landowners' knowledge, especially where ownership has changed or where the drains were installed a long time ago. Equally some may be properly licensed discharges, operating in accordance with Environment Agency consents; and others are likely to be simple land drains or culverted springs channelling rain and groundwater into the watercourse.

The most notable point source of pollution was livestock, in the extensive areas where they have uncontrolled access to the River Sid and its tributaries. By poaching (trampling) the river banks the animals cause erosion, with the topsoil and associated nitrates / phosphates causing sedimentation of the river bed and nutrient enrichment of the water column. These effects are exacerbated by animals depositing manure directly into the water. Where this issue is considered to be severe (i.e. where large numbers of stock, typically cattle, have access to the watercourse over a lengthy period) it can best be addressed by fencing off the river from adjacent grazing land. At the same time it is necessary either to provide an alternative source of drinking water, or to

retain limited stock access to a small sacrificial area of the watercourse. Detailed notes were kept so that future work with landowners can be effectively targeted.

Given the Sid Vale Association's interest in the landscape's visual appeal as well as its wildlife value, it should be borne in mind that fencing of publicly accessible river banks sometimes attracts community criticism on aesthetic grounds. Where land is grazed infrequently or where stock numbers are relatively low – as is typically the case where horses are being grazed for example – the balance of arguments for and against permanent fencing may not be clear cut. In such cases temporary electric fences can be erected if considered necessary, and then removed when no longer needed.

Left: One of many areas of cattle poaching (trampling) on the banks of the River Sid.
Right: algae smothering the river bed as a result of high erosion from the riverbanks and nutrient runoff from surrounding land.

4.3.2 Findings – diffuse pollution issues
The nature and extent of diffuse pollution problems relate directly to activities and land use practices in the vicinity of the river. The following factors of interest were noted during the walkover survey.

Woodland: in the north of the catchment the predominant habitat type on the steep valley sides of the Sid and its tributaries is broadleaved woodland. The middle catchment (on the Sid in particular) is also considerably more wooded than would be deduced from analysis of current Ordnance Survey maps, as linear copses have developed along lengthy stretches.

Broadleaved woodland is typically a benign land use as far as pollution is concerned. There are no fertiliser applications, and where the woodland stands between the river and agricultural land any runoff from the fields will be trapped (to a greater or lesser extent) before it reaches the watercourse. Associated nutrients will largely be absorbed by the trees and there can be no doubt that the Sid catchment's superior ecological condition compared to its neighbours is due in no small part to its more wooded nature. On the other hand riverbank trees can present some issues in terms of aquatic wildlife habitats – these are addressed in section 4.3.7 below.

Farmland: cultivation in the Sid Vale is less intensive than in the neighbouring Axe and Otter catchments. However there are a number of semi-intensive farms and much of the catchment is classified by the Environment Agency as a Nitrate Vulnerable Zone, due to the high risk of nutrient runoff from steeply sloping agricultural land. On this terrain roads and farm tracks can act as high speed pathways for phosphates and other pollutants, especially where they run downhill from bare

ground and stock gathering points (for example drinking troughs, feeding rings and yards lacking adequate provision for dirty water separation). River crossings of roads and tracks were therefore noted by the project surveyors as potential pollution issues to be addressed.

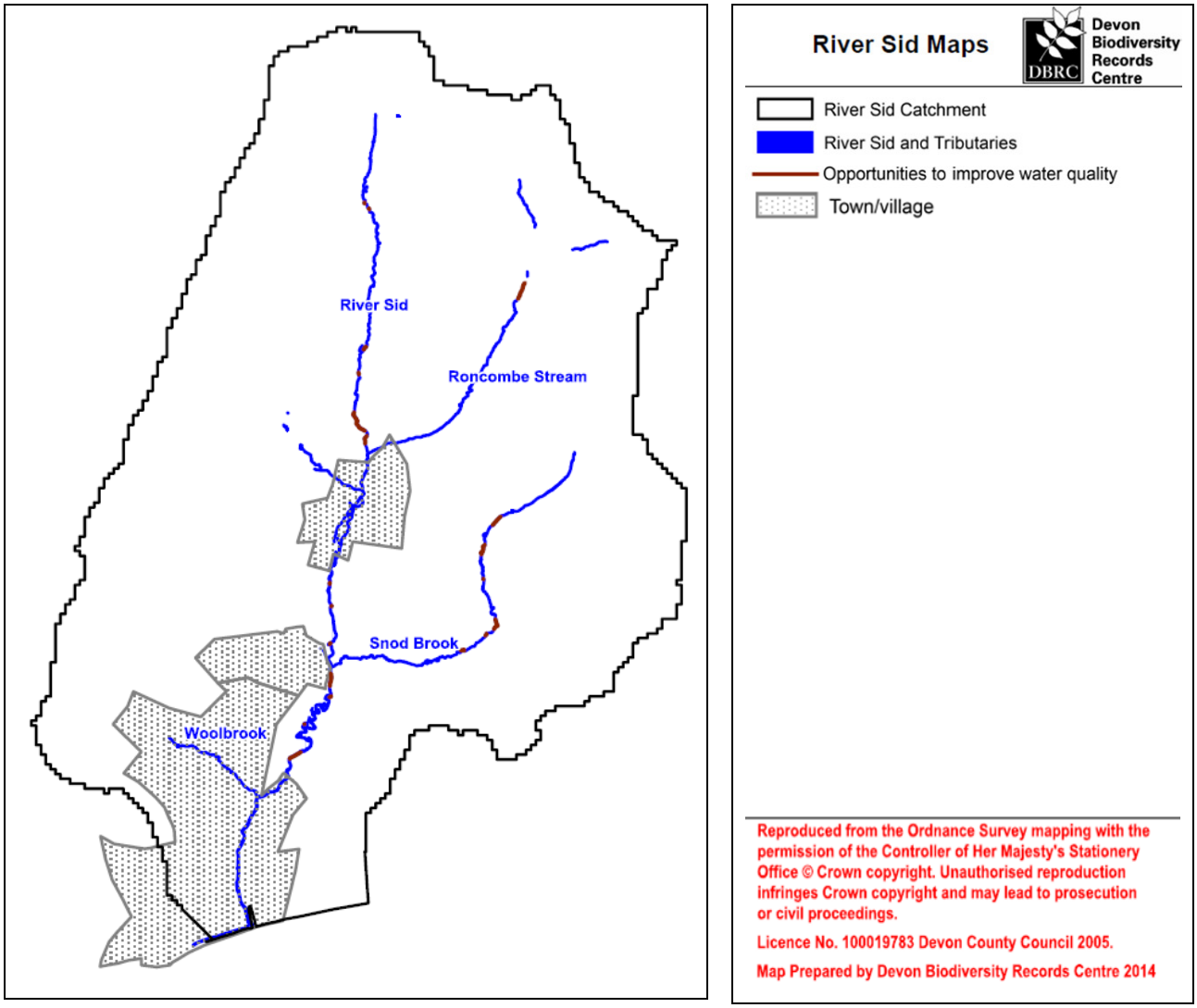
Permanent pasture: away from the headwaters there is a significant amount of pasture alongside the watercourses. On the River Sid, it was found that only about half of this pastureland is fenced to protect the river from livestock encroachment; on the Snod Brook, less than half; and on the Roncombe Stream, rather more than half. As detailed above under point-source pollution issues, this lack of fencing greatly increases the risk of sedimentation and nutrient pollution due to stock trampling the banks and entering the watercourse. In addition it raises the likelihood of diffuse pollution entering the river from surrounding land. On a fenced-off riverbank a dense buffer strip of scrub can rapidly develop and will act as a trap for runoff. Without fencing the bankside vegetation is likely to be tightly grazed so that sediments and pollutants can enter the watercourse unimpeded. Again, detailed notes were kept so that future work with landowners can be effectively targeted.

Arable land: there is a limited amount of arable farming adjacent to the River Sid and Snod Brook. On steep slopes this can pose a relatively high pollution risk because the bare ground between crop rows is very vulnerable to topsoil runoff caused by heavy rain. This problem is exacerbated where ploughing and planting are carried out downslope rather than across the slope, as the gaps between rows can act as highly effective pathways for sediment and pollutants.

Rural habitation: Away from Sidmouth, Sidford and Sidbury, the catchment's residential properties are widely scattered and relatively few in number and hence might be expected to present few problems in terms of pollution. However recent research in other Devon catchments suggests that septic tanks may be an important source of diffuse phosphate pollution in rural areas. As well as nutrient-heavy sewage, septic tanks collect waste water from washing machines, dishwashers and other appliances. The detergents this waste contains often have high phosphate levels. Some of these pollutants will be retained in the septic tanks and then removed by vehicle to sewage treatment works. Nonetheless some effluent will enter the soil via soakaways and eventually leach into groundwater and surface waterbodies. Even a small number of older, inefficient septic tank systems could combine to cause significant nutrient enrichment of a watercourse. No notes were made concerning potential sources of this nature; it might be more effective to conduct a general awareness campaign in the relevant areas rather than target specific households.

Urban areas: below the parkland of the Byes the River Sid runs into more built up areas of Sidmouth on its way to the sea. Much of the channel here is culverted and adjacent land-use consists largely of built structures and gardens. The Woolbrook too is predominantly urbanised and heavily modified and is also culverted in long sections. There are potential risks here in terms of water quality, and indeed an electrofishing survey on the Woolbrook resulted in a zero catch (see Appendix 5).

However with such a large number of small landholdings and such a highly modified watercourse, the opportunities for habitat enhancement are limited. Raising awareness of the problems caused (for example) by emptying chemicals, paints and used car oil into surface drains might be a useful focus of activity in the urban area. Problems can also be caused by pipe misconnections, for example where waste water from domestic plumbing and/or appliances such as washing machines and dishwashers is mistakenly fed into surface water drains rather than sewers. Again the best way to approach these issues might be through a general awareness campaign if it is considered necessary, perhaps in partnership with the Environment Agency or South West Water.



Map 5: the areas coloured in brown offer opportunities to work with landowners to deliver a range of water quality improvements. These include bankside fencing projects, track crossing enhancements and the investigation of unidentified inputs to the watercourse.

4.3.3 Findings - water quality monitoring (invertebrate sampling)

To supplement the walkover survey's findings regarding water quality and pollution, two days in September 2013 were devoted to a detailed investigation of invertebrate populations at twelve varied sites around the catchment.

Pollution, whether point-source or diffuse, affects the balance of life in the river. Studying the organisms present at a particular point helps to gauge water quality and highlight possible problems which might otherwise go undetected. The Biological Monitoring Working Party (BMWP) survey procedure is used to measure water quality by using biological indicators. A brief description of this method, together with detailed results obtained for the Sid catchment, are provided in Appendix 4. The table below shows a summarised version of the results.

Location	Sid - upper	Sid - upper middle	Sid - lower middle	Sid - lower
Classification	Poor	Moderate	Good	Moderate

Location	Roncombe Stream - upper	Roncombe Stream - lower
Classification	Moderate	Moderate

Location	Snod Brook - upper	Snod Brook - middle	Snod Brook- lower
Classification	Good	Good	Good

Location	Woolbrook - upper	Woolbrook - middle	Woolbrook - lower
Classification	Poor	Moderate	Poor

The upper reaches of the Sid scored poorly. The surrounding land is mostly broadleaved woodland so diffuse pollution from agriculture is unlikely to be the cause. However there may be some point-source pollution issues from unknown sources due to historical land use practices or inputs. It would be worthwhile to carry out a second survey and then, if the results are unchanged, to work with local landowners to investigate the cause.

The Roncombe Stream rates as “moderately impacted” based on this survey. This score could reflect the number of farms along the watercourse and may also have been influenced by the amount of post-flooding gravel abstraction that has had to be undertaken here, as this can significantly reduce invertebrate numbers – see section 4.3.7 below. There could also be historical effects on the water quality from the old Knapp Copse landfill in the headwaters of the stream, although this suggestion is purely speculative. Project staff had no time to research this issue and it may be that any outstanding issues regarding the Knapp Copse site have already been fully resolved.

The upper middle reaches of the Sid are shown as moderately impacted, which is logical as this is where it merges with the similarly impacted Roncombe Stream.

The Snod Brook shows “good” BMWP condition throughout and generally offers the best water quality and habitat diversity found in the catchment. The lower middle section of the Sid lies below the Snod Brook confluence and also scores “good”, reflecting the positive influence of water from the Snod.

The Woolbrook is a heavily modified and culverted watercourse with new housing developments at the upstream end. It rates as “moderate” to “poor”, being impacted by an unknown combination of sources. Below the Woolbrook / Sid confluence the lower Sid too is impacted, the influence of water from the tributary probably being compounded by such factors as road run off and diffuse pollution from the central urban area of Sidmouth.

The results show the catchment to be generally of good to moderate water quality. It is worth noting that the results of surveys such as this are heavily influenced by flow rates around the time of sampling. For example high flows will increase the amount of potential pollutants coming into the

river from other sources but will also dilute the concentration of pollution. Likewise lower flows will increase pollutant concentration. Further sampling could be carried out by volunteers in order to obtain a more comprehensive assessment of water quality across high, low and average flow conditions.



Left: kick sampling in action on the River Sid.
Centre: sample tray containing freshwater invertebrates for identification.
Right: a clinging mayfly nymph, an indicator of good water quality.

4.3.4 Findings - fish habitats (general)
The River Sid is known to have populations of the following fish species.

Migratory:

- Atlantic salmon *Salmo salar**
- European eel *Anguilla anguilla*
- Sea trout *Salmo trutta**

Non-migratory:

- Brook lamprey *Lampetra planeri*
- Brown trout *Salmo trutta*
- Bullhead *Cottus gobio*
- Minnow *Phoxinus phoxinus*
- Stickleback species *Gasterosteidae sp.*
- Stoneloach *Barbatula barbatula*

*Atlantic salmon and sea trout are only found upstream of School Weir if they have been caught below the weir and released above it by the Sid Vale Association River warden's seasonal "fish rescue parties".

