SMALL STREAMS CHARACTERISATION SYSTEM

Training Course

Time table for training course

This one and half day training course will involve:

Day 1:

- Morning - a power point presentation (inside)
- Afternoon - learning how to take and sort out invertebrate samples (outside)

Day 2:

- Morning – aquatic weed identification and invertebrate sampling and scoring (outside) and assessment

Small Streams Characterisation System

Following various conferences and workshops it was identified that care and attention was urgently required for many smaller water courses as they were not being properly protected by the formal systems in place.

So the Small Stream Characterisation System was developed to allow a wide range of interested volunteers to get involved in understanding the health of small streams.

What is a small stream and why care about them?

- Not a clear definition but typically under 3 metres wide.
- Can make up a significant part of an overall catchment (>75%)
- Are often very important for fish for spawning and juvenile nursery areas.
- Can be particularly vulnerable from pollution, stock overgrazing and dredging.
- Are often overlooked in formally monitored programmes and thus not protected adequately by legislation.

The role of Citizens Science in this project

- Volunteers are key in the successful delivery of the project.

- Definition of Citizen Science: ‘the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists’

- Lets work and learn together!

Data collection

This project involves the collection of a range of data. You will learn about:

- How to collect a sample of aquatic invertebrates.
- How to identify the invertebrates you have caught.
- How to identify aquatic weeds
- How to consider the passability of a potential barrier to fish migration.

Once you have collected the data you will then analyse it to allow you to understand the health of the small stream you have sampled.

Health and Safety

It is very important that everyone involved in the project considers their own health and safety (and others) at all times.

This includes travelling to the sampling site, getting in and out of the water courses, undertaking the sampling and even when looking through the samples.

It is desirable to have at least one member of the sampling team trained in first aid.

Health and Safety

It is important that RISK ASSESSMENTS are used. For each ‘activity’ to be undertaken it is important to identify any potential ‘risks’ and then consider control measures which will be adequate to protect everyone.

Discuss as a group the appropriate safety equipment and clothing (PPE) that you all feel is required for the planned field work for tomorrow.

Health and Safety

PRACTICAL

You will all now be given a blank Risk Assessment sheet to fill in for a fictitious sampling scenario – details from the trainer!

Biosecurity

When sampling on more than one water course, it is important to be aware of the risks of transferring disease and invasive species on your clothing and equipment. The introduction of some invasive species could decimate the receiving water and could be illegal.

Biosecurity refers to measures that are taken to stop the spread or introduction of harmful organisms.

