

Report on the data collected from our Citizen Science 'Community River Monitoring Volunteer Project' – Monitoring Sediment Movement and Blockages on Hillfoots Burns

Citizen Science Overview

Citizen Science can be simply defined as the involvement of volunteers in scientific research.

As described in TCV's previous work, across the scientific community, there is widespread recognition that Citizen Science "offers a means of doing substantial, thoughtful public outreach and of tackling otherwise intractable, laborious or costly research problems" (Gura, 2013). Participation in Citizen Science is increasingly recognised as a valuable tool for connecting people with nature and influencing the adoption of sustainable lifestyles. At a community level Citizen Science has been shown to be an agent for empowering communities to act as environmental stewards, protecting and improving their local and global environment.

This report has been produced by The Conservation Volunteers (TCV) as part of the Scotland Counts project with the support of Scottish Government, Scottish Natural Heritage (SNH), Forestry Commission Scotland (FCS) and Scottish Environmental Protection Agency (SEPA). It aims to provide a brief summary and feedback of the project and presents the data collected by the Community River Monitoring volunteers and this data source will hopefully feed into Clackmannanshire Councils forthcoming Flood Risk Assessment (FRA) options appraisal report for Tillicoultry.

Project Summary

With support and funding from the Scottish Government TCV Scotland and Clackmannanshire Council are working in partnership to deliver a Citizen Science Community River Monitoring volunteer project. The project's aim is to help raise awareness of flood risk in the Council area and to get local communities involved in recording useful information about some of the Hillfoots Burns. Through the project local communities and volunteers are actively recording data and taking photographs to monitor how sediments can move within burns and how this can influence flood management techniques.

In this project Clackmannanshire Council assisted us to identify specific information and/or data lacking linked to flooding and ways we can help fill these data gaps through delivering a Citizen Science pilot project with volunteers.

The study period covered by this project is from the 9th August to 7th December 2016 and the three Hillfoots Burns selected to monitor sediment chokes and blockages from key vantage points on: Tillicoultry Burn Confluence with River Devon, Alva Burn at A91 Road Bridge and Dollar Burn water race and beneath Mixed Leisure Route Bridge to the South (maps showing each location found below).

The aim of the project was to take a photograph(s) at vantage points chosen by the Environmental Monitoring volunteer to monitor sediment movement, chokes and blockages on the above burns, record river levels via photographs and relate this to information from the local Menstrie Weather website to record rainfall levels. Thus our Citizen Science activities were meaningful, useful and guided by the Community Resilience/Natural Flood Management (NFM) theme. TCV provide training and support for the volunteers and all the survey materials (laminated maps of monitoring sites, recording sheets, weatherproof clipboards, and pencil), training, support and guidance for the project.



Data collated by Community River Monitoring Volunteers

Community River Monitoring volunteers have been collating data on sediment movement and blockages on Hillfoot burns from 9th August to 7th December 2016 in the form of photographs and written data.

This report presents the data on sediment inspection location points at:

• Tillicoultry Burn Confluence with River Devon



Alva Burn at A91 Road Bridge





• Dollar Burn water race and beneath Mixed Leisure Route Bridge to the South



Each of the above locations has its own section in the report and includes information on:

- A general description of the type of sub-catchments (previous and current agricultural uses for example) involved
- A series of time stamped photos and an idea of weather conditions relevant to each photo, prior to and on the day itself, for the study period, so any movement of sediment can be related to weather / rainfall to a degree
- A summation of the thoughts of volunteers themselves re about what they saw in the burns throughout the period. Points of interest on possible erosion at, or near, crossings points and the movement of other (e.g.) woody debris as well as sediments and any other opinions re flood risk potential emanating from the burn/s











Catchment Description

A general description of the type of sub-catchments (previous and current agricultural uses for example) involved. The following is a PDF excerpt from one of Clackmannanshire Councils commissioned FRA's (2009 Flood Warning Report).

1.2 Catchment description

The River Devon rises on Blairdenon Hill (631 mAOD) in the Ochils and flows east and south east through Glendevon before taking a sharp turn to the south west at the Crook of Devon. The river then continues westwards along the foot of the Ochil Hills to its confluence with the River Forth, west of Alloa. The River Devon has a catchment area (to Cambus weir) of 198.8 km².

The Ochil Hills are part of a Devonian lava extrusion, the southern face of the hills forming an escarpment as a result of the Ochil fault. The plateau is undulating, the highest point being Ben Cleuch (721 mAOD). The fast-responding, south-flowing burns have cut deep ravines in the hillsides, with the hillfoot towns of Tillicoultry, Alva, and Menstrie (originally mill towns), largely situated on their alluvial fans. There is risk of flooding in some urban areas both from the River Devon and from its tributaries.