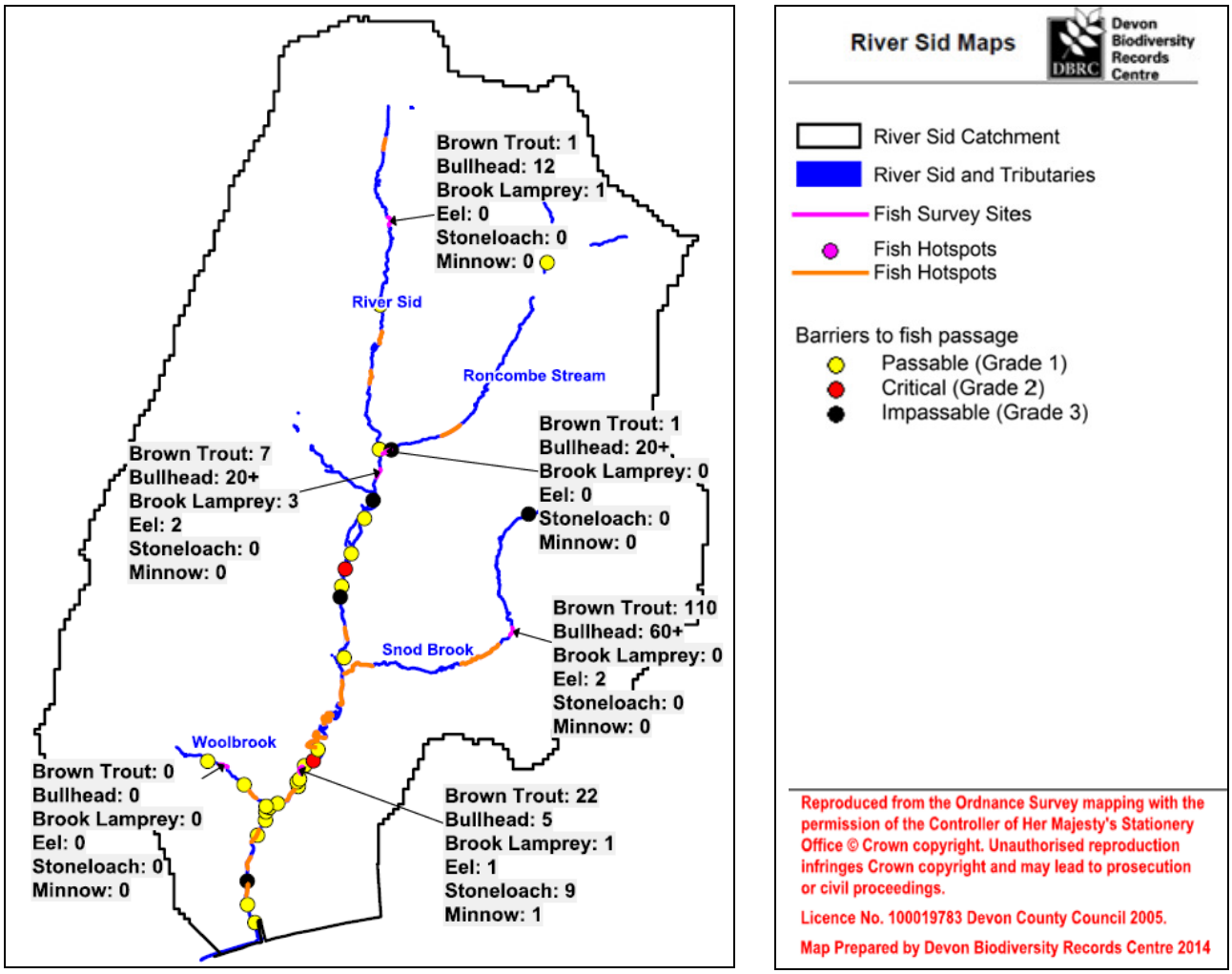

Brown trout


Stoneloach

Bullhead

Brook lamprey

During the course of the walkover survey, fish were observed throughout the lower catchment. These were mainly brown trout, minnows and bullheads. The lower Sid (up to Sidford) and the Snod Brook boast excellent fish habitat with a great diversity of depth and areas of cover. Between Sidford and Sidbury the river still shows good habitats for fish but with slightly less diversity. Map 6 below shows that the upper Sid and the Roncombe Stream also featured one or two apparent fish "hotspots", but in general this part of the catchment currently lacks the appropriate habitats to support really good fish populations. Further indications of fish populations in various parts of the catchment were obtained through an electro-fishing survey, detailed below.



Map 6: showing fish "hotspots", barriers to fish passage, and electro-fishing survey site results

4.3.5 Findings - electro-fishing survey

To support the findings of the catchment walkover, Environment Agency permission was obtained for a two day catchment-wide electro-fishing survey in order to gather additional information about fish populations and species present. This method uses a weak electric field to attract fish towards a net for capture. The survey took place in autumn 2013 (September 30th - October 1st) 2013 using 100m sample sites at six locations, with one venue being offered as a demonstration for Sid Vale Association members. The survey was undertaken by licensed staff from Devon Wildlife Trust and the Institute of Fisheries Management, using specialised electro fishing equipment kindly supplied by the IFM.

Left: Staff from the Institute of Fisheries Management and Devon Wildlife Trust electro-fishing on the River Sid, 2013. Polarised sunglasses allow the surveyors to see below the water surface. Right: a captured brown trout is measured before being returned to the river unharmed.

The results of the survey are shown in map 6 above. The conclusions drawn were as follows, taking the sites from north to south.

The **upper Sid** sample produced large numbers of bullheads (a priority species under the UK Biodiversity Action Plan) together with one brown trout and one well-developed brook lamprey. The graph of fish sizes (see Appendix 5) clearly shows two year classes of bullheads: older fish on the 60-80mm range and younger ones between 15-30mm. This suggests that the upper Sid is a good breeding area for bullheads. The poor water quality noted in section 4.3.3 above would explain the solitary brown trout, which probably became stranded here due to the debris of 2012's storms and has not been able to return downstream.

The **Roncombe Stream** site was very poor in terms of fish populations, despite exhibiting all the key fish habitats. One brown trout adult was captured along with one year class of bullheads.

The **middle reaches of the Sid** again seem to be dominated by bullheads but all of a similar year class with many brown trout (mainly adults), large eels and undeveloped lamprey also present.

The **Snod Brook** fish catch matches up with its more diverse habitat. Good numbers of brown trout parr (juveniles) were found. These tend to be solitary fish that seek territories with a diverse range of habitats in a compact area, so their presence here is a positive sign. Large numbers of bullhead were present, all of the same year class and age, together with a few large eels.

No fish were caught in the **Woolbrook** survey, another indication of this tributary's impoverished ecological condition.

In the **lower Sid** large numbers of adult trout are present alongside low numbers of large eels and developed brook lamprey. Again there were good numbers of bullhead and also of another key BAP species, the stoneloach.

In conclusion, the results of the electro-fishing survey show the Sid catchment to have areas of good habitat and hence good fish populations, particularly brown trout and bullheads. Certain areas in the lower Sid (the Byes) and Snod Brook were clearly suitable for both juvenile and spawning fish. Elsewhere however there were fewer areas that juvenile trout (parr) would inhabit, with larger solitary fish the norm. On a less positive note several areas of the catchment were unsuitable for healthy fish stocks, notably the Woolbrook, Roncombe Stream and upper Sid.

A selection of excellent fish habitats on the lower Sid

4.3.6 Findings - barriers to fish passage

Map 6 on page 20 shows the locations of 29 barriers to fish passage that were recorded during the walkover survey. Five of these were assessed by the project surveyors as impassable even under elevated flows and flood conditions. It will be seen from the map that there are fish hotspots upstream of most of the barriers, even those graded as “impassable”. This does not mean that the fish are somehow navigating the barriers; it is more likely that there are a number of sub-populations of the various species, each being largely confined to a particular area of the catchment. These comparatively small areas may well be sub-optimal in terms of habitat diversity for the fishes’ various life stages, and there can be little doubt that eliminating the barriers would have benefits to all of the species present in the catchment, not just the migrants.

Unfortunately fixing these barriers to allow passage for salmonids would involve either retro-fitting fish passage structures or removing the obstacles completely, and both of these options are typically expensive and logistically complex. Please see section 5 for an appraisal of the options for circumventing the most significant barrier, School Weir.

From left to right: obstructions graded 1 to 3
*(1 = passable, 2 = passable under increased flows, 3 = impassable) ****

An interim option for some of the barriers identified by the walkover survey might be to commission passes specifically for European eels. It would seem from our survey that the Sid catchment contains a fair number of adult eels and it should be possible to make their populations more sustainable. Eels are able to climb rather than jump, and can ascend structures which are much more affordable and easier to install than more elaborate all-species fish passes. Addressing eel passage on the Sid would help to establish healthier numbers of this critically endangered

migratory species and would also consolidate the catchment's populations of apex predators such as otters and kingfishers. Further details regarding possible eel passage enhancements at School Weir are provided in section 5 below.

An adult European eel and a brook lamprey caught in the Byes area of the River Sid

4.3.7 Findings – other fish habitat influences

Bankside trees: as noted earlier in this report, areas of bankside broadleaved woodland can have a very positive effect on water quality as they can intercept and absorb diffuse pollution from surrounding agricultural land.

However in some areas the river may become too shaded if the trees are under-managed. Both invertebrates and fish favour watercourses with a mixture of light and shade, allowing good habitat for both feeding and shelter. There are some parts of the catchment where it would be advantageous to work with landowners to coppice certain areas of bankside trees in order to re-establish optimal habitat conditions.

Storm and flood debris: recent years' storms and floods have brought changes to the Sid catchment with numerous large trees uprooted and many flood debris blockages, particularly in the more heavily wooded headwaters. In some cases fallen trees and woody debris lead to the formation of natural pools and variations in river flow, creating superb habitat for fish and other wildlife. On the other hand they also affect the river's capacity to channel away excess water during subsequent floods, which can be a particular issue in a steep "flashy" catchment such as this. A careful appraisal of the risks posed by large fallen trees in the river channel should be undertaken on a case by case basis before removal. Where their presence leads to increased flooding risk for buildings or sensitive surrounding land, the decision may be taken to remove the blockages. If however the surrounding land will be tolerant of occasional flooding it might be preferable to leave the woody debris in place. As well as providing good habitat, by trapping some water upstream it may actually protect properties further down the catchment from inundation.


Flood debris encountered during the Sid catchment walkover survey

Gravel extraction is potentially a serious fish habitat issue for the Sid catchment, particularly on the Snod Brook, Roncombe Stream and upper Sid. The catchment has been much affected by both summer and winter floods in recent years. These have triggered the movement of large amounts of rocky material, both into the river from surrounding land and downstream from the headwaters. In some areas the river has been effectively blocked and landowners have had no option but to remove the material with tractors and diggers. However, this can have negative impacts on the freshwater food chain, particularly if the material moved (which will contain most of the invertebrates on which the ecosystem depends) is deposited at some distance away from the watercourse; or if the operation is carried out at a sensitive time for spawning fish. The amount of gravel removed, the method used and the timing of the operation are all important. Thus while such activity has been unavoidable in the past and is likely to be needed again in the future, efforts should be made to engage with landowners and relevant experts in advance so that it is carried out in the least damaging way possible.

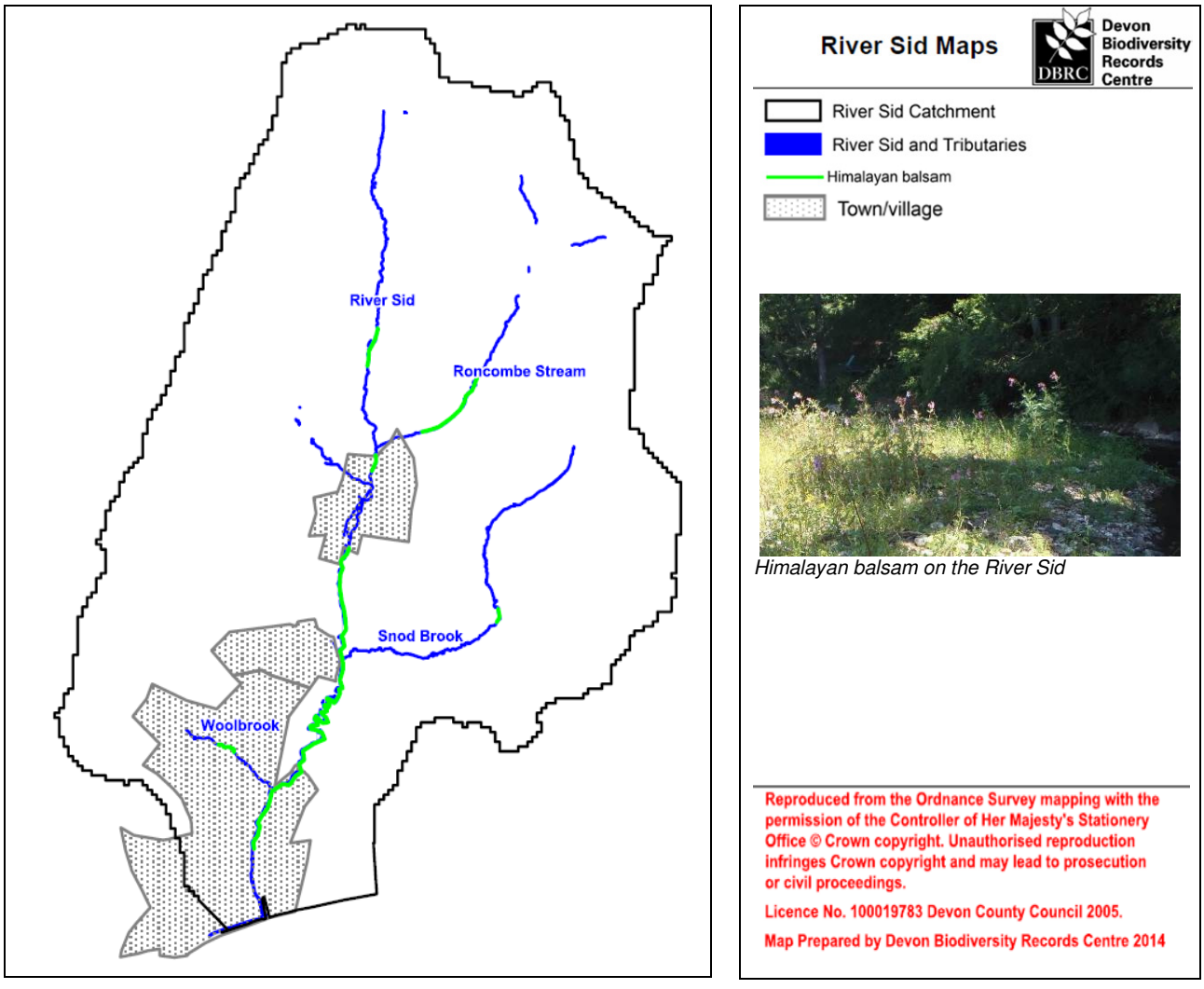

The extraction of gravel from the river channel may be unavoidable after severe flooding events, but precautions can be taken in order to minimise the ecosystem damage caused by these clean-up operations.

4.3.8 Findings – non-native invasive species

Himalayan balsam can take over large areas of riverbank habitat by outcompeting native plants. It then dies back in the winter, leaving riverbanks bare and subject to increased erosion. Eroded bank material causes sedimentation and introduces nutrient pollution into the watercourse.

