Tasmania

Habitats sampled

In Tasmania, models have been created for both **Riffle** and **Edge** habitats. The reach is defined as 100m of stream length and within the stream only. Areas of riffle and edge habitats that are representative of the reach should be chosen for sampling.

The riffle habitat is one of flowing broken water over gravel, pebble, cobble or boulder, with a depth greater than 10 cm.

The edge habitat consists of slow flowing or still waters adjacent to the bank, preferably with overhanging or emergent vegetation, undercut banks, root mats or other suitable habitat providing cover and refuge for macroinvertebrates.

Habitat Assessment

The steps to follow for assessing habitat at sites sampled in Tasmania are outlined in the following section. The habitat assessment form used for Tasmania can be found in Section 4.62.

Water samples and basic water measurements
The water sample and basic water measurements are the first measurements to be collected. Water samples are collected by facing upstream, rinsing the bottle three times and then submerging the bottle until 3/4 full. Samples are placed on ice and frozen if the water is not analysed immediately for Alkalinity, NO3, NO2+NO3, NH3, Total Nitrogen (TN), PO4 and Total Phosphorus (TP).

Field sampling sheet (Section 4.62)
It is essential that all variables on the data sheet are recorded. Missing data may prevent the testing of a site. An explanation of the variables on the field data sheet follows:

Date and Time: Must be written on all sheets

Personnel: Persons involved in the collection and live picking of macroinvertebrates and habitat assessment must be recorded on the datasheet

Location Code:

Location: e.g. Ouse River above lake Augusta

Weather:

Air Temp:

Cloud cover: Estimate percent cloud cover over the region of the site.

Rain last week ?: was there rain in the catchment in the last week before sampling.

Sampling Conditions: Sampling conditions can be affected by high or low flows, deep pools, or substrate that is difficult to sample e.g.bedrock.

Picking conditions: Picking conditions can be affected by poor weather and/ or low light conditions. If picking conditions are unsuitable, the sample should be live picked back at the work base.

Habitat Assessment

In-stream visual estimates for the riffle and edge are taken to characterize the 10m sampling areas. Instream substratum characteristics are essential for providing habitat and food sources for macroinvertebrates.

Substrate description: Percent composition of river bed surface and sub-surface substratum in riffle and edge habitats. Must total 100 %.

Organic substratum: Percent cover of algae, detritus, silt, and moss on river substrata in each habitat

Photo No.: At least one colour photo should be taken at each site sampled for the site information sheets, to aid location of the site at for subsequent sampling and to aid data interpretation.

Depth measurement: Three measurements of depth are taken at each of the riffle and edge habitats, and the average is recorded on the datasheet.

Site information sheet

Vegetation

The area from which the following observations are taken, the reach, is approximately 100m.

Overhanging Vegetation: The shading of the stream from riparian vegetation estimated from a plan view of the reach.

Trailing Bank Vegetation: Area of the bank vegetation trailing in the stream.

Riparian Vegetation: The riparian zone is the area from the waters edge to a distance from the bank where the stream interacts with and influences the type and density of bankside vegetation.

Width of riparian zone: left and right bank measurements (facing upstream) - may be measured or estimated. It is preferable to measure distances at a number of sites until estimates can be made with accuracy.

Composition: Percent native and exotic vegetation must total 100 %.

Exotic Species: Note presence of any exotic species.

Land Use: Note the land use on either side of the reach

Erosion: Erosion in the surrounding catchment Evident from gully erosion, sheet erosion, river bank erosion etc.

Dams/Weirs: Examine local area within one kilometre upstream and downstream of the site.

Pollution: Potential or obvious pollution e.g. livestock grazing, crop fertilizing

Habitat Diversity: Estimate the riffle, run and pool area over 100m of stream length The total riffle, run, and pool area in a stream should equal 100 %.

Riffle: riffle habitat is one of flowing broken water over gravel, pebble, cobble or boulder, with a depth greater than 10 cm.

Run: flowing relatively unbroken water not classified as a riffle.

Pool: deeper sections of very slow flowing or not flowing water.

Stream Widths: measure/estimate from edges of water. Take three measurements or estimates of stream width along the reach (at 50 and 100m) and calculate the mean. Estimates are acceptable where measurements cannot be made.

Bank width: measured from top of one bank to top of the other bank, an estimated average for the reach.

