

Appendix 1 Physical, chemical and habitat variables measured or estimated at each site.

FIELD SAMPLING SHEET

(Version 1.8 March 2000)

DATE TIME LOCATION CODE

RIVER LOCATION

RECORDERS NAME PHOTOGRAPHS Y [] N []

WEATHER AIR TEMPERATURE°C

CLOUD COVER% RAIN IN LAST WEEK ? Y [] N []

MEASUREMENTS:

Length of Reach ¹.....m Bank width²m Bank height³ within reach.....m

Stream Widths⁴ within reach¹ (m) Min..... Max..... Mode.....

Instrument

Water Temperature ⁵ (°C)	.....	Barometric Pressure (millibars)	.....
Conductivity ⁵ (mS cm ⁻¹)	.....	Alk. H ₂ SO ₄ (ml)/H ₂ O (ml)/.....
pH ⁵	.....	Alkalinity (mg l ⁻¹)	.....
Dissolved Oxygen ⁵ (mg l ⁻¹)	.....	NOX (mg l ⁻¹)	.....
% Sat. Dissolved Oxygen ⁵	.....	Total Phosphorus (mg l ⁻¹)	.....
Turbidity ⁵ (NTU)	.....	Total Nitrogen (mg l ⁻¹)	.....

Water sample(s)⁵ taken? yes [] number..... no [] Flow meter fan no.

% habitat in Reach ¹	Depth ⁶ (cm)			<u>mean</u>	Flow ^{6,7} (revs/30sec) / (metres/seconds) ⁸			<u>mean</u>
	1	2	3		U/L	U/L	U/L	
Riffle ⁹/...../...../.....
Pool ⁹/...../...../.....
Run ⁹/...../...../.....

Edge¹⁰/100

M³phyt¹⁰...../100

¹ Within 'reach' :ie. 5 times mode stream width either side of riffle sampling site, unless stream width <5m then the minimum reach length = 50m. ² Distance between tops of banks (top of bank as determined in note 7). ³ Measured from water surface vertical to top of bank (bank-full height). ⁴ Measured from edges of water. ⁵ Measured/sampled from riffle area. ⁶ If depth ≥ 30cm then measure flow at 4/5 depth (U = Upper) & at 1/5 depth (L = Lower); if <30cm, measure at 1/2 depth only. ⁷ Three measurements taken to encompass flow variability within habitats. ⁸ Circle units used to record flow ⁹ Riffle, Pool & Run together must total 100. ¹⁰ Length of both banks as % of reach length that can be effectively sampled with sweep net.

RIPARIAN VEGETATION

Width of riparian zone¹¹: estimated / measured left bank¹²

estimated / measured right bank¹²

Vegetation type :	% Cover of riparian zone ¹³	Description
trees (>10m)
trees (<10m)
shrubs
grasses / ferns / sedges

Vegetation cover of river¹⁴: <5% [] 6-25% [] 26-50% [] 51-75% [] >76% []

Native vegetation¹⁵%

Exotic vegetation¹⁵%

¹¹ Area where waterway interacts with vegetation. ¹² Facing downstream. ¹³ From 'plan' view, estimation of outline cover; may or may not total >100%.

¹⁴ Estimate as if sun directly overhead. ¹⁵ Native & Exotic vegetation together must total 100%.

Appendix 1 Cont.