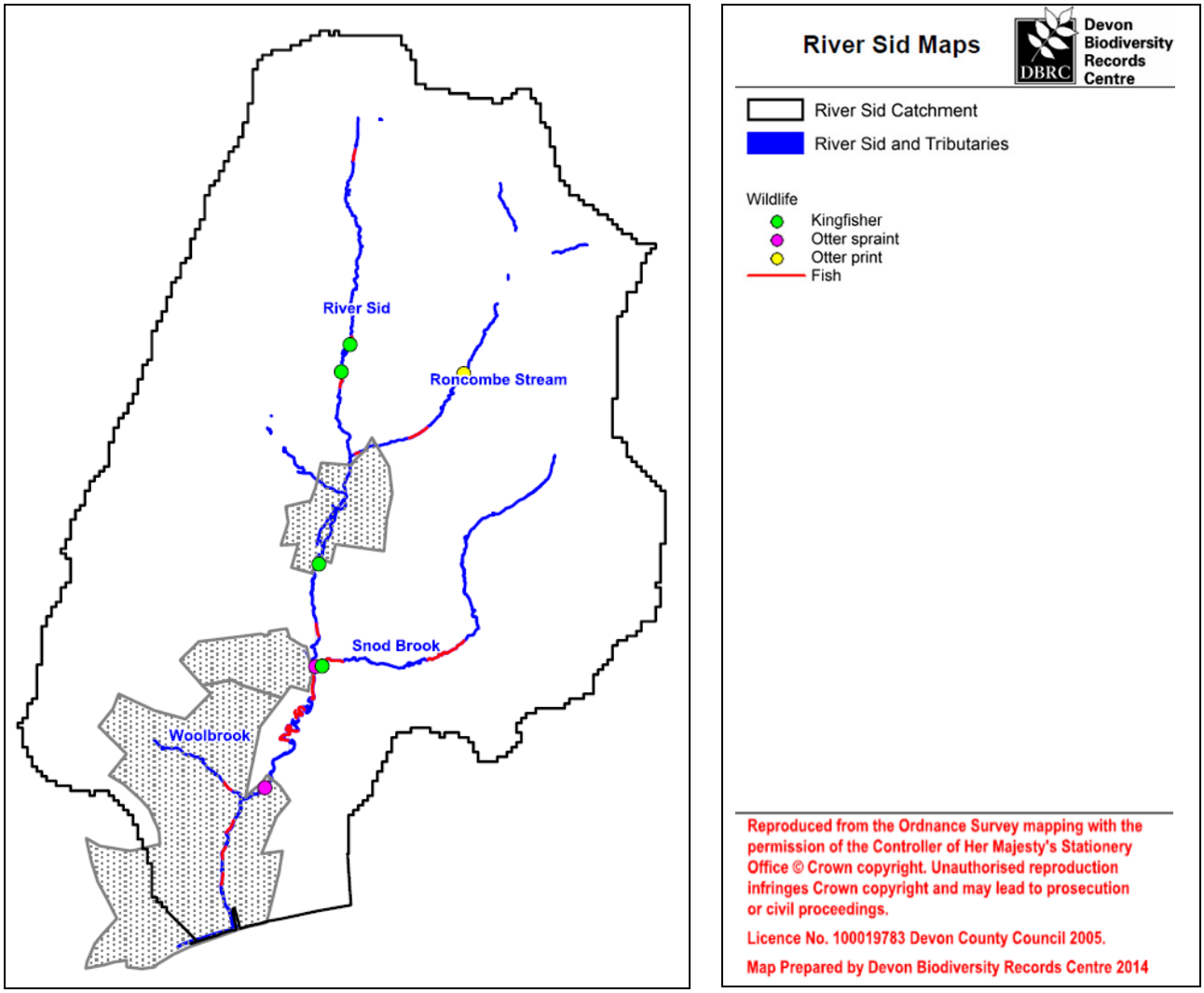
During the walkover survey stands of Himalayan balsam were noted and recorded throughout much of the catchment, particularly in the area from Sidmouth up to the middle reaches of the main river. Map 7 highlights the approximate range of the main infestations. At present the plant it is less prolific in the upper reaches and tributaries. Detailed records were made as to the precise locations of balsam stands and these can be made available if the Sid Vale Association decides to work with landowners and volunteer work parties to address this problem.

Although much less common than Himalayan balsam, stands of the still more problematic Japanese knotweed were noted in some areas and these records will also be kept on file should it be decided to take action. It would be advantageous to tackle this issue as soon as possible as the difficulty of eradicating Japanese knotweed from the catchment is likely to increase exponentially with time. It is much more difficult to remove than Himalayan balsam and any action is likely to require professional assistance as well as close cooperation with landowners.



Map 7: The main areas of Himalayan balsam colonisation in the Sid catchment, August 2013

4.3.9 Findings – other wildlife records



Map 8: Locations where fish, kingfishers and otter signs were recorded during the walkover survey

In addition to fish and invasive plants, incidental sightings of other species identified during the catchment survey were recorded. Map 8 above presents a handful of records of two of the catchment's top predators, the kingfisher and the otter. Otter spraints (territorial scent-marked droppings) and footprints were witnessed in three locations, two in the lower/middle Sid and one on the middle reaches of the Roncombe Stream. Otters have extensive ranges and these records probably represent members of just one or two families moving through the catchment. Kingfishers were observed at four locations on the middle and upper reaches of the Sid.

It will be seen that these records do not coincide particularly well with identified hotspots for fish, both species' main prey. This will almost certainly be due to records being missed, rather than because the animals are absent from these areas. The walkover survey was a major undertaking and in order to complete it within the month of August, it had to be conducted at some speed. As a result many sightings and signs of interest – of kingfishers, otters and many other species - will have gone unnoticed.

This map is therefore presented not as an accurate representation of kingfishers' and otters' ranges within the catchment, but as a challenge – a starting point for others to enlarge upon.

Section 7 below makes a number of suggestions for future “citizen science” volunteer recording initiatives that could be undertaken in the catchment.

Extracts from Devon Biodiversity Records Centre’s database for the Sid and its tributaries are included in Appendix 6. Due to space constraints plant records are not shown. As far as animal records are concerned, given DBRC’s role as the county’s central repository for wildlife records, the data for many groups is surprisingly sparse. Again, this can be viewed as an incentive to promote community engagement in local wildlife recording. It is difficult to conserve and protect wildlife if we do not know where it is.

Two records for the river Sid below Sidford, late summer 2013: a green sandpiper and a stand of invasive Himalayan balsam in flower.

5. SCHOOL WEIR INVESTIGATION

People have been building dams and weirs to modify the flow of Britain's watercourses for centuries. Where the motive was to divert water to drive machinery at water mills and saw mills, the original need will probably have long since disappeared with the advent of other sources of power. In such cases the structures may only remain in place because of their historic or landscape value, or perhaps simply because of a lack of will to remove them. Unfortunately, these relics of past human activity can have profoundly negative impacts on river ecology.

The Living Rivers catchment walkover identified 29 man-made obstacles to fish passage on the Sid and its tributaries (please see map 6 on page 20). Some of these barriers are negotiable when the river is in spate but five are considered to be impassable, presenting serious problems for resident fish such as the brown trout. This animal can live for 20 years or more and as it grows and matures its needs (in terms of shelter from predators, access to prey and spawning opportunities) will change considerably. Thus a brown trout requires access to a range of different habitat niches over its lifetime. The presence of barriers on the river restricts this access and its choice of habitats, which in turn can limit the health of the species' population in the catchment. For example there may be higher than normal mortality due to predation of small fish in unsheltered areas that they would ideally prefer to avoid; slow growth of individual fish growth due to lack of access to the right type of prey at certain life stages; and difficulty in finding good clean gravels for spawning.

The issues posed to migratory fish are even more serious, as they may be prevented from entering the river system at all. Most fish are adapted to live in either salt or fresh water, and if relocated to the wrong environment would quickly perish. However a few can adapt their metabolisms to survive moving from one habitat to the other. Sea trout, Atlantic salmon European eels are three such species. All rely on access to rivers across the westcountry at critical stages of their lives, and should in theory be found in good numbers here in the Sid catchment. However having entered the Sid from the sea they can only travel a short distance up river before encountering the catchment's main barrier to fish passage, School Weir at the lower end of the Byes. Even a full-grown salmon has no chance of scaling the 2m-3m cliff that the weir presents.

School Weir, Sidmouth

Since 2007 local volunteers, led by the SVA's River Warden, have carried out regular "fish rescues" over a period of weeks each autumn. Salmon and trout at the base of the weir are netted and then transported upstream to continue their journeys, this being the only way that they can make their way upriver to spawn. The numbers can be quite large; 28 trout and two salmon were caught and translocated in a single day in 2011. This effort is highly commendable and is making a huge difference for individual fish. Nonetheless volunteers cannot be in the river continuously throughout both species' migration windows, so the number of fish assisted must be small as a proportion of all those attempting to get access spawning grounds up river. The volunteers see their actions as a stop gap, not a long term solution.

European eels need access to the Sid for a different reason. These fish begin life as plankton in the Sargasso Sea in the western Atlantic. Drifting across to Europe on the ocean currents, some of the slender, see-through juveniles (elvers) end up in Devon's estuaries. In most watercourses they then migrate en masse to safer sheltered waters up river, where survivors may eventually grow to a metre or more in length. After 10 to 20 years the mature eel returns to salt water, again adapting its metabolic processes for its westward return across the Atlantic to spawn.

On the Sid however the eels' natural cycle is disrupted by School Weir. Unlike salmon and trout, eels are capable of travelling some distance over land and a few do manage to progress to the upper reaches of the river (as can be seen from the results of the electro-fishing survey described in section 4.3.5 above). However there can be no doubt that School Weir greatly reduces the Sid's value as a habitat for this critically endangered species.

Salmon, sea trout and eels will all have been integral to the Sid's freshwater ecosystem until barriers started to be put in place a century or two ago. Their absence will have affected the natural balance of the river and a resurgence in their populations would be a very positive development. It should also be borne in mind that all three species are facing population declines across their natural ranges, eel numbers having dropped by an estimated 90% or more since the 1970s. There would be great merit in taking any opportunity to provide them with valuable new habitat during crucial phases of their respective life cycles.

Left: the Sid Vale Association's annual rescue of migratory fish in progress.
Right: a salmon vainly attempts to leap School Weir. (photos: Sid Vale Association)

School Weir options

Of all the barriers to fish passage identified on the River Sid, School Weir is the one having the biggest ecological impact. It is impassable to salmon and sea trout heading up river to spawn, and difficult to negotiate for eels arriving to mature in the river. If it were made possible for migratory fish to negotiate this obstacle then the catchment's best potential salmonid habitats would be opened up - the lower and middle reaches of the Sid together with the Snod Brook (see map 6 On page 20). This would still leave impassable barriers further upstream; but while it would be beneficial to address these too if money were no object, the habitats above them would in any case have rather less potential for breeding salmon and trout.

As part of the Living Rivers project Devon Wildlife Trust has been asked to provide a broad overview of the options for reinstating fish passage at School Weir. The following appraisal takes practical and ecological issues into account but as yet there has been no attempt to engage or consult with the landowner or the wider community. Should the Sid Vale Association decide to take the investigation a stage further, such consultation will need to be undertaken at a later date.

Weir removal: there are actually two parallel barriers at School Weir. The main visible structure was built in the second half of the 20th century, because an earlier weir was believed to be falling into disrepair. However the older weir can still be glimpsed below water level just a few metres upstream.

A weir was originally needed here so that water could be channelled off via a leat to feed a water mill. With the mill no longer operative, could the problems created by the weir be solved by simply removing both the old and new structures? Unfortunately this solution would be anything but elegant. If the weir were to be removed entirely, the level of the river upstream would drop dramatically and leave the popular landscape of the Byes looking very different, with footpaths running along cliff-like banks way above the river. Public amenity considerations seem likely to make this a highly controversial course of action.

Partial weir removal: although the construction of the modern weir was apparently triggered by the perceived weakness of the older structure, the latter still appears to be intact. Partial removal of the modern (downstream) structure might therefore be worthy of consideration. This would involve removing the upper part of the modern weir (or just a notch from its upper middle section) and leaving the original weir in place. In this way it might be possible to create a two-tier cascade, with each tier being of such a height that it could be leaped by salmon and trout.

If this option were to be progressed further a detailed feasibility study would be needed. Furthermore if the engineers' conclusion were to be favourable, public consultation might also be required. How would the transformation of the single-drop waterfall into a stepped cascade be perceived by the Byes' many regular users?

Fish pass options for salmon and trout: around the world numerous solutions have been devised to reinstate fish passage at weirs and dams. These involve fitting devices of various kinds onto, into or alongside the weir structure. As part of the Living Rivers project, professional consultants have been engaged to carry out an initial survey of School Weir and to recommend fish pass solutions that would be worth considering given the particular characteristics of the site.

The consultants' full eleven page report can be downloaded (along with a digital copy of the report you are currently reading) from the Sid Vale Association's website. Its main findings can be summarised as follows.

Three different types of fish pass for salmon and trout were considered: a Larinier pass, a pipe/siphon pass, and an Alaskan A pass. Of these, the Alaskan A design has been recommended as being the most appropriate as it can cope with the steepest gradients and (unlike the other two) could therefore handle the obstacle presented by School Weir site in a single flight. From the perspective of somebody walking upstream the pass would need to be installed on the right bank of the river immediately adjacent to the weir, as shown in the images below.

Proposed location of Alaskan A fish pass

Considerations to be taken into account before embarking on such a project include the following.

Cost: based on initial surveys it is estimated that an Alaskan A pass would cost around £120,000 including landowner and community consultation, river survey and monitoring, obtaining all necessary consents, detailed design and installation. As an optional add-on to maximise the benefits of the pass, the consultants also recommend modifications to some of the less severe obstacles downstream, which although passable in high flow conditions nonetheless hinder fish passage. These additional works would cost an estimated £50,000.

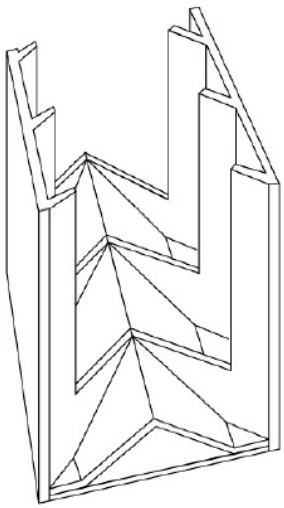
External funding: it would be advisable to investigate whether external grants could be sourced to supplement any local funds that might be available for a fish pass project. One of Devon Wildlife Trust's Living Rivers project team could potentially be available to provide advice on this issue on a voluntary basis, if needed.

Visual impact: doing nothing - leaving School Weir in its current state - would result in continuing ecological impacts for the Sid catchment. On the other hand, any solution implemented will inevitably have visual impacts in the Byes. Either course of action will therefore entail some significant trade-offs. The illustration below shows an Alaskan A pass in place. Such a pass would be less obtrusive at School Weir than the one in the photograph as it would be sunk into the already sloping river bank. However, there will inevitably be some visual impact whenever a modern artificial device is added to an older artificial landscape feature.

A fish pass has recently been installed nearby at Tipton St. John weir, on the River Otter. It is of a different type (an enclosed Larinier pass, as opposed to an open Alaskan A) but otherwise the appearances of the two types are broadly similar. Initial community reaction to the completed

Tipton weir structure, at least as quoted in the local press, was largely negative. However such reaction was perhaps unfairly premature as it was reported before the structure had been fully landscaped in. If a School Weir fish pass is being seriously considered it might be advantageous to monitor any change in the level of public acceptance at Tipton St. John, as surrounding vegetation grows and the pass starts to blend in to the landscape.

Single flight Alaskan A fish pass (Source: Fishtek Ltd)



Alaskan A baffle arrangement (Source: Environment Agency fish pass manual, 2010)

Fish pass options for European eels: eels are very different from salmon and trout not only in terms of their life cycle, but also in the physical way in which they move through river catchments,. Unfortunately fish passage designs targeting salmonids tend to be of little use to eels, and vice versa.

While some eels were recorded by the electro-fishing surveys upstream, there can be no doubt that School Weir and also the shallower weirs nearer the sea are greatly restricting the number of elvers that are able to access the middle and upper catchment. The consultants engaged to advise on the main fish pass options provided some additional recommendations regarding eel passage: “eel tiles” could be attached to the shallower downstream weirs, and a gravity-fed pass enclosed within a plastic pipe could be installed at School Weir.

Cost: installation of these items would cost approximately £8,000-£10,000. Once again it would be sensible to investigate potential external funding sources.