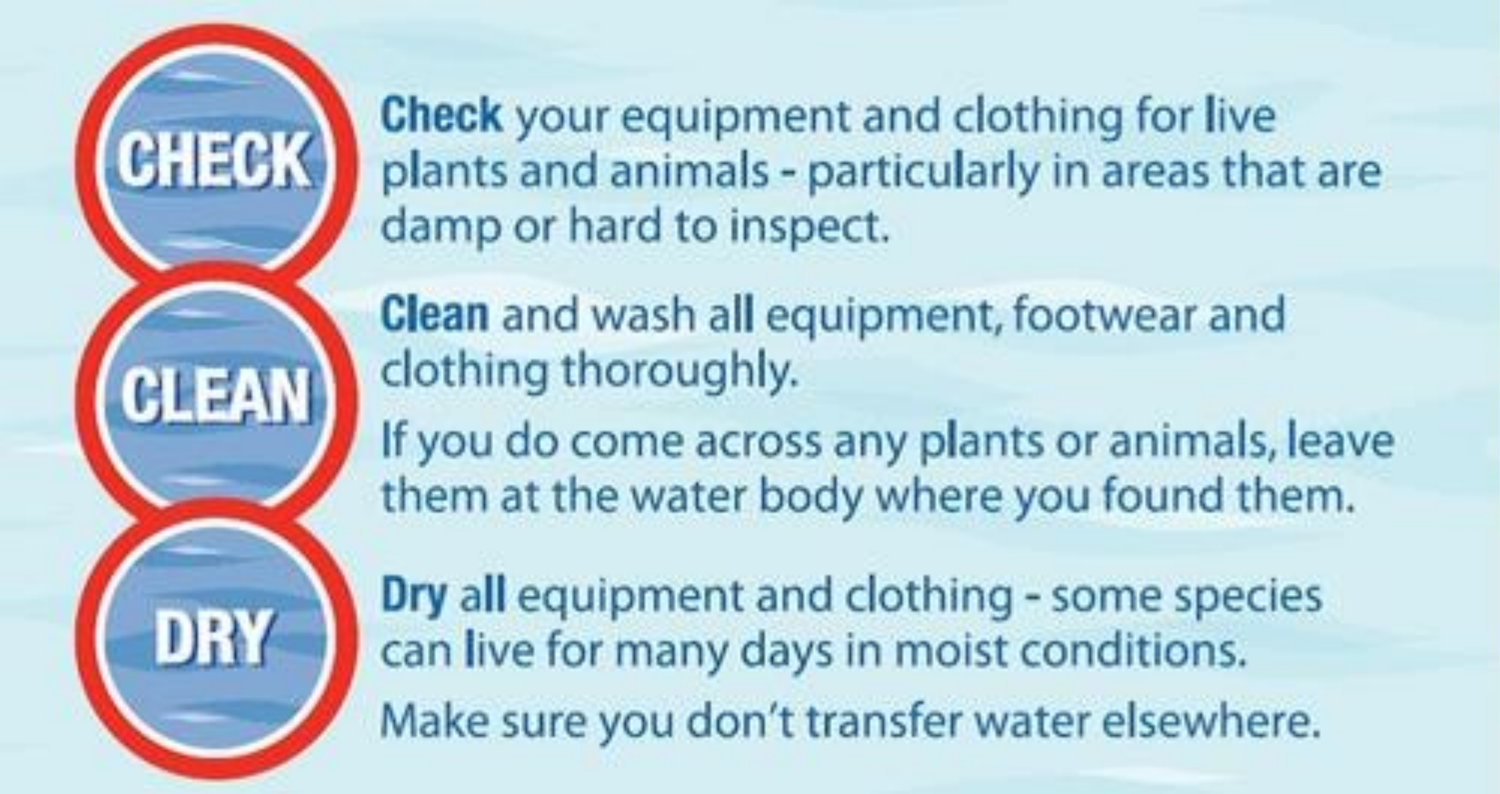
Invasive Non-Native Species (INNS)

Below are listed some of the types of non native species to be aware of. There are many so it is best to undertake biosecurity measures always to be safe.

Plant species – some non-native plant species will out compete all other plants and can block water ways.

Invertebrate species – some non-native invertebrate species will prey heavily on native species and modify habitats such as killer shrimp or North American signal crayfish.

Check Clean Dry



Always use the Check Clean Dry protocol. For more information see:

www.nonnativespecies.org/checkcleandry/

Survey – getting started

It is important that the sampling strategy is clearly understood by all parties. The locations of sampling sites will be important depending on what questions are to be answered. Page 35 / 36 in the training manual describes a possible scenario.

What permissions are required for the sampling?

Survey equipment

On page 8 of the manual there is a list of the survey equipment you will need to undertake the field sampling.

We will now go through each of the items listed and discuss what they will be used for.

It is also important to consider the maintenance and storage of these items.

Survey sheets

It is very important when collecting field data that standardised data recording sheets are always used to ensure data is recorded always in a similar format by all surveyors, otherwise future comparison between sites and within the site will not be possible.

site location / characteristics sheet

This sheet is detailed on pages 10 and 11 of the manual. It is important that these sheets are completed at each sampling site before you undertake the sampling.