RIVER	DATE	LOCATION
CODE		

OBSERVATIONS (Circle and indicate appropriate number in box)						
WATER ODOURS:	1. normal	2. sewage	3. petroleum	4. chemical	5. none	[]
WATER OILS:	1. slick	2. sheen	3. globs	4. flecks	5. none	[]
TURBIDITY:	1. clear	2. slight	3. turbid	4. opaque		[]
PLUME:		1. little	2. some	3. lots		[]
<small>(amount of fine sediment generated when kick-sampling)</small>						
SEDIMENT OILS:		1. absent	2. light	3. moderate	4. profuse	[]
SEDIMENT ODOURS:		1. normal	2. sewage	3. petroleum	4. chemical	
		5. anaerobic	6. none	7. other.....		[]
FLOW LEVEL: (relative to "water mark" ie. normal inundation level shown by limit of terrestrial grasses, or by eroded area, or boundary in bank sediment types).						
	1. No flow	2. Low	3. Moderate	4. High	5. Flood	[]
	<small>(dry / isolated)</small>	<small>(<water mark)</small>	<small>(=)</small>	<small>(>water mark)</small>		
Bare ground above water mark: area in riparian zone expected to be vegetated but bare.						Left bank ¹²%
						Right bank ¹²%
Are the undersides of stones which are not deeply embedded black?				1. yes	2. no	[]
SEDIMENT DEPOSITS: 1. none 2. sludge 3. sawdust 4. paper fibre						
	5. sand	6. relict shells	7. silt	8. other.....		[]
LOCAL CATCHMENT EROSION: 1. none 2. some 3. moderate 4. heavy []						
LOCAL PS¹⁶ POLLUTION: 1. no evidence 2. potential..... 3. obvious..... []						
LOCAL NPS¹⁶ POLLUTION: 1. no evidence 2. potential..... 3. obvious..... []						
DAMS / BARRIERS: 1. present - upstream / downstream 2. absent []						
RIVER BRAIDING: 1. yes no. of braids 2. no []						

SITE CLASSIFICATION¹⁷:					
	1. steep valley	2. broad valley	3. wetland/bog	4. heath	
	5. levees present	6. stream bars	7. natural riparian meadow	8. Other.....	[]
LANDUSE¹⁷:	1. Native forest	2. Forestry	3. Native pasture	4. Grazing	5. Cropped
Left Bank¹²	6. Residential	7. Commercial	8. Industrial	9. Recreational	
	10. Grassland (no grazing)		11. Other.....		[]
LANDUSE¹⁷:	1. Native forest	2. Forestry	3. Native pasture	4. Grazing	5. Cropped
Right Bank¹²	6. Residential	7. Commercial	8. Industrial	9. Recreational	
	10. Grassland (no grazing)		11. Other.....		[]
BARS: (bed surface protruding from normal water level & forming a bar)				%
<small>¹⁶ PS = Point Source, NPS = Non Point Source. ¹⁷ Within the reach measurements; may indicate more than one category if required.</small>					

Appendix 1 Cont.

RIVER	DATE	LOCATION
CODE		

REACH¹					
SUBSTRATUM DESCRIPTION (% cover):			ORGANIC SUBSTRATUM (% cover of inorganic substrate)		
		<u>PHI</u>			
Bedrock	[.....]	-9.5	Detritus (sticks, wood, CPOM¹⁸)	[.....]	
Boulder (>256mm)	[.....]	-9.0	Muck/Mud (black, very fine organics)	[.....]	
Cobble (64-256mm)	[.....]	-6.5			
Pebble (16-64mm)	[.....]	-4.5			
Gravel (2-16mm)	[.....]	-2.0			
Sand (0.06-2mm)	[.....]	2.0			
Silt (0.004-0.06mm)	[.....]	6.5			
Clay (<0.004mm)	[.....]	9.5			
Periphyton	1	2	3	4	5 (percent of reach covered by)
Moss	1	2	3	4	5 (percent of reach covered by)
Filamentous algae	1	2	3	4	5 (percent of reach covered by)
Macrophytes	1	2	3	4	5 (percent of reach covered by)
1= <10%	2=10-35%	3=35-65%	4=65-90%	5=>90%	
<p>¹ 'Reach': 5 times mode stream width either side of riffle sampling site, unless stream width <5m then the minimum reach length = 50m.</p> <p>¹⁸ Course Particulate Organic Material.</p>					

RIFFLE

Macroinvertebrates collected by

Macroinvertebrates picked/ sorted by

Method: Kicknet [] Other.....

Length of riffle sampled 10 metres [] Other.....metres.