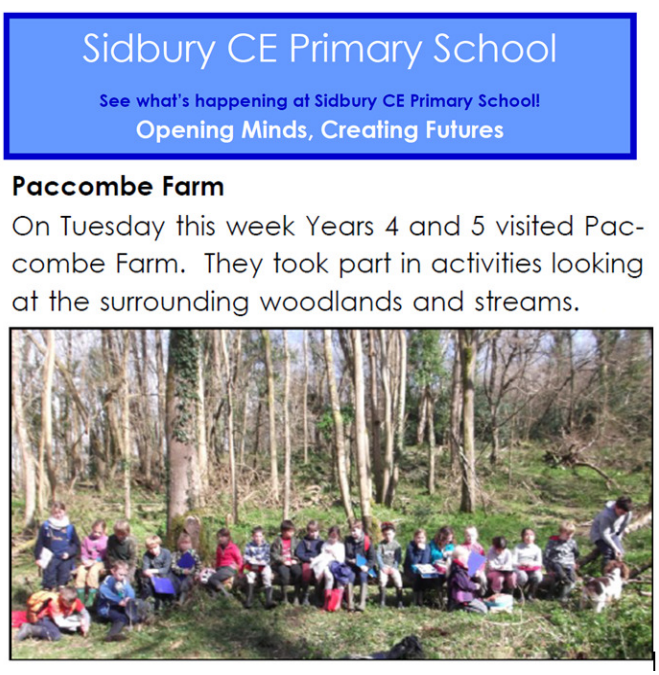
Visual impact: Eel tiles are fairly unobtrusive. Meanwhile at School Weir there would be a certain amount of flexibility in the siting of an eel pass. The exact options would vary depending on whether the main salmon and trout pass had also been given the go-ahead. Either way, the options for eel passage would need to be carefully reviewed taking into account cost, effectiveness and the visual impact for local people using the Byes.

6. "OUR SID" FRESHWATER EDUCATION PROGRAM

The long-term future of the River Sid's wildlife will depend on the extent to which it continues to be understood and valued by local people. With this in mind Devon Wildlife Trust has devised and delivered a programme of educational activities, "Our Sid", as part of the Living Rivers project. This has helped children from three local schools – Sidmouth Primary, Sidbury Primary and St John's International School - to engage with and enjoy the rich natural world around them. Amongst other skills they have learnt how to kick-sample the river bed for small creatures and how to carry out basic wildlife identification using keys. The program has also highlighted ways in which schools and individuals can make behavioural changes to benefit the Sid's freshwater ecosystem.

The initiative has involved a mixture of indoor and outdoor "nature detectives" work, with the Donkey Sanctuary providing both classroom facilities and an excellent venue for fieldwork at Paccombe Farm. James Chubb, the Donkey Sanctuary's Events, Activities & Wildlife Manager, has worked alongside DWT's education staff to help children to explore the fascinating aquatic and riverbank habitats along this stretch of the Snod Brook.

The teachers and students have been encouraged to continue to develop their work on the "My Sid" theme back at school, looking at the river in whatever context they like - history, science, nature, land use etc. For example following their visit to Paccombe Farm, Sidmouth Primary borrowed the necessary equipment to carry out a detailed survey of their local stretch of the lower Sid so that they could compare it with what they had seen higher up the catchment in the Snod Brook tributary. An end-of-year event has been scheduled for 20 May 2014, when students from all three schools will come together at St John's to share their experiences and findings.


Sidbury CE Primary School

See what's happening at Sidbury CE Primary School!

Opening Minds, Creating Futures

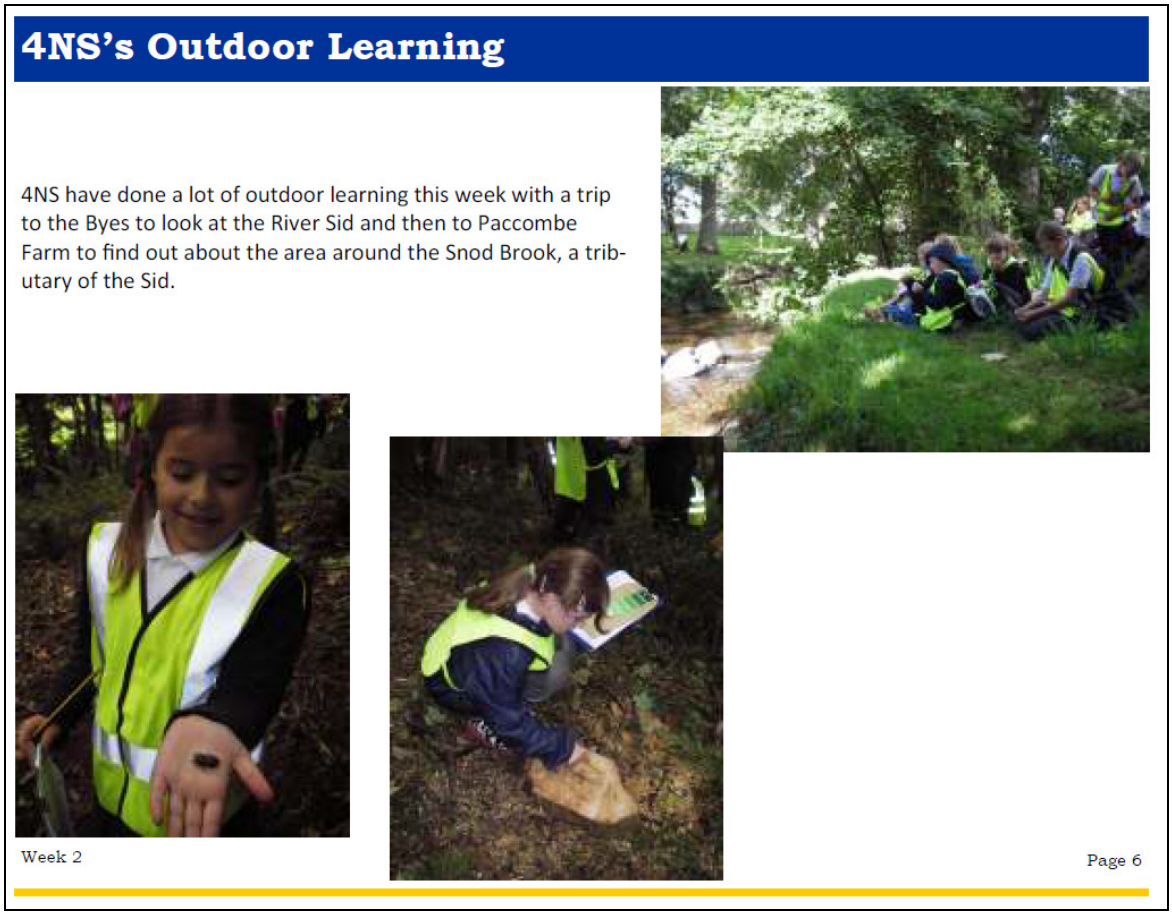
Paccombe Farm

On Tuesday this week Years 4 and 5 visited Paccombe Farm. They took part in activities looking at the surrounding woodlands and streams.

An extract from Sidbury Primary School's newsletter and a Devon Wildlife Trust tweet about the same event – March 2014

In order to deliver the project DWT's Paul Martin has customised a set of curriculum-based freshwater education materials using the "Our Sid" theme, and teaching staff have received on site guidance about how these can be used (please see Appendix 7 for some sample slides). It is

intended that the three schools will continue to use and develop these materials for the benefit of future student cohorts. It is hoped that the schools' partnership with the Donkey Sanctuary will also flourish and allow many more classes to enjoy wildlife education activities in this ideal setting. The various items of survey and sampling equipment which have been funded through the Keith Owen Fund (SVA) grant will be available for the schools to borrow from the Sid Vale Association's River Warden.



4NS's Outdoor Learning

4NS have done a lot of outdoor learning this week with a trip to the Byes to look at the River Sid and then to Paccombe Farm to find out about the area around the Snod Brook, a tributary of the Sid.

Week 2

Page 6

Extract from Sidmouth Primary School's newsletter

Children from Sidmouth Primary investigating the Snod Brook at the Donkey Sanctuary's Paccombe Farm


Sidmouth Primary's kick sampling trays reveal exciting mini-beasts such as this nymph of a chaser dragonfly


James Chubb, the Donkey Sanctuary's Events, Activities & Wildlife Manager, provides expert guidance in mammal tracking

7. RECOMMENDED ACTION PLAN

Summary

- Set up a River Sid Stakeholders Group in order to coordinate action and mobilise community support
- Engage and train volunteers
- Create an "East Devon Wildlife Hit Squad"?
- Make small grants available for freshwater projects
- Secure additional external funding (if required)
- Work in partnership with other projects to deliver mutual benefits

In partnership with stakeholders and volunteers, and by providing small grants where necessary:

- Tackle freshwater pollution and sedimentation
- Tackle invasive non-native species
- Carry out habitat works, research and landowner training to benefit wildlife
- Decide priorities regarding School Weir and other barriers to fish passage
- Promote and support species recording and monitoring in the Sid catchment
- Support schools' future freshwater education projects

7.1 Set up a River Sid Stakeholders Group

Improving the health of the Sid catchment will require a collaborative community effort. There will be roles for the Sid Vale Association, farmers and other landowners, volunteers, contractors, wildlife and land management experts, local businesses, public sector organisations, NGOs, schools and other educational establishments, and probably many more.

It is important that the various stakeholders should be aware of each other's existence, of their respective influences on the catchment, and of their mutual and complementary interests. It is also important to enable them to communicate easily with one another should they need to.

A similar challenge was faced recently in the delivery of a project in the Otter catchment. There were clear benefits to be gained from setting up a stakeholders' group but the people whose participation was most needed were typically hard to engage. The reasons most often expressed were variations on a common theme: not wanting to be involved in "more time-consuming meetings that don't achieve anything". It was therefore decided to build up relations with individuals gradually over a number of months, in the course of delivering other project activities. In this way stakeholders became genuinely interested in the Otter catchment project and its objectives, and information was disseminated naturally by word of mouth.

Once a critical mass of interest had been established – helped by the SVA's counterparts in the Otter catchment, the Otter Valley Association and Tale Valley Trust – an informal "Otter Group" was set up. Once they were properly engaged, it was repeatedly stated by stakeholders that an initiative to help unite efforts in the catchment was long overdue. An inaugural one-off meeting was held to discuss the issues facing the catchment and the need for cross-sector support for their solution. However the members were keen for the group to remain informal, with no meeting schedule and communication to continue primarily via electronic means.

It is suggested that a River Sid Stakeholders Group could be set up with a similarly informal, low-maintenance model. Members would be free to get involved as much or as little as they wish

depending on their need and ability to do so. Nonetheless it would be essential for at least one individual, or a core group, to maintain the interest of the wider membership by disseminating information about interesting developments and opportunities. The best way to attract attention - by far – will be to announce the availability of financial and / or practical support for environmental projects on members' land. This can be supplemented with information about proposed priorities for conservation work, dates of volunteer work parties and so on.

Note: in order to address some of the priority actions recommended below, it would be advantageous to provide landowners and land managers with specialist training and/or one- to-one advice. For this purpose a professional wildlife and farming advisor / trainer could be engaged on for a limited number of days per year. FWAG South West and Westcountry Rivers Trust have expertise in this area, and there are numerous independent advisors available who may already be known to SVA members.

7.2 Engage and train volunteers

The Sid Vale Association's voluntary ethos is its greatest asset. Community participation will be absolutely essential in improving the health of the river catchment. Volunteers will be able to help deliver a wide range of tasks, for example:

- Identification and removal of Himalayan balsam stands (this will be a multi-year project)..
- Enhancing fish habitat - raking gravels, sediment removal, coppicing bankside trees.
- Recording and monitoring a wide range of wildlife species in partnership with Devon Biodiversity Records Centre.
- Acting as project ambassadors - engaging with landowners in the catchment to help and encourage them to take a positive role in enhancing freshwater habitats.

Training will be required for some of these tasks, so in some cases the work may need to be led by qualified professionals (paid or otherwise) with the main body of volunteers playing supporting trainee roles.

7.3 Create an "East Devon Wildlife Hit Squad"?

On Dartmoor volunteers who had previously been working solely for one organisation – Butterfly Conservation, Dartmoor National Park Authority, Devon Wildlife Trust, the National Trust or Woodland Trust - have joined forces to create a "Dartmoor Wildlife Hit Squad". This larger group is able to tackle more challenging tasks on behalf of all five organisations. It provides individuals with more (and more varied) opportunities for volunteering, and thus allows those with spare capacity to devote more time to enhancing their local environment. It also provides opportunities for volunteers to share skills, expertise and good practice.

This successful model could perhaps be replicated in East Devon across the catchments of the Sid, Otter and/or Axe, embracing community action groups and perhaps other stakeholders such as angling clubs and syndicates. In this way the Sid Vale could benefit from the considerable experience of communities in the neighbouring catchments, for example in tackling Himalayan balsam removal. In addition a cross-catchment group could (with suitable training where necessary) combine forces to carry out more wide-ranging survey and monitoring tasks and undertake other wildlife habitat enhancement works.

7.4 Make small grants available for freshwater projects

The delivery of this report's recommendations, and of any other actions to enhance freshwater habitats in the Sid catchment, will require the provision of appropriate resources in cash as well as in kind. While volunteers will have a major role to play in delivering the actions recommended in

this report, some tasks will inevitably require equipment, supplies and professional help that will need to be paid for.

In other Devon catchments this need has been addressed by setting up small grants schemes to part-fund capital works (for example to install riverbank fencing and purchase drinking troughs), as well as to subsidise educational projects and landowner / volunteer training. The availability of these small grants has often made the difference between the success or failure of the overall project.

Typically practical projects will be carried out in partnership with the relevant landowners, who will meet part of the cost themselves - either through a cash contribution, or by providing services / use of equipment in kind. In other cases a proportion of costs may be met through agri-environment grants. Higher Level Stewardship is soon to be superseded by NELMS, the full scope of which is not yet known; however there have been some suggestions that it may have a focus on catchment-level conservation, in which case it could prove useful in co-funding freshwater conservation work in the Sid Vale.

It is strongly recommended that the Sid Vale Association should make such small grants available to support freshwater conservation projects. It is fortunate that unlike other catchments, the Sid Vale already has a grant-giving mechanism in place courtesy of the Keith Owen Fund (SVA). Questions such as the amount of KOF funding to be allocated annually to river work, the amount of match funding to be sought from elsewhere, any preferred project priorities and so on could be resolved with advice from partner organisations if required. Devon Wildlife Trust has administered several small grant schemes of this type in the Dart, Taw and Torridge catchments, and DWT staff would be willing to share their experience and provide advice if the Sid Vale Association was to provide similar support in its local community. A visit could also be arranged for SVA committee members to see some of the completed projects funded recently in northern Devon.

Small grants in the Sid Vale could focus in the first instance on urgent problems and easy wins.

- Urgent problems would include eradicating Japanese knotweed in the catchment. Unlike Himalayan balsam, control of this non-native invasive plant is best tackled by experienced professionals rather than volunteers. Delay compounds the difficulty of this task (see section 7.8 below).
- Easy wins will be most feasible in areas such as the Snod Brook. This watercourse has the best current condition of any in the catchment. By consolidating this status and making its habitats as good as they can be, the Snod can act as a “wildlife reservoir” from which species can gradually colonise the rest of the catchment.
- Alternatively, the focus for easy wins could be based on project theme rather than project geography. For example it might be beneficial to concentrate for a period on schemes across the catchment that aim to fence off riverbanks from grazing animals, and provide alternative water sources such as drinking troughs and pasture pumps.

Small grants could also be provided in order to develop wider community engagement in freshwater conservation. This could include setting up a programme of occasional seminars and site visits for interested landowners, to address such issues as post-flooding removal of gravel and fallen trees, fish habitat management, invasive species issues, and tailoring farming methods to benefit water quality. Recent events of this type have proved popular when provided by the Catchment Sensitive Farming project in the Otter catchment.