The upper Devon catchment is predominantly moorland, and contains a number of small reservoirs (operated by Scottish Water). The upper reaches of the River Devon are relatively quick to respond to rainfall, with a time to peak of approximately 3-4 hours at Castlehill gauging station, directly downstream of Castlehill reservoir. There is little floodplain in the upper reaches of the River Devon, however the reservoirs can provide some attenuation. This is particularly noticeable in the summer months, when reservoirs may be part full. Downstream of the Crook of Devon, the river cuts a deep, narrow ravine in agglomerate bedrock. There are a series of waterfalls within the gorge, as the river drops 75 metres in 2 kilometres.

The lower catchment is very different in character, comprising a mixture of arable and pasture farmland and a number of small towns: Dollar; Tillicoultry; Alva and Menstrie – the hillfoot towns. The river meanders through agricultural land and there is significant floodplain which can result in

flow attenuation. The flow travel time between Castlehill and the hillfoot towns of Dollar; Tillicoultry; Alva and Menstrie is of the order of several hours. The standard percentage runoff (SPR) for the River Devon catchment is around 41%.

A number of small, Ochil Hill tributaries enter the River Devon in its lower reaches. The tributary catchments mainly consist of moorland, with a few forested areas. Figure 1 (see back of report) illustrates land use within the catchment².

The River Forth is tidally influenced at its confluence with the River Devon. Both tides and high flows in the River Forth can influence water levels in the downstream reaches of the River Devon. Ten properties within Cambus, south of Cambus weir, are within the SEPA 200 year tidal flood extent map. Where extreme tides coincide with high flows in the River Forth, this downstream influence on water levels may extend further upstream along the River Devon.



Volunteer Data Recorded for Sediment Movement and Blockages on Hillfoots Burns

In this section of the report we present the volunteer data recorded for sediment movement and blockages on Hillfoots burns from 9th August to 7th December 2016 in the form of photographs and written data on the three sites monitored.

Please click this link: <u>https://owncloud.tcv.org.uk/index.php/s/IWQ9IkU9BVMffdh</u> to be redirected to ownCloud to view all the hardcopies of photographs and recording sheets.

Tillicoultry Burn Confluence with River Devon

One set of data for - 15th September 2016





Survey details

Date: 15th September 2016

Time: 12pm

Location: Tillicoultry Burn confluence with River Devon

Current weather observed on site: dull, cloudy and mild

Rainfall (mm/hour) for today: 00.8mm

Rainfall (mm/hour) day prior: 02.3mm

- River medium flow of water since recent showers of rain yesterday
- Wooden debris and vegetation (medium branches) build up and boulders exposed. No visible sediment blockages. Noted visible boulders and will note of any changes in movement or new boulders appearing













Alva Burn at A91 Road Bridge

14 sets of data from 9th August to 7th December 2016

9th August 2016







Survey details

Date: 9th August 2016

Time: 10:35 am

Location: Alva Burn A91 Road Bridge

Current weather observed on site: cloudy, overcast with a moderate breeze

Rainfall (mm/hour) for today: 02.7mm

Rainfall (mm/hour) day prior: 01.9mm

- Moderate water flow
- Several large boulders with some litter and various small branches trapped behind
- Some torn up weeds on a rock near the bridge
- No significant blockages or high water levels













14th August 2016







Survey details

Date: 14th August 2016

Time: 11 am

Location: Alva Burn A91 Road Bridge

Current weather observed on site: overcast

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 00.0mm

- Some small branches
- Small amount of litter
- No significant blockages or high water levels











Clackmannanshire Council



16th September 2016







Survey details

Date: 16th September 2016

Time: 2 pm

Location: Alva Burn A91 Road Bridge

Current weather observed on site: sunny, light clouds and moderate breeze

Rainfall (mm/hour) for today: 00.2mm

Rainfall (mm/hour) day prior: 00.8mm

- Moderate to fast water flow
- Several large boulders with some small branches trapped behind
- No significant blockages or high water levels
- 3 or more pieces of branch debris under the road bridge (approx. 4' length)
- One golf ball and one metal object (3' long) in the water (additional photos taken below)















20th September 2016







Survey details

Date: 20th September 2016

Time: 2 pm

Location: Alva Burn A91 Road Bridge

Current weather observed on site: clear sunny day

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 00.0mm

- Some small branches
- Minimal litter apart from football
- No significant blockages or high water levels