You will all now receive a copy of this sheet and we will discuss the definitions to allow you to fill in the sheet in the future.

site location / characteristics sheet - discuss

1. Where Are You Sampling?

Stream or River Name:	
Description of Sampling Site:	
Location (Lat/Long, OS Map Grid Ref, GPS, Postcode):	
Date and Time of Sampling:	
Names of Samplers:	

2. Describe the Stream and its Surroundings

Width of Channel when Full (m):	
Current Wet Width (m):	
Average Depth at Sample Site (cm):	NNS S

IT IS IMPORTANT TO BE ABLE TO ACCURATELY RECORD THE LOCATION OF THE SAMPLING SITE USING GPS AND READING GRID REFERENCES FROM A MAP.

site location / characteristics sheet - discuss

Principal Type of Substratum Sampled: Ring the Boxes that Apply to the Site
(+ = Present; ++ = Moderate; +++ = Dominant.)

Cobble/ Large Stones	+	++	+++		Degree of Siltation: (Is silt released when you take a kick sample?)			
Gravel	+	++	+++		Clean	Slight	Moderate	Heavy
Sand	+	++	+++					
Silt or Mud	+	++	+++					

Depth of Mud on Bottom:

No Mud:	<1 cm:	1–5 cm:	5–10 cm:	>10 cm

Do Cattle or other Farm Animals have access to the stream?

Full Access (no fencing)	Semi-Controlled Drinking Point	No Animal Access
Comment:		

site location / characteristics sheet - discuss

Which of these describe the land next to the stream bank – circle all that apply

	Present	**Moderate**	**Abundant**
Grassland	+	++	+++
Tillage Crops	+	++	+++
Urban	+	++	+++
Forest	+	++	+++
Bog/Heath/Moorland	+	++	+++
Other (describe)			

(Circle one of the +, ++, +++ (present, moderate, abundant) boxes in one or more of the panels to indicate the dominant land uses – leave blank if not applicable.)

site location / characteristics sheet - discuss

(Circle one of the +, ++, +++ (present, moderate, abundant) boxes in one or more of the panels to indicate the dominant land uses – leave blank if not applicable.)

What is an aquatic invertebrate?

Aquatic invertebrates are small animals (without back bones), such as insects, crustaceans, molluscs, and worms that live in water. Most invertebrates are found living in the stream bottom among the rocks and gravel.

They are useful indicators of the health of water bodies as:

- they are commonly and widely found in water courses.
- they respond with a range of sensitivities to many kinds of pollution.
- as many aquatic invertebrates complete their life cycles in water, there presence signals that conditions have remained healthy for the duration of their lifecycle.

Undertaking a kick sampling

Sampling of the stream invertebrates is done using a pond net.

The net is held into the flow facing upstream while the operator disturbs the stones and cobbles immediately in front of the open net with his or her foot.

The current washes the macroinvertebrates into the net.

3 minute sample is usually adequate.

Sample is then placed onto a tray and cleaned of detritus and sand/gravel by decanting a number of times through the net or using a bucket to allow active cleaning of mosses and leaf material.

THE TRAINER WILL DEMONSTRATE HOW TO TAKE A SAMPLE

Key invertebrate groups to identify

The SSCS is based on five key groups of invertebrates – most are insects but snails, worms and the water louse are also included. The five groups are:

- Mayflies or up-wing flies
- Stoneflies
- Caddis flies
- GOLD+ a group that includes snails, worms and true fly larvae (diptera) plus flatworms and leeches
- Asellus (the water louse)

You will need to be able to identify these main groups.

How the system works

The principle behind the system is that some species are very sensitive to pollution while others are quite tolerant.

The scoring system used by the SSCS ranges from 0 to 32. The score is calculated very simply and depends on the number of types within each group and also how abundant they are within the groups.