Bank height: from water level to top of bank, an estimated average for the reach.

Coarse Woody Debris: Coarse woody debris is often a key structural component of streams, providing both food and habitat for macroinvertebrates. Estimate the proportion of coarse woody debris in the 100m reach

Aquatic Plants: Estimate the proportion of the 100m reach covered by aquatic plants and note whether they are emergent, submerged or floating.

Disturbance: Circle the most accurate description of the state of the stream and surrounding vegetation.

Physical Parameters: Water measurements of temperature, conductivity, ph, dissolved oxygen and turbidity are taken using the respective multimeters placed upstream of the operator.

Map Based Data: Northing, Easting, Distance from source, Elevation, Stream class, Bedslope and Catchment area are to be measured for each site from the relevant 1:25000 or 1:100000 scale maps.

Access sketch: The directions and sketch of the access route are essential for locating the site for sampling at later dates. The sketch should also include the sequence of riffles, runs and pools, riffle and edgewater sampling locations, direction of flow and any other relevant details If keys, landowner's permission or permits are required to access the site then this should be indicated on the sheet.

Bottom substratum/available cover: Assess the amount of substratum available as macroinvertebrate habitat e.g. pebble, gravel, cobble, boulder, logs, undercut banks. Choose category and circle appropriate score within the category.

Embeddedness: Assess how embedded gravel, cobble and boulders are. Choose category and circle appropriate score within the category. Excellent embeddedness category is defined as minimal fine sediment around substratum that may block cover and refuge for macroinvertebrates under the substratum.

Velocity/depth category: Assess how many velocity/depth categories are present - slow deep (<0.3 ms^{-1}, >0.5 m), slow shallow, fast deep, fast shallow. Choose category and circle appropriate score within the category.

Channel alteration: Choose category and circle appropriate score within the category.

Bottom scouring and deposition: an assessment of substratum stability. Larger substratum (larger than gravel/pebble) is not subject to scouring and deposition in usual flows. However, smaller substratum (gravel/sand/silt/clay) is subject scouring and deposition. Choose category and circle appropriate score within the category.

Pool/Riffle, run/bend ratio: Choose category and circle appropriate score within the category.

Bank stability: Choose category and circle appropriate score within the category.

Bank vegetative stability: Choose category and circle appropriate score within the category.

Streamside cover: Choose category and circle appropriate score within the category.

Macroinvertebrate Sampling

Riffle Sampling
Samples are taken with a 250 µm mesh kick net with a 280x340 mm opening. Facing downstream, the operator should place the net directly on the substratum in front of the feet and vigorously disturb and dislodge the substratum by kicking and twisting the feet to a depth of approximately 10 cm, slowly moving upstream employing this method. Every 2-3 metres the net should be rinsed to remove fine particles which may be blocking the flow of water through the net. Separate lengths of riffle may be sampled if a continuous 10 metre section is not present. Note total length of riffle sampled if less than 10 metres.

Edge Sampling
Samples are taken with a 250 µm mesh kick net with a 280x340 mm opening. Macroinvertebrates are collected by vigorously sweeping from a distance of approximately one metre from the bank to the bank edge, disturbing the emergent and overhanging vegetation in the water if present. The operator should slowly move upstream for a distance of 10 metres employing this method. Separate lengths of edge habitat may be sampled if a continuous 10 metre section is not present. Note total length of edge sampled if less than 10 metres. The net should be thoroughly rinsed to remove silt, mud, and fine detritus.

Macroinvertebrate sample processing
Macroinvertebrate samples are live picked in the field. The aim of the sampling is to pick all the different taxa that occur in the sample. To do this, the live sorting protocol requires active searching and a sufficient picking effort to 'capture' as many taxa as possible. A target of around 200 animals is being sought. Picking takes between a minimum of 30 min and a maximum of 60 min, as follows:

Sorting Strategy

1. Pick for a **minimum** of 30 min., using tweezers and a hand held counter.

2 At the start, the common, abundant taxa should be picked for about the first 5 mins. After that, the major picking effort should be directed at finding the less common, inconspicuous taxa. After 10 mins no more common taxa should be picked unless it is suspected that a particular common form contains more than one family, or it was a common taxon overlooked initially.

3. After 30 mins. pick for an additional 10 mins if you have less than 200 animals.

4. If in that extra time you do not encounter a new taxon, then cease picking. If at least one new taxon is encountered, pick for a further 10 mins.