Funds could also be provided in order to train volunteers in survey and monitoring skills, for example otter detection and general wildlife recording. Grants for the Sid Vale’s schools could also

be effective as a means of continuing the excellent work they have begun with Devon Wildlife Trust's Paul Martin during year one of the Living Rivers project.

Devon Wildlife Trust personnel would be willing to provide occasional voluntary assistance, for example with the targeting of small grants and assessment of applications, if required by the SVA.

- Matt Boydell (Land Manager): has experience and expertise in all aspects of practical conservation management work. Considerable local knowledge having lived and worked in Branscombe for many years.
- Andrew Taylor (contract worker / volunteer): has experience of costing and funding practical conservation projects, and of participation in wildlife survey / monitoring / recording schemes.

7.5 Secure additional external funding (if required)

It would be beneficial to maximise the impact of any Keith Owen Fund (SVA) grants for freshwater conservation work by securing match funding wherever possible. The SVA may find itself in a relatively strong position to secure such funding for two reasons:

- It has a strong track record of mobilising local volunteers, which will help to persuade potential donors that there will be an excellent return (in terms of on the ground action) on any donation they make.
- The fact that it is contributing some of its own resources through the Keith Owen Fund will persuade external funders that the SVA has a strong vested interest in delivering projects responsibly and effectively.

If required, Devon Wildlife Trust can provide an overview of potential sources of external funds for such purposes as practical conservation works, volunteer training and any further field surveys that may be considered necessary.

7.6 Work in partnership with other projects to deliver mutual benefits

At any given time there may be other wildlife conservation and/or water resource conservation initiatives active across the county or specifically in East Devon. By keeping abreast of other projects' activities the Sid Vale Association may be able to benefit from their efforts.

Organisations and projects with which to liaise in this context could include:

- Catchment Sensitive Farming (Axe / Otter project hosted by Natural England)
- Devon Biodiversity Records Centre
- Devon Wildlife Trust
- East Devon AONB
- East Devon District Council (Countryside Team)
- Environment Agency
- FWAG South West
- NELMS (Natural England)

By way of example, 2014-15 will see the development phase of a proposed 5-year Devon Greater Horseshoe Bat Project, to be led by East Devon AONB and Devon Wildlife Trust. This will focus on the sustenance zones of Devon's 11 greater horseshoe bat maternity roosts; one of these sustenance zones encompasses a large slice of the Sid catchment. Greater horseshoes use rivers as strategic flyways, and there is therefore scope for the costs of bankside habitat works to be

shared between an SVA Small Grants scheme (should such a scheme be established) and the Devon Greater Horseshoe Bat Project.

Recommended practical actions to be delivered in partnership with stakeholders and volunteers, and supported by small grants where necessary:

7.7 Tackle freshwater pollution and sedimentation

Although the Sid has been categorised by the Environment Agency as having Good Ecological Status, parts of the catchment are nonetheless impacted by pollution and sedimentation. There are number of issues to be addressed, as follows.

Problem: there is a significant amount of pasture land alongside the Sid and its tributaries of which only about 50% is fenced off from the watercourse. As a result livestock are trampling the riverbanks causing erosion, and depositing manure directly into the watercourse. The results are sedimentation of the riverbed (smothering valuable habitat) and contributing to nutrient pollution (causing algal blooms that outcompete other freshwater plants, and killing more sensitive freshwater invertebrates because of reduced oxygen levels).

Solution: Work with relevant landowners to install riverbank fencing where livestock are causing significant pollution and sedimentation of the river. Provide cattle troughs / pasture pumps etc to replace lost drinking points.

Problem: the extent to which other point-sources of pollution are affecting the watercourse is currently unknown.

Solution: Work with landowners to investigate and address any potential point-source pollution issues resulting from old/abandoned land drains, effluent pipes, farm track crossings, farm infrastructure etc. Detailed notes from the Living Rivers catchment walkover survey can be made available to support this work.

Problem: variable water quality in the catchment indicates that diffuse pollution is an issue that needs addressing as a matter of priority.

Solution: Work with targeted landowners to conserve farm resources (i.e topsoil and fertilisers). Reduce diffuse pollution by limiting soil and nutrient runoff from pasture and arable fields. Example methods:

- Create hard standing areas where livestock congregate, for example around farm gates and drinking troughs. This will eliminate the heavy trampling and erosion that often occurs at these points, which then leads to runoff of soil and nutrients.
- Plough sloping fields along rather than across contours to avoid creating high-speed pollution pathways down ploughed strips.
- Reduce fertiliser runoff by better timing (avoid spreading before heavy rain is forecast), through improved application techniques (for example using a slurry injector rather than traditional muckspreader), and more accurate calculation of requirements (don't spread more fertiliser than the soil and crop can use). Grant support for hiring specialised equipment for landowners' group use could be considered and value for money evaluated.

Prioritisation of above works: consider allocating resources to both the least favourable areas (to improve them) and to the best areas such as the Snod Brook (to maximise its already high wildlife benefits).

7.8 Tackle invasive non-native species

Stands of Himalayan balsam are present across much of the catchment, particularly in the area from Sidmouth up to the middle reaches of the main river. The still more problematic Japanese knotweed is also present in some areas.

Solutions:

- Identify volunteer "balsam wardens" for different areas of the Sid catchment.
- Wardens to recruit further volunteers willing to take part in labour-intensive balsam removal events.
- Volunteers to liaise with experienced groups tackling Himalayan balsam in the Otter and Tale valleys (Otter Valley Association and/or Tale Valley Trust) to learn best practice, and to develop a removal plan for the Sid Vale based on the Otter and Tale models.
- Consult Environment Agency and qualified professionals regarding Japanese knotweed issues as these are likely to require action from experienced contract workers rather than volunteers.

7.9 Carry out habitat works, conduct research and train landowners to benefit wildlife

Problem: the Sid catchment boasts some excellent habitats for fish and other aquatic wildlife but these are localised to certain sections of the river and its tributaries. For example there is a notable lack of habitats suitable for spawning and juvenile trout.

Solutions:

- Enhance riverbeds for spawning fish by loosening gravels and clearing / rejuvenating areas that have become silted up.
- Bankside coppicing: work with landowners to partially open up over-shaded areas of the river corridor on the Sid and Snod Brook, thereby creating the various patchworks of light and shade required by different fish for feeding and shelter.
- Create new spawning and juvenile trout habitats on the Snod Brook by installing woody debris structures, flow deflectors etc. at appropriate sites (with Environment Agency flood consent)

Problem: some key native freshwater species such as white-clawed crayfish are currently under-researched in the Sid catchment and hence their status and conservation requirements are unknown.

Solution: organise training for volunteers, then carry out a crayfish survey in the catchment with a view to a possible future reintroduction programme, or the augmentation of any existing population.

Problem: due to storms and floods of recent years, gravel dredging has been necessary in some parts of the upper catchment. The timing of such operations and the methods used are critically important in minimising damage to habitats and aquatic invertebrate populations, and in some cases best practice has not been followed due to lack of landowner awareness.

Solution: group training for landowners (organised through proposed River Sid Stakeholder Group), and/or site visits from a qualified advisor, would enable landowners to tackle this problem in the least damaging way possible after future flooding events.

7.10 Decide priorities regarding School Weir and other barriers to fish passage

Problem: The catchment has 29 barriers to fish passage, affecting both adult salmonids on their way upstream to spawn, and juvenile eels seeking suitable conditions to mature before escaping to sea to breed. Five of these 29 barriers are effectively impassable, and of these School Weir in the Byes occupies the most strategically problematic location.

Action: with reference to section 5 of this report, decide whether to progress investigation of the Alaskan 'A' fish pass solution for School Weir to the next stage.

Action: consider specific efforts to aid European eel passage at School Weir and elsewhere. Work with the Environment Agency to develop an eel management plan that will provide for better recruitment and escapement for eels in the Sid catchment; to include possible retrofitting of eel passes to the five impassable obstacles.

7.11 Promote and support wildlife recording and monitoring in the Sid catchment

Problem*:* Species recording and monitoring is a vital part of wildlife conservation. The information it provides is essential to the process of prioritising and delivering practical habitat works on the ground. Devon Biodiversity Records Centre's information relating to the Sid catchment contains much historical data (1990s and earlier) – this provides an excellent baseline but more recent records are relatively sparse. There is an urgent need to enthuse and engage a new generation of wildlife recorders in the Sid Vale so that future conservation effort is well-targeted and effective.

Solutions:

- Devon Biodiversity Records Centre is working to remove barriers to participation in wildlife recording wherever possible. In 2014, with volunteer support, DBRC is developing a free smartphone application allowing users to record wildlife sightings in the field, and to add digital photographs to their records where the species has not been identified. Location information is generated by the phone's built-in GPS and the data is sent to DBRC automatically and at no charge when the phone enters wi-fi range. It is suggested that the Sid Vale Association and DBRC could work together to promote this new approach to wildlife recording, with the Sid catchment being one of the first areas of Devon to benefit.
- Newcomers to wildlife recording could be encouraged to start by focusing on key easily identifiable species such as kingfishers, then engage further by taking part (for example) in Otter Spotter training sessions.
- DBRC has recently delivered an Otter Spotter training session based at the Paccombe Farm on the Snod Brook. The otter is an excellent flagship species to trigger public interest in wildlife recording, and DBRC would be willing to deliver further sessions here (perhaps specifically for Sid Vale Association members) if it can secure external funding to cover a proportion of the costs.

7.12 Support schools' future freshwater education projects

The programme of freshwater education events and visits delivered by Devon Wildlife Trust in year one of the Living Rivers project has been enthusiastically received by the participating schools. DWT's Paul Martin has provided schools with teaching resources so that the activities can be repeated for future year groups, and equipment purchased with KOF funding will be available for them to borrow through the Sid Vale Association's River Warden. If schools are keen to develop the activities further, or to purchase additional equipment, they could be encouraged to apply to the Keith Owen Fund for financial support.

In 2014-15 DWT's Paul Martin has been commissioned by the Otter Learning Group to carry out a year of wildlife education events, with individual schools and with the Group as a whole. The Sid Vale schools would be welcome to join in this initiative in their neighbouring catchment, and again they could be encouraged to apply to the Keith Owen Fund for financial support if they cannot meet the full costs themselves.

APPENDICES

Appendix 1: Project Participants

Name / Role	Activities	Time spent (where funded by KOF grant)
Michael Flynn Sid Vale Association River Warden	Advice and project supervision	Volunteer time
Samantha Davies Devon Biodiversity Records Centre Records Centre Officer	Catchment walkover survey Recording survey results Map production	11½ days
Matt Boydell Devon Wildlife Trust Land Manager	Project management Catchment walkover survey Invertebrate survey Electro-fishing survey School Weir options investigation	DWT contribution in kind
Scott West Devon Wildlife Trust Living Rivers Project Officer	Catchment walkover survey Invertebrate survey Electro-fishing survey School Weir options investigation+ report Report writing	33 days
Paul Martin Devon Wildlife Trust Education Officer	Educational activities - planning and delivery	9 days + DWT contribution in kind
Emily Stallworthy Devon Wildlife Trust Conservation Officer	Educational activities - planning and delivery	6 days + DWT contribution in kind
Andrew Taylor Devon Wildlife Trust Contract worker / volunteer	Report writing Project co-ordination Catchment walkover survey Invertebrate survey Electro-fishing survey	5 days + volunteer time
Paul Coulson Institute of Fisheries Management Development Officer	Electro-fishing survey	2 days
Randolph Velterop Consultant	School Weir options investigation + report	1 day
Pete Kibel Fishtek Consulting Ltd.	School Weir options investigation + report	Contribution in kind
James Chubb Donkey Sanctuary	Educational activities planning and delivery Advice re. walkover survey planning	Contribution in kind
Chris Woodruff and Pete Youngman East Devon AONB	Advice re. walkover survey planning	Contribution in kind

Appendix 2: Standardised habitat map keys for Catchment Walkover survey

a) Key used for in-stream features

Standardised Habitat Map Key

Habitat	Symbol
SUBSTRATE	
Boulders	
Pebbles / stones	
Gravels	
Silt	
CHANNEL HABITATS	
Riffle	
Pool	
Glide	
IN STREAM FEATURES	
Island	
Weir (grade)	
Waterfall	
Fallen tree	
Flood debris	
FISH (migratory)	
Fish sightings (species)	
Potential spawning habitat	
Potential fry habitat	
Potential adult habitat	
PLANTS	
Submerged plants (species)	
Emerged plants (species)	
Algal growth	
INPUTS	
Pipe	
Cattle poaching	
Visible run off (Grade)	

Habitat	Symbol

a)

Appendix 2 continued: Standardised habitat map keys for Catchment Walkover survey

b) Key used for bankside features

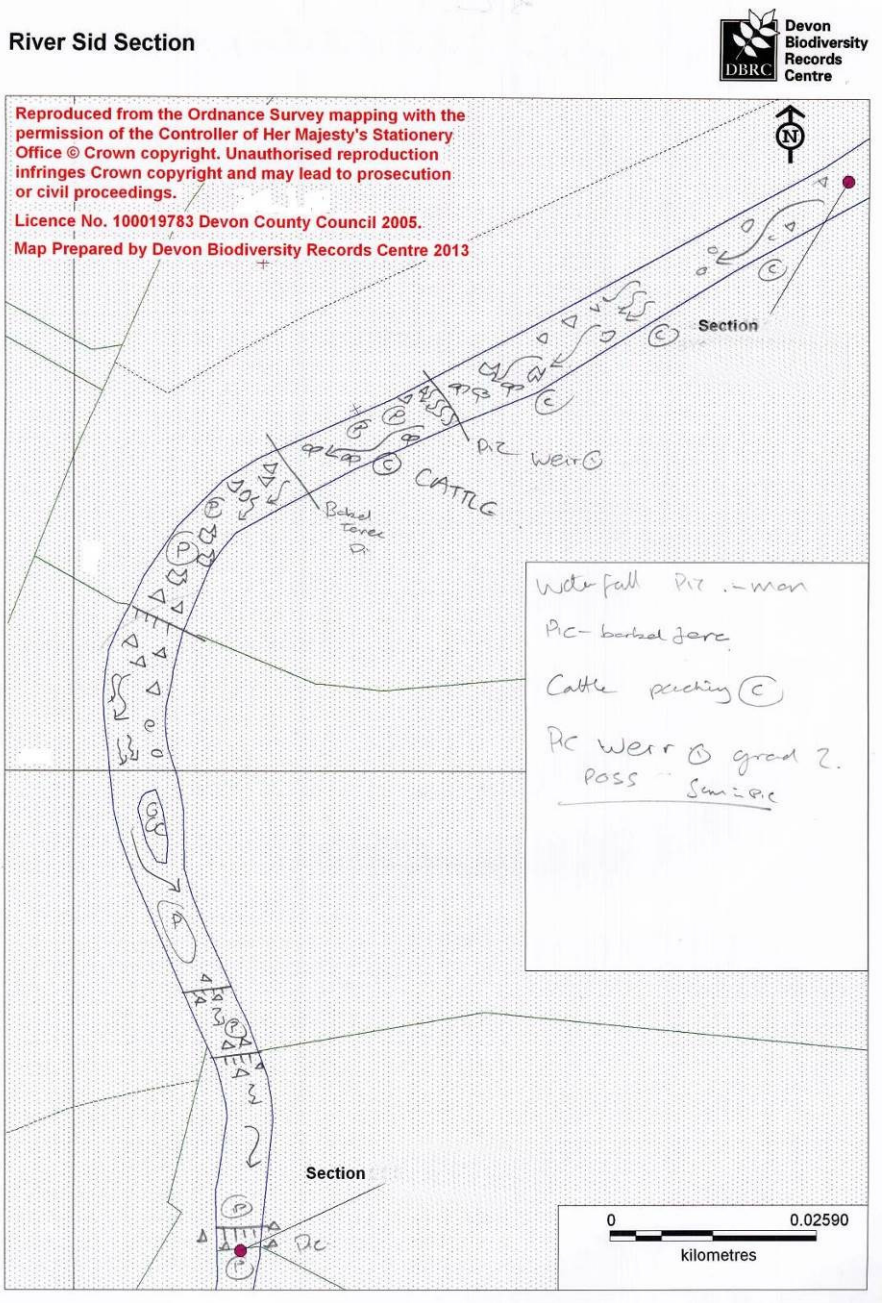
Standardised Habitat Map Key

Habitat	Symbol
GRASSLAND	
Unimproved / species-rich grassland	
Semi-improved grassland	
Improved grassland	
Arable	
Grazed	
WOODLAND	
Broadleaved woodland – lowland	
Wet woodland	
Mixed woodland	
Coniferous woodland	
Coppice	
Orchard	
SCRUB	
Scattered scrub	
Continuous scrub	
Scrub woodland	
Recently felled woodland	
WETLAND	
Purple moor-grass & rush pasture / mire	
Swamp / fen	
HEATH	
Lowland heath	
MISCALANEOUS	
Bracken	
LINEAR FEATURES	
Hedgerow / hedgebank	
Defunct hedge	