YOU WILL NOW RECEIVE COPIES OF IDENTIFICATION KEYS FROM THE TRAINER

Do not count:

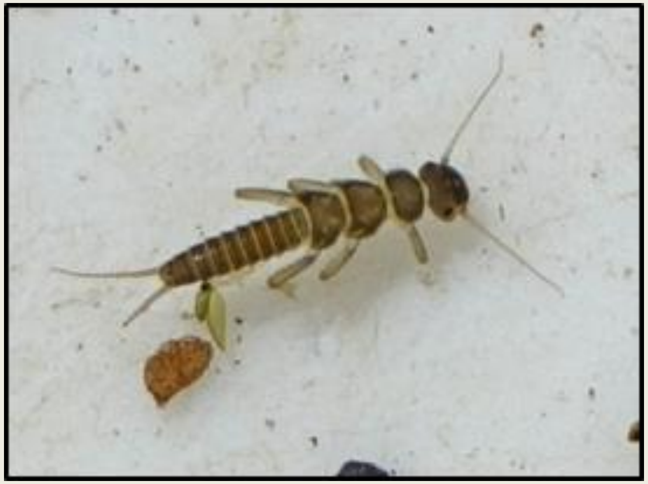
The scoring system deliberately omits the two most commonly found and most abundant macroinvertebrates – the Baetis family (known as olives to anglers) and Gammarus (shrimp) which are found in most waters. Beetles are also omitted.

Group 1:

Mayflies – 3-Tails

Group 2:

Stoneflies (Plecoptera) – 2-Tails



Distinguishing the different stonefly types can be perplexing enough. The most important thing to remember is to simply count the NUMBER of different types that you can distinguish and give a rough indication of the abundance of each one. The score will be calculated correctly.

Group 3:

Caddis Flies – (Trichoptera) Cased and Caseless

Group 4:

GOLD + Gastropods, Oligochaetes, Diptera + Leeches and Flatworms

Group 5:

Asellus

It is important to record its absence, as a site without any Asellus is automatically awarded 6 points of the total score.

Calculating the SSCS score

We will now calculate a SSCS score using some pre-collected data. Blank data sheets / flow chart will be provided to you all.

Use the data to calculate a score using the Manual Calculation Method.

Finally we will use the same data to calculate a score together using the Spreadsheet Method.

The score is compared with the cut-off values – less than 18 it is likely that the stream is polluted. If greater than 19 the stream is not at risk. Scores of 18 and 19 are indeterminate.

Aquatic plants

After undertaking the invertebrate sampling it would be useful to undertake an assessment of the aquatic plants present. This can provide useful information e.g.

- Filamentous algae are probably the most useful indicator of enriched conditions.
- Excessive amounts of filamentous algae indicate too much phosphate and nitrate in the system.
- Over-abundance of submerged plant biomass leads to oxygen stress at night (when photosynthesis stops, carbon dioxide is released and respiration continues using up oxygen from the water).

Aquatic plant survey

Surveyors should record three broad types of aquatic plants growing in the stream:

1. Mosses and Liverworts
2. Filamentous Algae
3. Flowering Plants

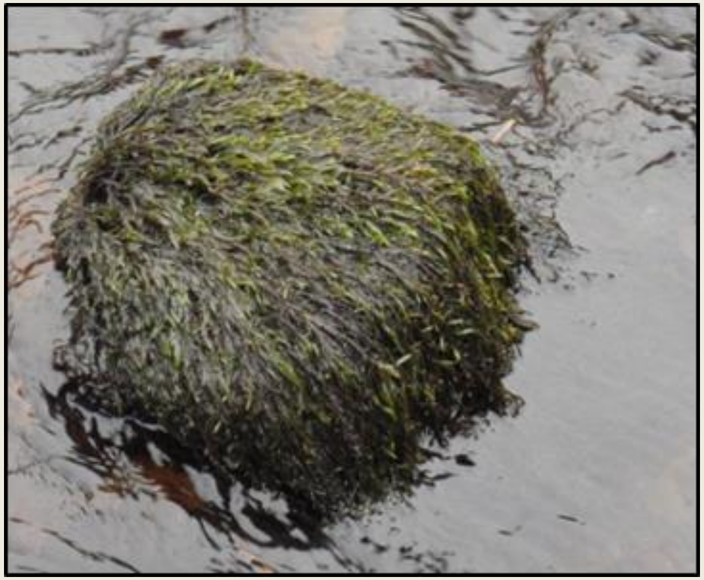
Do not distinguish between the different species.