Clackmannanshire



21st September 2016







Survey details

Date: 21st September 2016

Time: 1:25 pm

Location: Alva Burn A91 Road Bridge

Current weather observed on site: dry, clear sky with patchy cloud and warm

Rainfall (mm/hour) for today: 08.0mm

Rainfall (mm/hour) day prior: 03.8mm

- Free flowing
- Medium flow
- Small branches debris
- Plastic bag
- 1 small cardboard box
- 1 white and blue plastic bag
- No sediment build up













25th September 2016







Survey details

Date: 25th September 2016

Time: 3 pm

Location: Alva Burn A91 Road Bridge

Current weather observed on site: sunny spells but cloudy and a cold wind

Rainfall (mm/hour) for today: 00.2mm

Rainfall (mm/hour) day prior: 13.4mm (heavy persistent rain)

- Free flowing
- No sediment build up
- Medium flow
- Plastic blind
- Small branches debris











Clackmannanshire



29th September 2016



Survey details

Date: 29th September 2016

Time: 10:47 am

Location: Alva Burn A91 Road Bridge

Current weather observed on site: sunny, mild and dry

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 03.8mm (heavy persistent rain)

- Free flowing
- No sediment build up
- Medium flow
- Plastic blind still lodged
- Small branches debris



2









5th October 2016







Survey details

Date: 5th October 2016

Time: 9:35 am

Location: Alva Burn A91 Road Bridge

Current weather observed on site: cloudy, dry, breezy and slight chill

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 00.0mm

- Free flowing
- Medium flow
- No build-up of sediment
- Small wooden branches behind rock and small flat wooden board
- 1 small plastic bottle
- 1 blind, plastic bag attached to it



Ş.







Clackmannanshire



29th October 2016







Survey details

Date: 29th October 2016

Time: 11 am

Location: Alva Burn A91 Road Bridge

Current weather observed on site: overcast

Rainfall (mm/hour) for today: 00.2mm

Rainfall (mm/hour) day prior: 00.0mm

- Small branches lodged behind rocks, more noted than previously
- Paint pot under the bridge



2 9







Clackmannanshire



30th October 2016







Survey details

Date: 30th October 2016

Time: 3:30 pm

Location: Alva Burn A91 Road Bridge

Current weather observed on site: sunny, light clouds and moderate breeze

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 00.2mm

- Moderate water flow
- Several large boulders with some small branches trapped behind and lots of fallen leaves
- No significant blockages beyond the leaves, no high water levels
- No visible branches under the road bridge, but lots of leaves and a paint pot under the bridge
- Metal object (3' long) still present with two plastic bags (one white, one white with black spots)
- Other rocks now have a black bin liner and a plastic bag trapped
- Far bank (near fuchsia bush) has two bottles and soft drinks can













16th November 2016







Survey details

Date: 16th November 2016

Time: 9:30 am

Location: Alva Burn A91 Road Bridge

Current weather observed on site: cloudy, raining and cold

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 00.0mm

- Free flowing of water
- Minimum flow
- No build up of sediment
- Blind fitting plastic bag attached
- Small wooden branches













23rd November 2016





Survey details

Date: 23rd November 2016

Time: 9:22 am

Location: Alva Burn A91 Road Bridge

Current weather observed on site: bright and frosty

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 00.0mm

- Free flowing of water
- Medium flow
- No build up of sediment
- Blind fitting plastic bag attached
- Build up of leaves
- Plastic bottle
- Small pile of wood













29th November 2016







Survey details

Date: 29th November 2016

Time: 12:54 pm

Location: Alva Burn A91 Road Bridge

Current weather observed on site: cloudy, cold and dry

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 00.0mm

- Free flowing of water
- Low flow
- No build up of sediment
- Blind fitting plastic bag attached
- Small wooden branches
- Small piles of leaves build up
- 1 plastic bag rapped round rock



S.







Clackmannanshire



7th December 2016







Survey details

Date: 7th December 2016

Time: 10:57 am

Location: Alva Burn A91 Road Bridge

Current weather observed on site: cloudy, mild and dry

Rainfall (mm/hour) for today: 00.0mm

Rainfall (mm/hour) day prior: 00.0mm

- Free flowing of water
- Medium flow
- No build up of sediment visible
- Blind fitting with plastic bag attached
- Small wooden branches with one yellow 5 litre container attached
- 1 small metal plate
- 1 larger pile of leaves and twigs



Dollar Burn water race and beneath Mixed Leisure Route Bridge to the South

6 sets of data from 4th August to 3rd December 2016 - please note that there are many data sets with no photographs due to the volunteer only having limited access to take photographs.