Sample preserved []

SUBSTRATUM DESCRIPTION (% cover):
substrate)

ORGANIC SUBSTRATUM (% cover of inorganic

PHI

- Bedrock [.....] -9.5
- Boulder (>256mm) [.....] -9.0
- Cobble (64-256mm) [.....] -6.5
- Pebble (16-64mm) [.....] -4.5
- Gravel (2-16mm) [.....] -2.0
- Sand (0.06-2mm) [.....] 2.0
- Silt (0.004-0.06mm) [.....] 6.5
- Clay (<0.004mm) [.....] 9.5

Detritus (sticks, wood, CPOM¹⁸) [.....]

Muck/Mud (black, very fine organics) [.....]

Periphyton 1 2 3 4 5 (percent of riffle covered by)

Moss 1 2 3 4 5 (percent of riffle covered by)

Filamentous algae 1 2 3 4 5 (percent of riffle covered by)

Macrophytes 1 2 3 4 5 (percent of riffle covered by)

1= <10% 2=10-35% 3=35-65% 4=65-90% 5=>90%

¹⁸ Course Particulate Organic Material.

Appendix 1 Cont.

RIVER	DATE	LOCATION
CODE		

EDGE / BACKWATER:

Macroinvertebrates collected by

Macroinvertebrates picked/ sorted by

Method: Sweep [] Other.....

 Length of edge sampled 10 metres [] Other.....metres.

Sample preserved []

<p>SUBSTRATUM DESCRIPTION (% cover): substrate)</p> <p style="text-align: center;"><u>PHI</u></p> <p>Bedrock [.....] -9.5</p> <p>Boulder (>256mm) [.....] -9.0</p> <p>Cobble (64-256mm) [.....] -6.5</p> <p>Pebble (16-64mm) [.....] -4.5</p> <p>Gravel (2-16mm) [.....] -2.0</p> <p>Sand (0.06-2mm) [.....] 2.0</p> <p>Silt (0.004-0.06mm) [.....] 6.5</p> <p>Clay (<0.004mm) [.....] 9.5</p>	<p>ORGANIC SUBSTRATUM (% cover of inorganic substrate)</p> <p>Detritus (sticks, wood, CPOM¹⁸) [.....]</p> <p>Muck/Mud (black, very fine organics) [.....]</p> <p>Trailing bank Vegetation: nil [<input type="checkbox"/>] slight [<input type="checkbox"/>] moderate [<input type="checkbox"/>] extensive [<input type="checkbox"/>]</p> <p>Description:</p>
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Periphyton	1	2	3	4	5	(percent of edge covered by)
Moss	1	2	3	4	5	(percent of edge covered by)
Filamentous algae	1	2	3	4	5	(percent of edge covered by)
Macrophytes	1	2	3	4	5	(percent of edge covered by)

1= <10% 2=10-35% 3=35-65% 4=65-90% 5=>90%

18 Course Particulate Organic Material.

MACROPHYTES

Indicate whether the following common taxa are present in the reach:

<u>SUBMERGED/ FLOATING</u>	<u>EMERGENT</u>
<i>Ceratophyllum</i> (Hornwort)	<i>Callitriche</i>
(Starwort).....	
<i>Chara</i> (Stonewort).....	<i>Carex</i> (Tussock Sedge)
.....	
<i>Elodea</i> (Canadian Pondweed)	<i>Crassula</i> (Crassula)
.....	
<i>Myriophyllum</i> (Water Milfoil)	<i>Cyperus</i> (Sedge).....
<i>Nitella</i> (Stonewort)	<i>Eleocharis</i>
(Spikerush).....	
<i>Potamogeton</i> (Pondweed)	<i>Juncus</i> (Rush).....
<i>Triglochin</i> (Water Ribbon)	<i>Paspalum</i> (Water Couch)
.....	
<i>Vallisneria</i> (Ribbonweed)	<i>Polygonum</i> (Smartweed)
.....	
Other	<i>Phragmites</i> (Common Reed).....
.....	<i>Ranunculus</i> (Buttercup)
.....	<i>Scirpus</i> (Clubrush).....
.....	<i>Typha</i> (Cumbungi).....
.....	Other
Vegetation samples collected: Yes [<input type="checkbox"/>] No [<input type="checkbox"/>]	
Epiphyte cover on macrophytes Nil [<input type="checkbox"/>] Slight [<input type="checkbox"/>] Moderate [<input type="checkbox"/>] Extensive [<input type="checkbox"/>]	

Notes:

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Appendix 1 Cont.