Only record instream plants

For mosses, liverworts and higher plants record the abundance of submerged types separately to those that emerge above the water surface.

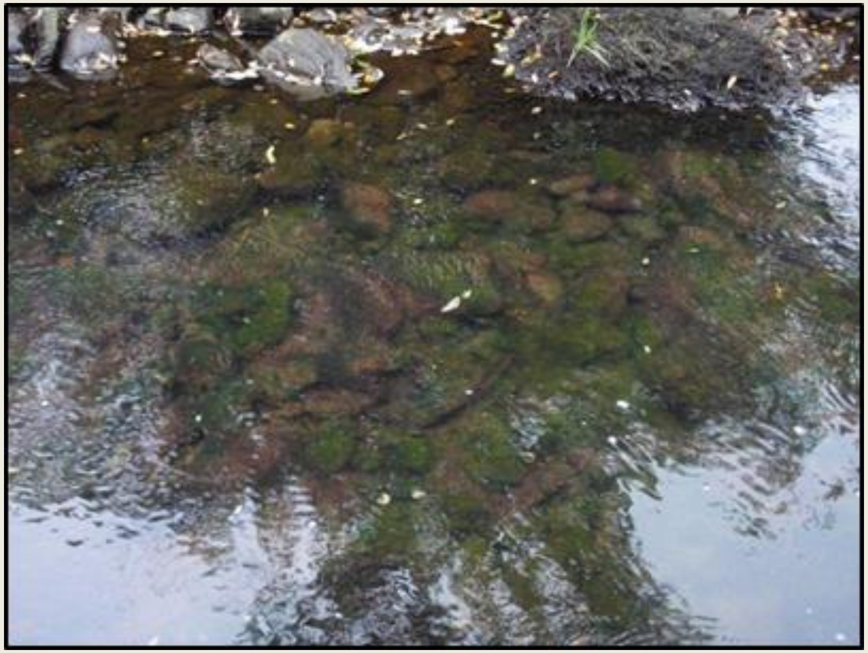
Aquatic plant survey

Mosses and Liverworts



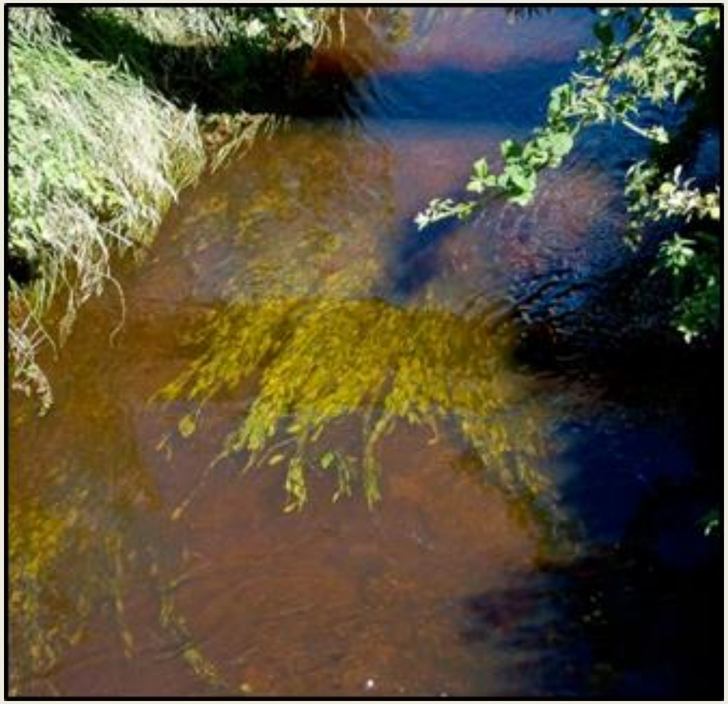
Aquatic plant survey

Filamentous Algae



Aquatic plant survey

Flowering Plants



Aquatic plant survey recording

Mosses and Liverworts

		Present	Moderate	Abundant
Mosses and Liverworts below water surface	Not Observed	+	++	+++
Mosses and Liverworts above water surface	Not Observed	+	++	+++