4th August 2016



Survey details

Date: 4th August 2016

Time: 4:30 pm

Location: Dollar Burn water race + beneath Mixed Leisure Route Bridge to the South

Current weather observed on site: clear dry day

Rainfall (mm/hour) for today: 00.4mm

Rainfall (mm/hour) day prior: 22.5mm

- River fast flow of water since recent heavy rain. No visible rocks, debris
- Again no visible sediments/rocks/debris. Very fast flow
- Metal rail not visible due to flow of water. Large boulder at bottom of picture shows depth of river very little debris to normal











Clackmannanshire



7th August 2016



Survey details

Date: 7thth August 2016

Time: 12 pm

Location: Dollar Burn water race + beneath Mixed Leisure Route Bridge to the South

Current weather observed on site: clear dry day

Rainfall (mm/hour) for today: 01.7mm

Rainfall (mm/hour) day prior: 05.2.5mm

- Weir and fish ladder are clear from debris
- Tide of water passing over both
- Underneath the bridge potential blockage from wooden door and large wooden branch not moving

Scotland Counts







Clackmannanshire Council



Date:	31 st August 2016	2 nd October 2016	5 th November 2016	3 rd December 2016
Time:	9 am	11:30 am	9:30 am	10:45 am
Location:	Dollar Burn Water Race and beneath MLR bridge to the South	Dollar Burn Water Race and beneath MLR bridge to the South	Dollar Burn Water Race and beneath MLR bridge to the South	Dollar Burn Water Race and beneath MLR bridge to the South
Current weather observed on site:	Dull, overcast. Occasional glimpse of the sun	Clear skies, slight breeze, and no rain	Clear sky. Temperature 4 degrees Celsius	Cloudy but dry
Rainfall (mm/hour) for today:	01.7mm (small amount of rain fell in the night)	00.0mm	00.2mm	00.0mm
Rainfall (mm/hour) day prior:	00.0mm	00.2mm (rained for 15 minutes)	00.0mm	<mark>00.0mm</mark>
Written description of volunteer observations:	 Water race clear of obstruction but a large wooden – of a pallet (4'x3') is wedged on the underside of the bridge Unsightly but does not obstruct the flow of water at present but should be removed asap No movement of boulders or sediment. The current is too strong over the weir race 	 The burn is flowing freely, with no obstructions, apart from the door/packing case (wooden pallet) wedged under the bridge, previously reported. No obvious movement of fish on the fish ladder 	 Collection of leaves on by steps, but fish ladder clear. Large leaf collection expected in the next few days in water race The side of the wooden crate has not yet been removed by the council No other blockages – a good flow of water 	 A strong flow on the burn and fish ladder No major obstructions apart from the broken door photographed and previously reported Leaf litter expected next time













Conclusion

The project has been very positive, inclusive and well received from the local community and Clackmannanshire Council has embraced the opportunity to jointly work together. We have 10 dedicated volunteers from the local community photographing burns and completing recording sheets to monitor sediment chokes and blockages from their chosen vantage points on a regular fortnightly/monthly basis. From our volunteer efforts we have data sets and photographs of the above burns. The volunteers have generated useful data for the Council and at the same time fulfilled the needs, interests and abilities of volunteers.

We will continue to work with the existing Community River Monitoring group. We will explore opportunities to expand our project and discuss longer term projects with the existing volunteers to further up skill volunteers and progress them to record more valuable data. The aim is to continue to increase volunteers' knowledge about the watercourse environment, flood risk management and the need for improved Community Resilience and partnership working more generally across organisations.

Overall the project is proving successful, hugely valuable and enjoyable. Feedback from the volunteers states that they have enjoyed taking part in this project and feel that they have made an active contribution to flood management in the local area where flooding is prone to occur and feel as a result of taking part the flood risk benefits of the survey is early intervention to help prevent localised flooding. The project has increased volunteer knowledge of Flood Risk Management (FRM) issues but also to encourage establishments of links between volunteer groups and the Clackmannanshire Council's FRM staff.

On the whole the project has had many successes, lots of enthusiasm and saw the value of Citizen Science especially in the context of raising awareness of flood risk. Volunteers from the villages of Alva, Tillicoultry and Dollar have benefitted from being involved and developed confidence and skills of FRM issues.



References

Gura, T. (2013) Amateur experts. Nature 496 (11 April): 259–261.

Clackmannanshire Council commissioned FRA's (2009 Flood Warning Report)