Habitat	Symbol
BANK	
Earth bank	
Rock bank	
Artificial bank	
Sand / gravel bank	
Sand / gravel bank + vegetation	
Copse (show species)	
Reed / sedge	
Short vegetation	
Long vegetation	
Drain / stream confluence	
Bridge	
Cattle drink	CD
Himalayan balsam	HB
Erosion	

Appendix 3: Examples of surveyors' Catchment Walkover field maps

a) Sample map produced by in-stream surveyor



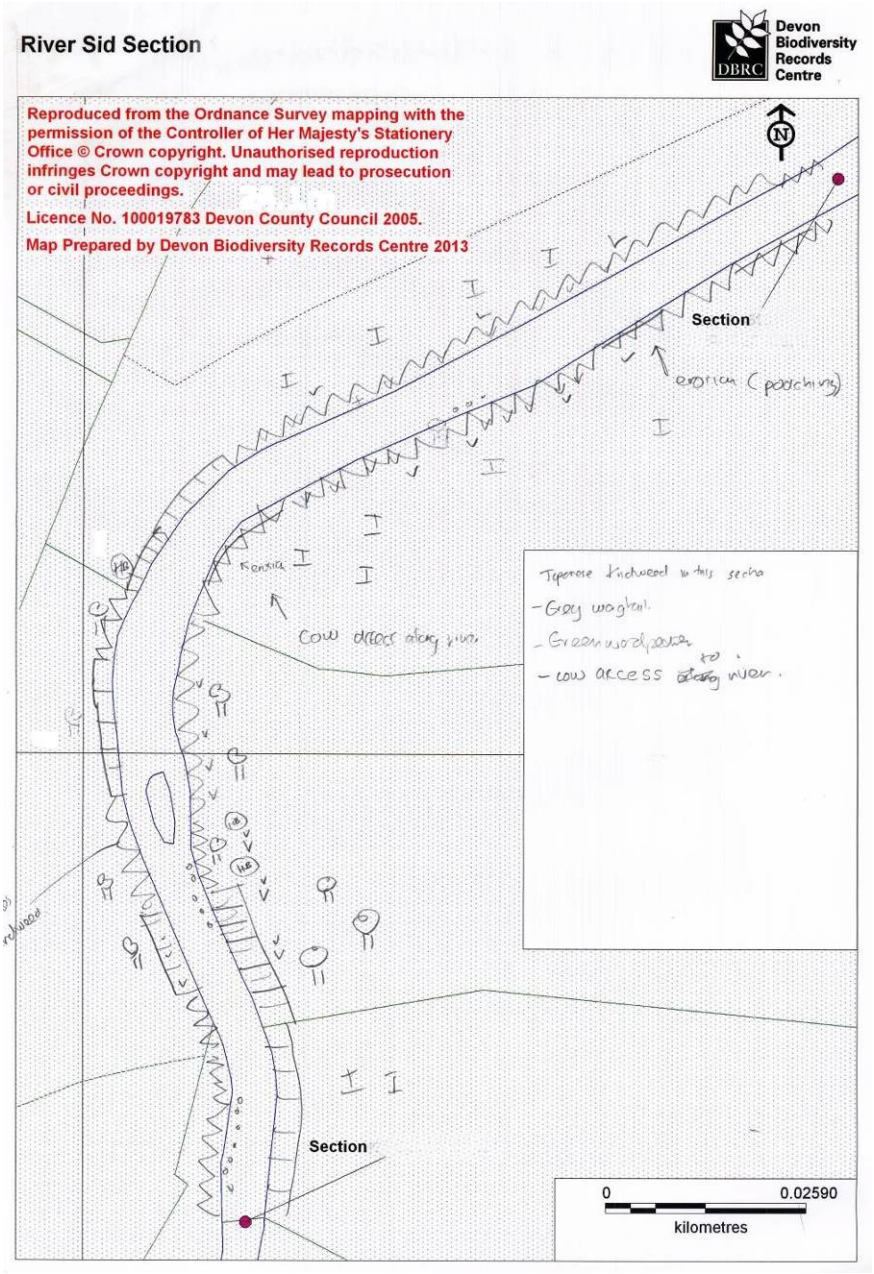
In-stream survey notes for a sample section of the River Sid – one of 177 such sections surveyed.

The in-stream surveyor has recorded numerous boulders in this naturally bending stretch of river as well as a mixture of riffles (broken water), glides (smoother flowing sections) and pools. This makes for a good variety of aquatic habitats that wil attract different groups of invertebrates and provide a range of food and shelter possibilities for fish and other predators.

On the other hand weirs have been noted that will restrict fish mobility, and a series of points on the eastern bank are identified as subject to cattle poaching (i.e. trampling of the riverbank causing erosion and hence sedimentation / pollution of the watercourse).

Appendix 3 continued: Examples of surveyors' Catchment Walkover field maps

b) Sample map produced by bankside surveyor



Riverbank survey notes for the same section of watercourse as shown under a) above.

The bankside surveyor also highlights the areas of erosion caused by cattle poaching as well as stands of Himalayan balsam and Japanese knotweed that will need to be addressed as soon as possible in order to prevent further spread.

On a positive note, some sections of bank are shown to be wooded; the trees here will act as a natural barrier, intercepting any diffuse pollution that might otherwise enter the watercourse from surrounding agricultural land.

Appendix 4: Invertebrate kick-sampling survey – method and detailed results

To supplement the walkover survey's findings regarding water quality and pollution, two days in September 2013 were devoted to a detailed investigation of invertebrate populations at twelve varied sites around the catchment.

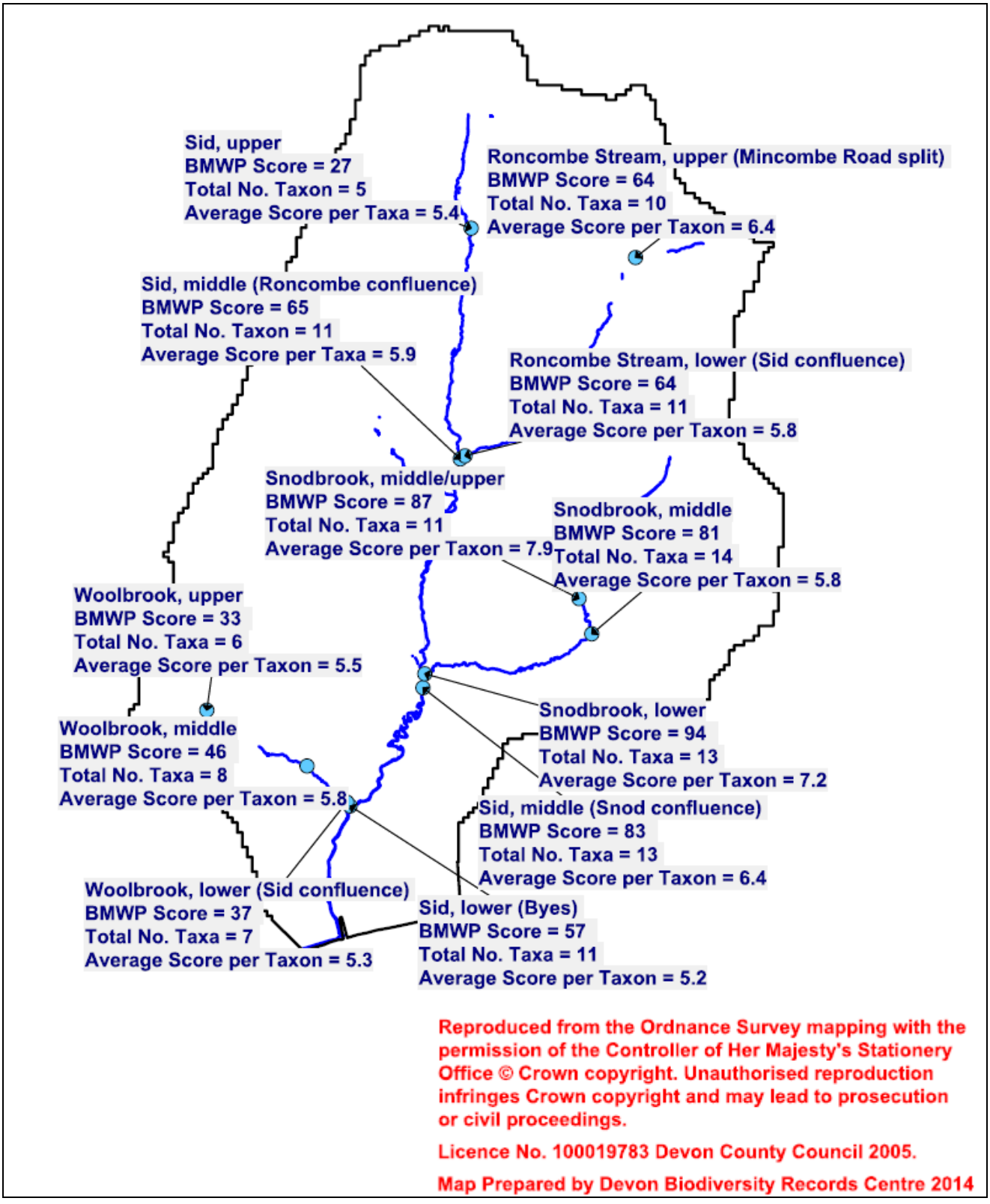
Pollution, whether point-source or diffuse, affects the balance of life in the river. Studying the organisms present at a particular point helps to gauge water quality and highlight possible problems which might otherwise go undetected. The Biological Monitoring Working Party (BMWP) survey procedure is used to measure water quality by using biological indicators.

Each site is "kick sampled", the river bed being agitated with the foot for a given period. Creatures disturbed are caught in a net held downstream, placed in a white tray for identification to family level, and then released. The BMWP score is the sum of the scores of all families in the sample. The system exploits the fact that different families of aquatic macro-invertebrate animals have different tolerances to the depletion of dissolved oxygen that results from nutrient pollution. For example, some families of mayflies and stoneflies require a high level of dissolved oxygen in the water in order to survive. Their presence in a freshwater sample indicates low pollution levels, and makes high contributions (10 points each) to the overall BMWP score for a site. At the other end of the scale, aquatic oligochaete worms are very tolerant of pollutants and therefore contribute a score of just one to the site total.

Total BMWP score for site	Category	Interpretation
0-10	very poor	heavily impacted
11--40	poor	polluted or impacted
41-70	moderate	moderately impacted
71-100	good	clean but slightly impacted
>100	very good	Unpolluted, unimpacted

An Average Score Per Taxon (ASPT) is also calculated for each site, this being the average score for all families found. The number of different macro-invertebrate families represented in a sample is also an important factor, higher diversity indicating better water quality. An overall qualitative rating (ranging from "very poor" to "very good" is determined for each location based on the BMWP, ASPT and overall diversity ratings. The map and tables below summarise the results for the Sid catchment survey.

Appendix 4 continued: kick-sampling survey – method and detailed results



Map 9: results of the BMWP kick sampling survey for the Sid catchment, September 2014

Appendix 4 continued: kick-sampling survey – method and detailed results

Location	Sid - upper	Sid - upper middle	Sid - lower middle	Sid - lower
BMWP score	27	65	83	57
*Total Taxa	5	11	13	11
**ASPT	5.4	5.9	6.4	5.2
Classification	Poor	Moderate	Good	Moderate

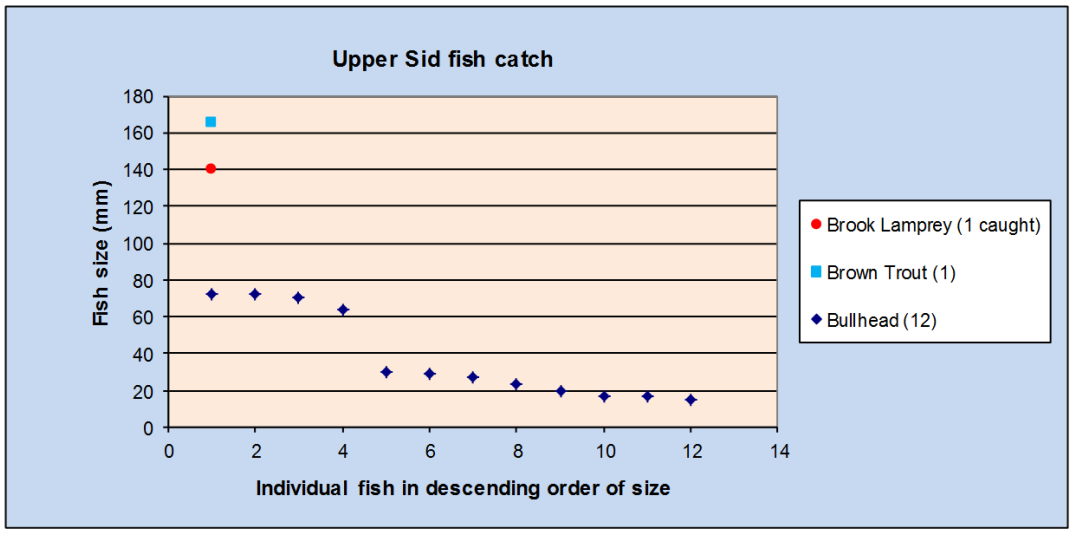
Location	Roncombe Stream - upper	Roncombe Stream - lower
BMWP score	64	64
*Total Taxa	10	11
**ASPT	6.4	5.8
Classification	Moderate	Moderate