Filamentous Algae

		Present	Moderate	Abundant
Filamentous Algae	Not Observed	+	++	+++

Higher Plants (Flowering Plants)

		Present	Moderate	Abundant
Higher Plants emerging out of the water	Not Observed	+	++	+++
Higher Plants submerged beneath surface of stream	Not Observed	+	++	+++

(Circle one of the not observed, +, ++, +++ (not present, present, moderate, abundant) boxes in one or more of the panels to indicate the plant type present.)

Hydromorphology: Estimating the Potential to Block Fish Passage

Most fish species migrate during their life time. Fish may travel long distances and will strive to spawn in streams and rivers. Structures which may block their migration routes will influence what fish are present. A lack of fish may suggest an obstruction problem. A walkover survey can be easily undertaken to locate and describe any structures that are present.

Small streams may contain many fish species including European eels, brown trout (resident and migratory forms), juvenile lamprey species and Atlantic salmon.

Types of blockages

Potential fish barriers can be described as either natural (such as water falls) or man-made (such as culverts, raised bridge sills or high weirs). If they are natural then they should be left alone but man-made fish barriers should be considered for removal or modification to allow fish access past them. Modifying man-made barriers can be extremely expensive.

What to record at blockages

- Velocity and Depth are critical. Adult trout should have a minimum of 10 cm depth and velocities should be less than 2 metres per second (2 m/s).
- The flow pattern across the floor / base of a culvert as fish find it difficult to swim against strong, laminar flows.
- Vertical drops, long slopes or stepped structures and the width of gaps in barriers

Maximum Depth	**Minimum Velocity**		
	>3m/s	2-3m/s	<2m/s
<5 cm	X	X	X
5-10 cm	X	?	?
>10 cm	X	√	√

X	Impassable to fish
√	Passable to fish
?	Potential barrier

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<5 cm	X	X	X
5-10 cm	X	?	?
>10 cm	X	√	√

X	Impassable to fish
√	Passable to fish
?	Potential barrier

Discuss filling in the barrier recording sheet

Grid Reference / Location of Barrier (must be filled in)		
Man-made or Natural Barrier?		
Barrier Type:		Measurement
Weir/Dam or Sluice across full width of stream from bank to bank? **Is there a fish pass present?** **Have fish free access to it?** **Is the fish pass free of debris / other blockages?** **Is there a natural barrier in place?** **Does this adversely affect the upstream migration of adults?**	Height of weir from upper water surface to lower stream surface or downstream pool:	
Sloping or stepped weir or other structure	Length of Slope:	
Stream velocity	Water velocity at slowest flow point on stream cross-section. Too fast for fish passage?	______ (m/s) Yes / No
Maximum stream depth		<5 cm – 5-10 cm – >10 cm
Culvert with significant drop below it? **Does the culvert create a dark passageway, without light?**	Height of culvert 'lip' above water:	Yes / No If Yes:_______(m) Yes / No
Accumulated debris dams, e.g. at culverts	Likely to Block Fish passage?	Yes / No
Fords or groynes narrowing stream?	Width of Widest Gap:	__________ (m)
Shape of Culvert	Round Pipe / Rectangular opening	
Fallen Trees/ Landslides?		
Photo(s) Taken		Yes / No
Other Potential Barriers:		

Time table for training course

This one and half day training course will involve:

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- Morning – aquatic weed identification and invertebrate sampling and scoring (outside) and assessment