

Date \_\_\_\_\_ Site No. \_\_\_\_\_ Time \_\_\_\_\_ Recorder's Name \_\_\_\_\_

River Name \_\_\_\_\_ Location \_\_\_\_\_

Weather \_\_\_\_\_ Rain in last week? Y [ ] N [ ]

Photograph numbers and details \_\_\_\_\_

Latitude:	<input type="text"/> <small>deg</small>	<input type="text"/> <small>min</small>	<input type="text"/> <small>sec</small>	Longitude:	<input type="text"/> <small>deg</small>	<input type="text"/> <small>min</small>	<input type="text"/> <small>sec</small>
GPS Name and Datum _____							

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PLANFORM SKETCH OF SITE**

Including bedform types, location of cross-sections, access points, landmarks and natural or artificial channel or floodplain features.  
Left bank is facing downstream.

<b>LENGTH OF SAMPLING SITE</b>	
Bankfull width	_____ (m)
	x 10
Length of sampling site	_____ (m)

**Notes**







\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

BEFORE LEAVING THE  
SITE, CHECK DATA  
SHEETS TO ENSURE  
THAT ALL VARIABLES  
HAVE BEEN RECORDED

**Y**

BASIC WATER CHEMISTRY		Units
Temperature	_____	°C
Conductivity	_____	_____
Dissolved Oxygen	_____	mg l <sup>-1</sup>
Dissolved Oxygen Sat.	_____	%
pH	_____	_____
Turbidity	_____	_____
Total phosphorus <input type="checkbox"/>	Water sample taken?	_____
Total nitrogen <input type="checkbox"/>		_____
<b>ALKALINITY</b>		
Amount of water	_____	ml
Amount of H <sub>2</sub> SO <sub>4</sub>	_____	ml
Alkalinity	_____	mg l <sup>-1</sup>

**Valley shape**  
Choose one category only

	<input type="checkbox"/> Steep valley
	<input type="checkbox"/> Shallow valley
	<input type="checkbox"/> Broad valley
	<input type="checkbox"/> Gorge
	<input type="checkbox"/> Symmetrical floodplain
	<input type="checkbox"/> Asymmetrical floodplain

**Local impacts on streams**  
Choose one or more categories and describe the detail of each

<input type="checkbox"/> Sand or gravel mining	<input type="checkbox"/> Sewage effluent
<input type="checkbox"/> Other mining	<input type="checkbox"/> Channel straightening
<input type="checkbox"/> Road	<input type="checkbox"/> River improvement works
<input type="checkbox"/> Bridge / culvert / wharf	<input type="checkbox"/> Water extraction
<input type="checkbox"/> Ford / ramp	<input type="checkbox"/> Dredging
<input type="checkbox"/> Discharge pipe	<input type="checkbox"/> Grazing
<input type="checkbox"/> Forestry activities	<input type="checkbox"/> Litter
<input type="checkbox"/> Sugar mill	<input type="checkbox"/> Recreation
<input type="checkbox"/> Irrigation run-off or pipe outlet	<input type="checkbox"/> Other

Description \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Floodplain width** \_\_\_\_\_ Average \_\_\_\_\_ (m)

**Floodplain features**

Choose one or more features when present

- |   |  |
|---|--|
| <input type="checkbox"/> Sampling site has no distinct floodplain   | <input type="checkbox"/> Scroll systems<br>Short, crescentic strips or patches formed along the inner bank of a stream meander                         |
| <input type="checkbox"/> Oxbows / billabongs<br>Body of water occupying a former river meander, isolated by a shift in the stream channel | <input type="checkbox"/> Splays<br>Small alluvial fan formed where an overloaded stream breaks through a levee and deposits material on the floodplain |
| <input type="checkbox"/> Remnant channels<br>Formed during a previous hydrological regime. May be infilled with sediment                  | <input type="checkbox"/> Floodplain scours<br>Scour holes formed by the concentrated clearing and digging action of flowing water                      |
| <input type="checkbox"/> Flood channels<br>A channel that distributes water onto the floodplain and off the floodplain during floods      | <input type="checkbox"/> No floodplain features present<br>Floodplain present at the sampling site but does not contain any of the above features      |