5. Complete picking for the current 10 min period. If in that period you encounter at least one new taxon, pick for a further 10 mins. If not, then cease picking.

6. If it is a really poor sample (ie urban trib or sandy stream) with very few animals in total, then stop at 60 min. Make it clear on the field sheet that it was a poor quality site or sample and why that is so. A poor sample may also result from a bad collection eg a sample taken during high flows over areas which were dry a few days before.

7. You are aiming for about 200 animals all up (plus or minus a bit), with maximum diversity. There is no need for large numbers of any single taxon.

   Particular care should be taken to search for the groups that can be commonly missed when live sorting (cryptic taxa) :
   elmid larvae
   oligochaeta
   empididae
   hydroptilidae
   small molluscs
   ceratopogonidae

8. A minimum of 30 chironomids should be picked for every sample, to ensure that the sub-families are represented in the vial.

9. After picking, 10% of the residues are randomly selected and preserved in formalin for QAQC analysis of operator sorting efficiency

10. Macroinvertebrate samples are preserved in 100% alcohol and transferred to the laboratory for identification using the most up to date taxonomic keys available (as recommended by Hawking 1999). Macroinvertebrates are identified to family level with the exception of the following:
    Chironomidae (Subfamily)
    Oligochaeta (Class)
    Hirudinea. (Class)
    Acarina (Order)
    Platyhelminthes (Class)

Macroinvertebrate Quality Control/Quality Assurance procedures

Quality control / quality assurance procedures are designed to establish an acceptable taxonomic standard of macroinvertebrate sorting and identifications. The quality control component is to determine the variation in the level of identifications, and quality assurance provides potential users with the assurance that the accuracy of results is within controlled and acceptable limits.

Sorting

The QA/QC program aims to assess the effectiveness of individual operator sorting procedures using as its basis, comparison of the composition of live-picked samples with associated residues. The MRHI Bioassessment manual states that the aim of the live pick procedure is to ensure that the broadest range of biota are collected at a site. This implies that the taxa list derived from a live pick will encompass more taxa than would be expected if a random sample of animals of equivalent number to the live sort total were drawn from the sample (i.e. 'whole sample estimate')

- Approximately 10% of all riffle and edgewater residues are to be preserved from each sampling round. Half of these (5%)are to be processed so that operator sorting efficiency can be assessed
- Analysis is carried out as per previous external audits conducted by ERISS

QA/QC DATASHEET FOR OPERATOR SORTING EFFICIENCY

Date Collected
Live Picked By
% sorted

No.	EPA Code	A	B	C	D	E	F	G	H	I	J
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
			SUM								
			COUNT								

Legend

A: Live Sort (LS)
B: Residue Fraction
C: Subsample of LS
D: (C) rounded
E: (B)+(D)
F: Subsample of (E)
G: (F) rounded [WSE]
H: (A)+(G) (LS+WSE)
I: (H) normalised to total 100
J:(I) rounded

Bray- Curtis Dissimilarity			
	Rel. Ab	Pres/Abs	LS/WSE
Actual:			
Normalised (100):			

Identification

- Approximately 5% of the samples collected each round are cross-checked by persons with adequate identification experience.
- Samples are selected to cover a broad range of biogeographical regions, habitats and staff.
- A miss-identification error of < 10 % of the total number of animals is deemed acceptable at the Family level. this is the error rate used by the Murray Darling Freshwater Research Centre who conducted external quality control checks of all state agencies
- In all cases, identification problems are to be resolved with additional training of staff. Past samples containing taxa that were found to be misidentified are to be rechecked and, where appropriate, the database updated.

IDENTIFICATION QA/QC DATA SHEET FOR MACROINVERTEBRATE SAMPLES

Site Name:
Site Code:
Date Collected:
Original Identifier:
QA/QC by:
QA/QC Date:

Order	Family	Operator ID	QA/QC
	TOTAL		

Percent New Taxa		**Incorrect ID or Counts**	
Total number of Taxa (a)		Total No. of Organisms (a)	
Number of new taxa (b)		No of organisms incorrectly	
Percent (b/a x 100)		identified/ counted (b)	
		Percent (b/a x 100)	
Pass or Fail? Pass if < 10%		Pass or Fail? Pass if < 10%	

Further Information

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