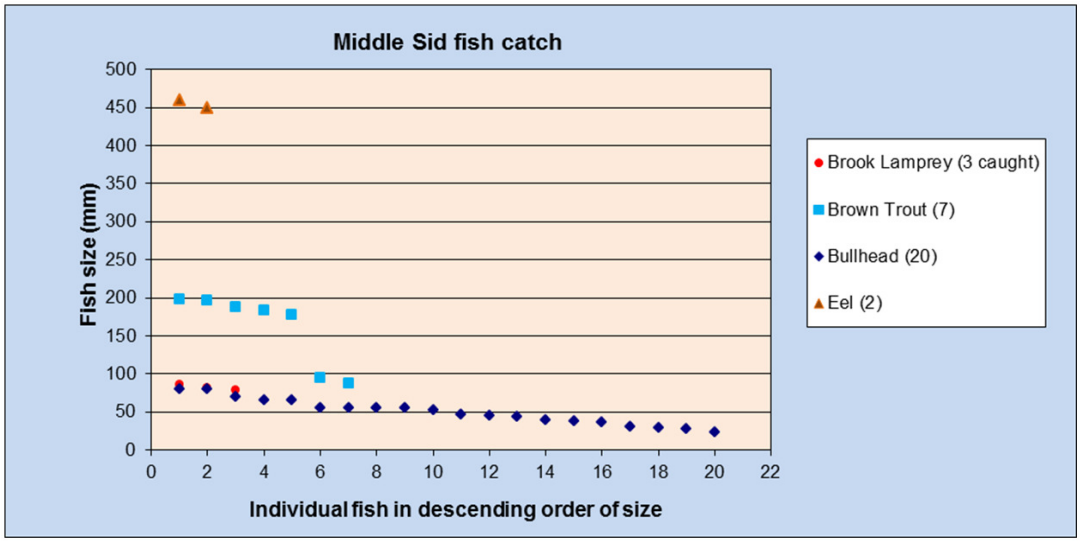
Location	Snod Brook - upper	Snod Brook - middle	Snod Brook- lower
BMWP score	87	81	94
*Total Taxa	11	14	13
**ASPT	7.9	5.8	7.2
Classification	Good	Good	Good

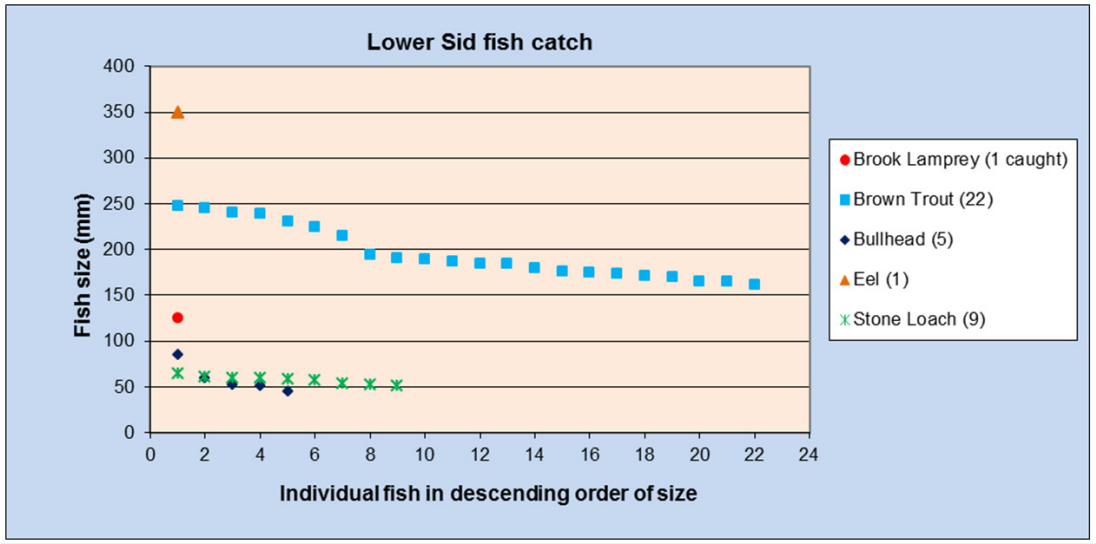
Location	Woolbrook - upper	Woolbrook - middle	Woolbrook - lower
BMWP score	33	46	37
*Total Taxa	6	8	7
**ASPT	5.5	5.8	5.3
Classification	Poor	Moderate	Poor

*Total Taxa: The number of groups of different organisms
**ASPT: Average score per taxon (BMWP divided by total taxa)

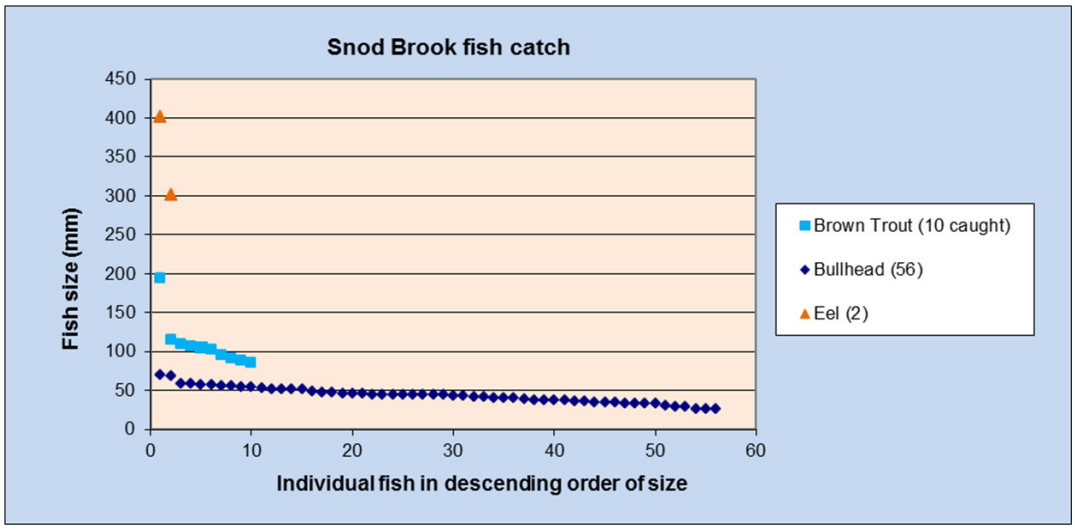
Appendix 5: Detailed results of electro-fishing survey, by site

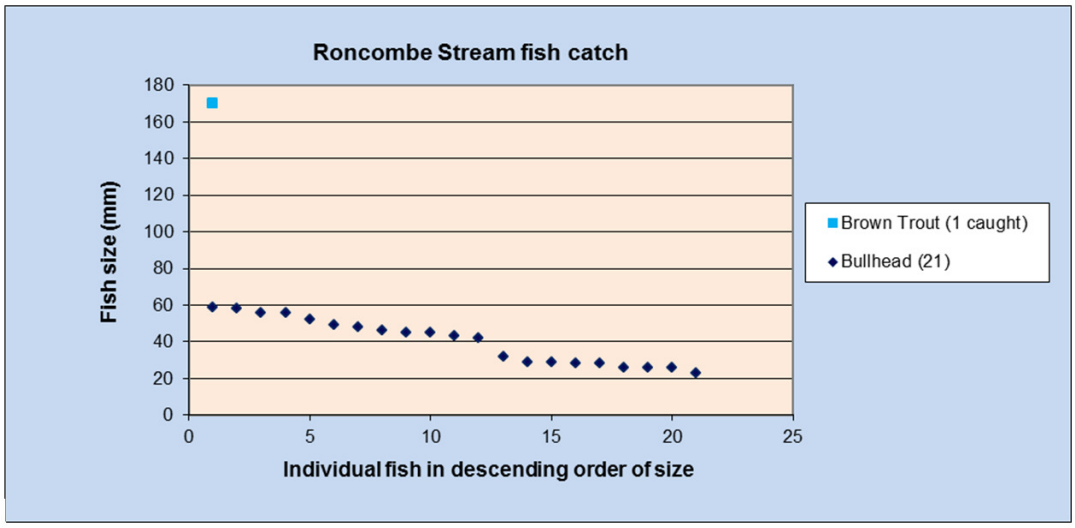






Appendix 5 continued: Detailed results of the electro-fishing survey, by site





Note: The survey of the **Woolbrook** resulted in zero fish caught.

Appendix 6: DBRC records held for the River Sid as at March 2014

The tables on the following pages list the animals for which records were held on the Devon Biodiversity Records Centre database (as at March 2014) for the River Sid, its tributaries, and the land up to 200m either side of the watercourses. In many cases the main database contains multiple records per species, allowing the records centre (in theory) to identify trends over time.

However the current level of Sid Vale records being sent to DBRC is very low, and one of the key aims of the Living Rivers project is to kick-start renewed wildlife monitoring activity in the catchment.

Note: due to space constraints, the list of plants for which DBRC has records for the catchment is not included in this report.

BIRDS	
Common Name	**Scientific Name**
Blackbird	*Turdus merula*
Blackcap	*Sylvia atricapilla*
Bullfinch	*Pyrrhula pyrrhula*
Buzzard	*Buteo buteo*
Coal Tit	*Periparus ater*
Cormorant	*Phalacrocorax carbo*
Dipper	*Cinclus cinclus*
Green Sandpiper	*Tringa ochropus*
Green Woodpecker	*Picus viridis*
Grey Heron	*Ardea cinerea*
Grey Wagtail	*Motacilla cinerea*
House Martin	*Delichon urbicum*
Jay	*Garrulus glandarius*
Kingfisher	*Alcedo atthis*
Marsh Tit	*Poecile palustris*
Mistle Thrush	*Turdus viscivorus*
Moorhen	*Gallinula chloropus*
Nightjar	*Caprimulgus europaeus*
Nuthatch	*Sitta europaea*
Pheasant	*Phasianus colchicus*
Robin	*Erithacus rubecula*
Snipe	*Gallinago gallinago*
Song Thrush	*Turdus philomelos*
Swallow	*Hirundo rustica*
Swift	*Apus apus*
Tawny Owl	*Strix aluco*
Treecreeper	*Certhia familiaris*
Wood Pigeon	*Columba palumbus*
Wren	*Troglodytes troglodytes*

MAMMALS	
Common Name	**Scientific Name**
American Mink	*Mustela vison*
Brown Long-eared Bat	*Plecotus auritus*
Brown Rat	*Rattus norvegicus*
Common Pipistrelle	*Pipistrellus pipistrellus*
Eurasian Badger	*Meles meles*
European Mole	*Talpa europaea*
European Otter	*Lutra lutra*
European Rabbit	*Oryctolagus cuniculus*
Field Vole	*Microtus agrestis*
Grey Squirrel	*Sciurus carolinensis*
Hazel Dormouse	*Muscardinus avellanarius*
Lesser Horseshoe Bat	*Rhinolophus hipposideros*
Red Fox	*Vulpes vulpes*
Serotine	*Eptesicus serotinus*
West European Hedgehog	*Erinaceus europaeus*
Whiskered Bat	*Myotis mystacinus*

AMPHIBIANS AND REPTILES	
Common Name	**Scientific Name**
Common Frog	*Rana temporaria*
Common Toad	*Bufo bufo*
Marsh Frog	*Pelophylax ridibundus*
Palmate Newt	*Lissotriton helveticus*
Grass Snake	*Natrix natrix*
Slow-worm	*Anguis fragilis*

Appendix 6: DBRC records held for the River Sid as at March 2014 (continued)

SLUGS + SNAILS	
Common Name	**Scientific Name**
a Snail	*Acanthinula aculeata*
a Snail	*Acicula fusca*
a Snail	*Aegopinella nitidula*
a Snail	*Aegopinella pura*
a Slug	*Arion ater*
a Slug	*Arion owenii*
Dusky Slug	*Arion subfuscus*
a Snail	*Balea heydeni*
a Snail	*Balea perversa*
a Snail	*Carychium minimum*
a Snail	*Carychium tridentatum*
Brown Lipped Snail	*Cepaea nemoralis*
a Snail	*Clausilia bidentata*
a Snail	*Columella edentula*
a Snail	*Cornu aspersum*
Marsh Slug	*Deroceras laeve*
Rounded Snail	*Discus rotundatus*
a Snail	*Euconulus fulvus*
Tree Slug	*Lehmannia marginata*
a Snail	*Nesovitrea hammonis*
Garlic Snail	*Oxychilus alliarius*
Glossy Glass Snail	*Oxychilus navarricus*
Glossy Glass Snail	*Oxychilus navarricus subsp. helveticus*
a Snail	*Phenacolimax major*
a Snail	*Punctum pygmaeum*
Hairy Snail	*Trochulus hispidus*
a Snail	*Vitrea crystallina*
a Snail	*Vitrina pellucida*
a Snail	*Zenobiella subrufescens*

DRAGONFLIES + DAMSELFLIES	
Common Name	**Scientific Name**
Azure Damselfly	*Coenagrion puella*
Banded Demoiselle	*Calopteryx splendens*
Beautiful Demoiselle	*Calopteryx virgo*
Broad-bodied Chaser	*Libellula depressa*
Common Blue Damselfly	*Enallagma cyathigerum*
Common Darter	*Sympetrum striolatum*
Large Red Damselfly	*Pyrrhosoma nymphula*
Southern Hawker	*Aeshna cyanea*

BEETLES	
Common Name	**Scientific Name**
Lesser Stag Beetle	*Dorcus parallelipipedus*

BUSH CRICKETS	
Common Name	**Scientific Name**
Great Green Bush Cricket	*Tettigonia viridissima*

BUTTERFLIES	
Common Name	**Scientific Name**
Clouded Yellow	*Colias croceus*
Hedge Brown	*Pyronia tithonus subsp. britanniae*
Meadow Brown	*Maniola jurtina*
Peacock	*Inachis io*
Red Admiral	*Vanessa atalanta*
Ringlet	*Aphantopus hyperantus*
Silver-washed Fritillary	*Argynnis paphia*
Small Skipper	*Thymelicus sylvestris*
Speckled Wood	*Pararge aegeria*
Wall	*Lasiommata megera*

Appendix 6: DBRC records held for the River Sid as at March 2014 (continued)

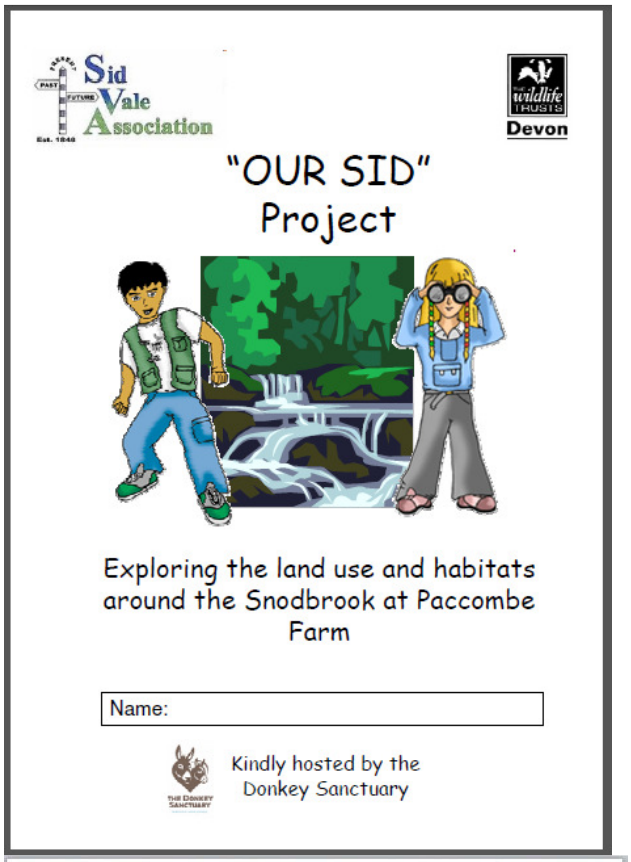
MOTHS	
Angle Shades	Dot Moth
Antler	Double Square-Spot
Barred Straw	Double-Striped Pug
Beautiful Brocade	Drinker
Beautiful Golden Y	Dun-Bar
Bee Moth	Dusky Brocade
Black Arches	Dusky Thorn
Blood-Vein	Elbow-stripe Grass-veneer
Bright-Line Brown-Eye	Elephant Hawkmoth
Brimstone Moth	Eyed Hawk-Moth
Broad-bordered Yellow Underwing	Fan-foot
Brussels Lace	Flame
Buff Arches	Flame Carpet
Buff Ermine	Flame Shoulder
Buff-Tip	Galium Carpet
Burnished Brass	Garden Carpet
Centre-Barred Sallow	Garden Pebble
Cinnabar	Garden Rose Tortrix
Clay	Gold Spot
Clouded Border	Gold Triangle
Clouded-Bordered Brindle	Green Carpet
Common Carpet	Grey Pine Carpet
Common Marble	Grey Pug
Common Marbled Carpet	Heart And Dart
Common Pug	Hummingbird Hawkmoth
Common Purple & Gold	Ingrailed Clay
Common Rustic	Iron Prominent
Common Swift	Jersey Tiger
Common White Wave	July Highflyer
Common Yellow Conch	Large Yellow Underwing
Coronet	Lesser Broad Bordered Yellow Underwing
Cream Wave	Light Brown Apple Moth
Dark Arches	Lobster Moth
Dark Sword-Grass	Lunar Hornet Moth
Dark-fringed Flat-body	Magpie Moth
Devon Carpet	Marbled Conch
Diamond Backed Moth	Mother Of Pearl
Dingy Footman	Mother Shipton