River:..... Date:..... Location Code:.....

	CATEGORY			
Habitat Variable	Excellent	Good	Fair	Poor
1. Bottom substrate/available cover	Greater than 50% rubble, gravel submerged logs, undercut banks or other stable habitat 20, 19, 18, 17, 16	30-50% rubble, gravel or other stable habitat. Adequate habitat 15, 14, 13, 12, 11	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable 10, 9, 8, 7, 6	Less than 10% rubble, gravel or other stable habitat. Lack of habitat is obvious 5, 4, 3, 2, 1, 0
2. Embeddedness	Gravel, cobble and boulder particles are between 0 & 25% surrounded by fine sediment 20, 19, 18, 17, 16	Gravel, cobble and boulder particles are between 25 & 50% surrounded by fine sediment 15, 14, 13, 12, 11	Gravel, cobble and boulder particles are between 50 & 75% surrounded by fine sediment 10, 9, 8, 7, 6	Gravel, cobble and boulder particles are over 75% surrounded by fine sediment 5, 4, 3, 2, 1, 0
3. Velocity/depth category	Slow deep (<0.3 m/s & >0.5m); Slow shallow; Fast deep; Fast shallow; habitats all present 20, 19, 18, 17, 16	Only 3 of the four habitat categories present (missing riffles or runs receive lower score than missing pools) 15, 14, 13, 12, 11	Only 2 of the four habitat categories present (missing riffles/ runs receive lower score) 10, 9, 8, 7, 6	Dominating by one velocity/depth category (usually pool) 5, 4, 3, 2, 1, 0

4. Channel alteration	Little or no enlargement of islands or point bars and/or no channelisation	Some new increase in bar formation, mostly from coarse gravel; and/or some channelisation present	Moderate deposition of new gravel, coarse sand, on old and new bars; pools partly filled w/silt; and/or embankments on both banks	Heavy deposits of fine materials, increased bar development; most pools filled with silt; and/or extensive channelisation
	15, 14, 13, 12	11, 10, 9, 8	7, 6, 5, 4	3, 2, 1, 0
5. Bottom scouring and deposition	Less than 5% of the bottom affected by scouring and deposition	5-30% affected. Scours at constrictions and where grades steepen, some deposition in pools	30-50% affected. Deposits and scours at obstruction and bends. Some deposition in pools.	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed
	15, 14, 13, 12	11, 10, 9, 8	7, 6, 5, 4	3, 2, 1, 0

Appendix 1 Cont.

River:..... Date:..... Location Code:.....

	CATEGORY			
Habitat Variable	Excellent	Good	Fair	Poor
6. Pool/riffle, run/bend ratio. <i>(Distance between riffles divided by stream width)</i>	0-7 Variety of habitat. Deep riffles and pools 15, 14, 13, 12	7-15 Adequate depth in pools and riffles. Bends provide habitat 11, 10, 9, 8	15-25 Occasional riffle or bend. Bottom contours provide some habitat. 7, 6, 5, 4	>25 Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 3, 2, 1, 0
7. Bank stability	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem. 10, 9	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods 8, 7, 6	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme/high flows 5, 4, 3	Unstable. Many eroded areas. Side slopes > 60% common. "Raw" areas frequent along straight sections and bends. 2, 1, 0

8. Bank vegetative stability	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble	50-79% of the streambank surfaces covered by vegetation, gravel or larger material	25-49% of the streambank surfaces covered by vegetation, gravel or larger material	Less than 25% of the streambank surfaces covered by vegetation, gravel or larger material
	10, 9	8, 7, 6	5, 4, 3	2, 1, 0
9. Streamside cover	Dominant vegetation is of tree form	Dominant vegetation shrub	Dominant vegetation is grass, sedge, ferns	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings
	10, 9	8, 7, 6	5, 4, 3	2, 1, 0

Column Totals				
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Score

From US EPA RBA Protocols 1989