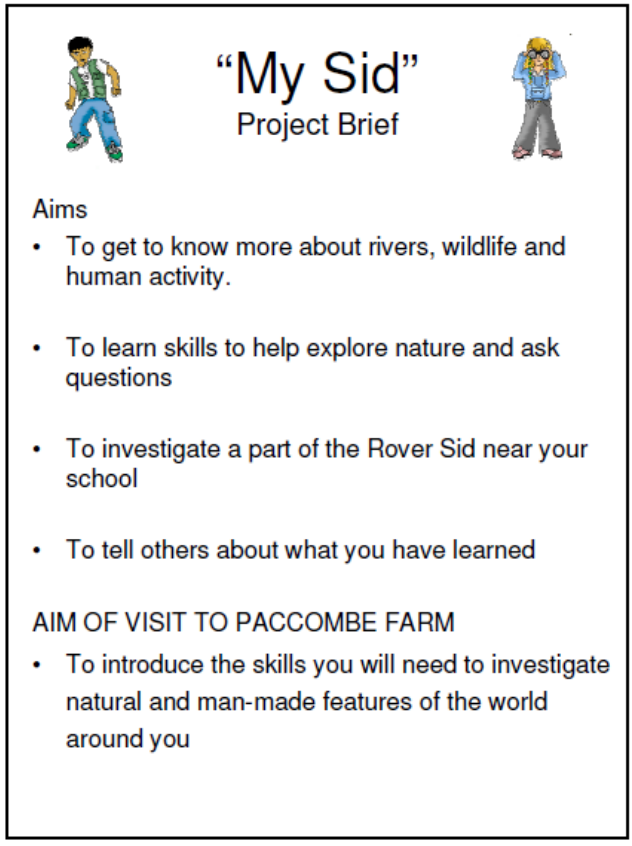
Appendix 6: DBRC records held for the River Sid as at March 2014 (continued)

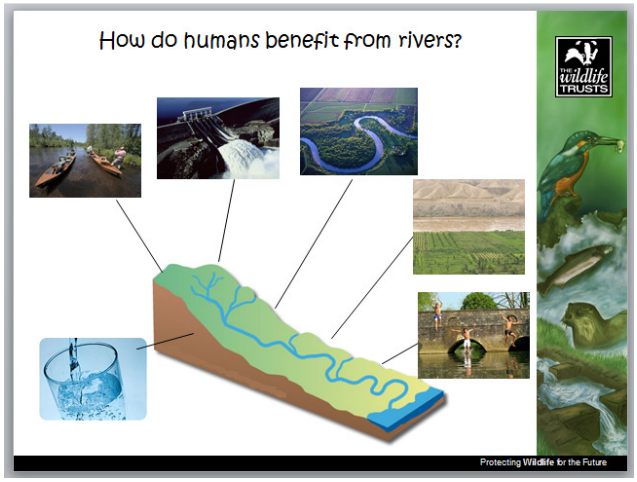
MOTHS continued	
November Moth	Small Angle Shades
Pale Mottled Willow	Small Fan-Footed Wave
Pale Tussock	Small Magpie
Pebble Hook-tip	Small Square-Spot
Pebble Prominent	Small Wainscot
Peppered Moth	Small White Wave
Poplar Hawk-Moth	Snout
Pretty Chalk Carpet	Spectacle
Purple Bar	Square-Spot Rustic
Riband Wave	Straw Dot
Rivulet	Svensson's Copper Underwing
Rosy Rustic	Treble Lines
Rufous Minor	Udea olivalis
Rush Veneer	Vine's Rustic
Sandy Carpet	V-Pug
Scorched Wing	White Ermine
Setaceous Hebrew Character	White-Pinion Spotted
Sharp-angled Peacock	Willow Beauty
Shears	Winter Moth
Silver Y	Wood Carpet
Silver-ground Carpet	Yellow Shell
Six-Striped Rustic	

Buff tip moth

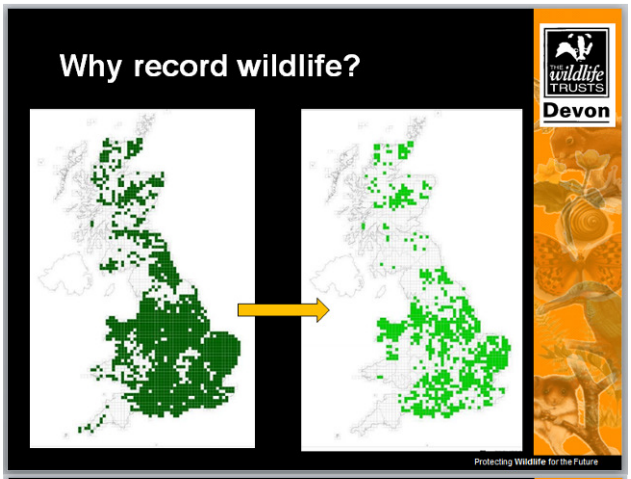
Appendix 7: Extracts from "Our Sid" schools education materials







Appendix 7 continued: Extracts from "Our Sid" schools education materials



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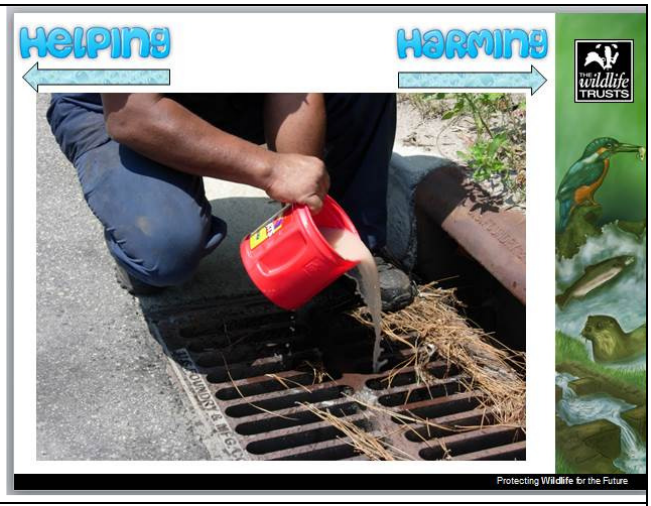

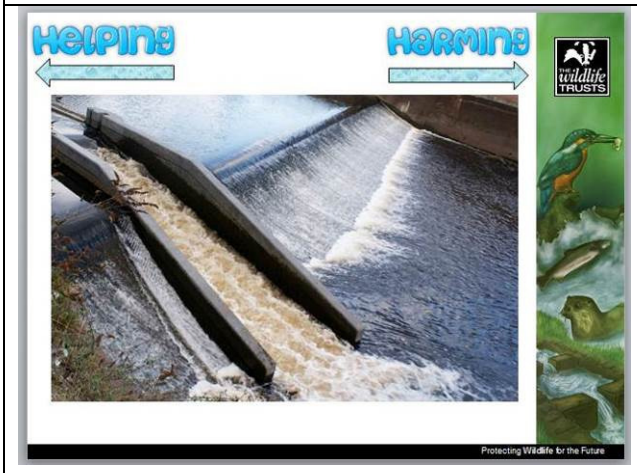

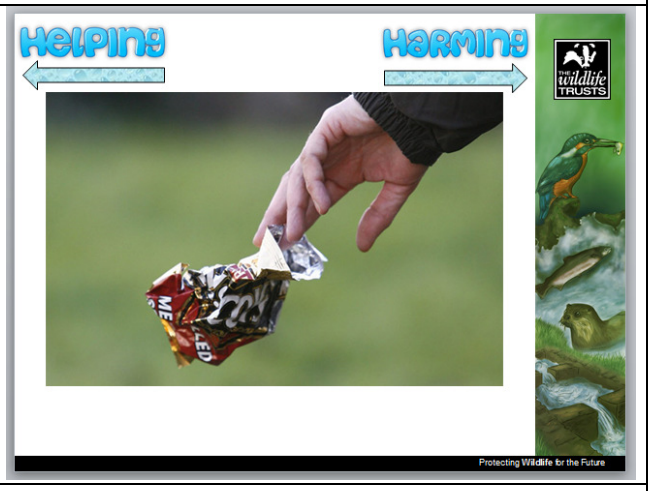

Appendix 8: Western Morning News article

14 WEDNESDAY OCTOBER 9 2013 WESTERN MORNING NEWS

Morning News Country

Nature watch

with **Trevor Beer**

The chill of autumn coupled with a downpour convinced me a jumper and raincoat was the order of the day as Willow and I squelched along the lane. Willow now has a "coat" which protects him from really wet weather. He rather likes to wear it and to know he's looked after. One of the many good things about having a dog companion is they get you out and about whatever the weather.

Lots of beech mast this year but few acorns on the oaks hereabouts. Hawthorns are heavily laden with haws, or aglets, while birds have been enjoying blackberries on the brambles, the latter a bit mushed.

Given the right conditions for hawthorn to set down natural regeneration the potential is enormous. Each of the fleshy fruits we know as haws contains a single seed so could produce a new tree. Many are eaten by birds including redwings and fieldfares here for the winter. They can also be made into a jelly rich in vitamin C. This winter I am going to plant a few hundred haws and will record what happens.

A reader from Plymouth has asked if I have any particular dislikes re TV wildlife programmes. I told her I am not at all keen on the music that spoils so many otherwise good programmes. I also dislike the handling of wild creatures such as the dormouse on a recent *Countryfile*. No need for it at all. Just go on improving habitat, we know what to do. Just get on with it.

Tomorrow: Reader's Query

Country notebook

BY DAVID HILL

My father, like most farmers, owned a shot gun which was kept in a mahogany gun rack in kitchen above the Bible on the bookcase and the black Bakelite telephone. He kept it in immaculate condition, taking it down occasionally to "get the feel of it". The orange cartridges were kept in a drawer of the kitchen table.

He rarely shot, and I only held it a couple of times and never fired it. In winter the stream was damned allowing it to to flow over Bulls mead, where on severe weather days snipe billed for grubs.The gun was taken down and he usually returned with a small meal which was very tasty.

He never shot at snipe when they were feeding. "Too easy. The skill lies in shooting one in flight, judging the zig and the zag. Got to give them a sporting chance."

He only ever shot one pheasant, as they rarely strayed into the fields of the farmhouse tree at East Knowstone. Occasionally he would shoot pigeons, and once he came back with a brace for the pot which he had shot with one cartridge when they had been billing and cooing on a branch. Cartridges were saved for me, and I made them into a family of finger puppets which kept me happy for days. I also enjoyed the scent, as it reminded me of Guy Fawkes Night.

When he died suddenly, my cousin sold the gun for my mother. The receipt reads 'Geoff Hinton and Sons. Gun makers Taunton. Paid for one 12 Bore Belgian h'less no ejector shot

Kingfishers are just one of the species being helped on the River Sid through the joint initiative between Devon Wildlife Trust and the Sid Vale Association PICTURE: CHRIS ROOT

Project ensures River Sid remains a special place for people and wildlife

A project which aims to improve the water quality and wildlife of a Westcountry river has got off to a strong start.

The project is a joint initiative between Devon Wildlife Trust and the Sid Vale Association, based on a six-mile stretch of the river Sid, plus tributaries upstream from Sidmouth in East Devon.

Devon Wildlife Trust's Scott West is leading the project.

"Many people know and love the River Sid," he said. "It's somewhere that local communities walk, play and live beside.

"It's also a key component of what brings tourists to this wonderful part of the world. What the project is aiming to do is to ensure that the river remains as a special place for people and wildlife.

"That means looking after its water quality and making sure that it can continue to support a wide diversity of life."

After six months of the project Scott has got to know the river intimately having walked its entire length – and main tributaries – not on the bank, but in the river itself, wearing waders.

He has taken surveys of invertebrate life, typically mayflies and waterbugs, to evaluate its water quality and conducted a series of electrofishing survey, with consent from the Environment Agency, in which fish are temporarily immobilised by an electric current to check on species and numbers.

Scott has also consulted with and advised ten local major landowners regarding land management and its impact on the river.

He said: "This is also an opportunity to see how positive management on the Sid can lead to healthier rivers not just here but across East Devon.

"We plan to take the lessons learned on this one small river catchment working with local landowners and enhancing riverside habitats and then apply them to other rivers."

The River Sid already supports wildlife including kingfishers, otters, brown trout and damselflies, but Scott believes it could to support more.

He said: "This river has the potential to support other well-known but threatened species, perhaps the best example would be migrating Atlantic salmon. This river and other rivers like it would once have contained good numbers of salmon. Local people recall seeing them in years past.

"Our ambition is that the Sid and its neighbouring rivers might one day support species like this again."

The project is not only targeting the lives of the rivers wildlife, but is also engaging local communities through an ambitious education programme.

> 'The idea behind the visits is to get the children more familiar with their river, to appreciate its beauty'
>
> Devon Wildlife Trust's Paul Martin

Devon Wildlife Trust's education officer Paul Martin has been working with two local schools – Sidbury Primary and Sidmouth Primary – on a series of "river days".

Paul said: "On river days we take groups of local children out to the River Sid. We assign them stretches of the river and ask them to explore them recording the wildlife that they find.

"The idea behind the visits is to get the children more familiar with their local river, to appreciate its beauty and to learn about the wonderful life it supports. The children certainly seemed to have enjoyed the experience."

The organisers believe the project's encouraging start bodes well for its next phase.

Scott said: "These initial months have been about understanding the river, its wildlife and the pressures upon it. It's also been about recognising the potential areas in which good local management can make a really positive impact.

"The next steps are threefold. First, to offer clear advice to local landowners on how they can play their part. Second, to address some of the physical barriers which face migrating fish, so for example introducing fish passes (ladders or pools) to help them overcome weirs. And lastly, to restore habitats along the river's banks – one special area we hope to tackle is the introduction of fencing to prevent cattle from entering the river."

Western Morning News – 9 October 2013 (text enlarged on following page)

Appendix 8 continued: Western Morning News article

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