**Local landuse**

Choose one category for each bank

- | Left                     | Right  |
|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> Native forest                             |
| <input type="checkbox"/> | <input type="checkbox"/> Native grassland (not grazed)             |
| <input type="checkbox"/> | <input type="checkbox"/> Grazing (native or non-native pasture)    |
| <input type="checkbox"/> | <input type="checkbox"/> Exotic grassland (lawns etc., no grazing) |
| <input type="checkbox"/> | <input type="checkbox"/> Forestry Native [ ] [ ] Pine [ ] [ ]      |
| <input type="checkbox"/> | <input type="checkbox"/> Cropped Rainfed [ ] [ ] Irrigated [ ] [ ] |
| <input type="checkbox"/> | <input type="checkbox"/> Urban residential                         |
| <input type="checkbox"/> | <input type="checkbox"/> Commercial                                |
| <input type="checkbox"/> | <input type="checkbox"/> Industrial or intensive agricultural      |
| <input type="checkbox"/> | <input type="checkbox"/> Recreation                                |
| <input type="checkbox"/> | <input type="checkbox"/> Other _____                               |

**Riparian zone composition**

Assess for whole sampling site

	% Cover	Vegetation Description
Trees (>10m in height)	_____	_____
Trees (<10m in height)	_____	_____
Shrubs	_____	_____
Grasses / ferns / sedges	_____	_____

} May total more than 100%

**Shading of channel**

- < 5%   
  6 – 25%   
  26 – 50%   
  51 – 75%   
  > 76%

**Extent of trailing bank vegetation**

- nil                       moderate  
 slight                   extensive

**Native and exotic riparian vegetation**

- % Native \_\_\_\_\_ } Total 100%  
 % Exotic \_\_\_\_\_ }

**Longitudinal extent of riparian vegetation**

Choose one category for each bank. Do not include ground layer except where site is in native grassland.

		Left bank	Right bank
None		<input type="checkbox"/>	<input type="checkbox"/>
Isolated / scattered		<input type="checkbox"/>	<input type="checkbox"/>
Regularly spaced		<input type="checkbox"/>	<input type="checkbox"/>
Occasional clumps		<input type="checkbox"/>	<input type="checkbox"/>
Semi-continuous		<input type="checkbox"/>	<input type="checkbox"/>
Continuous		<input type="checkbox"/>	<input type="checkbox"/>

**Regeneration of native woody vegetation**

Is the sampling site in undisturbed forest?

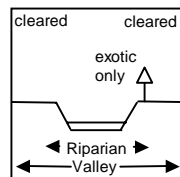
Y [ ] N [ ]

- Abundant (>5% cover) and healthy  
 Present  
 Very limited (<1% cover)
- If no, record regeneration category

**Overall vegetation disturbance rating**

Choose one category only. Sites with valley vegetation cleared on BOTH sides, but with riparian vegetation in good condition should be scored in the high disturbance category. Words within the drawings summarise the detailed text about the state of the riparian and valley vegetation for each category.

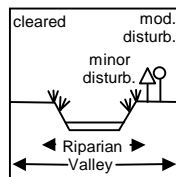
**Extreme disturbance**



**Riparian vegetation** – absent or severely reduced. Vegetation is extremely disturbed (ie. dominated by exotic species with native species rare or completely absent)

**Valley vegetation** – agriculture and/or cleared land BOTH sides. Plants present are virtually all exotic species (willows, pines etc.)

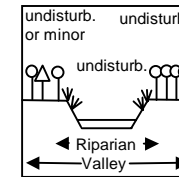
**High disturbance**



**Riparian vegetation** – moderately disturbed by stock or through the intrusion of exotic species, although some native species remain

**Valley vegetation** – agriculture and/or cleared land ONE side, native vegetation on the other side clearly disturbed or with a high percentage of introduced species present

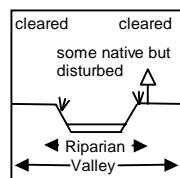
**Low disturbance**



**Riparian vegetation** – native vegetation present on BOTH sides of the river and in relatively good condition with few exotic species present. Any disturbance present is relatively minor.

**Valley vegetation** – native vegetation present on BOTH sides of the river, with a virtually intact canopy and few exotic species

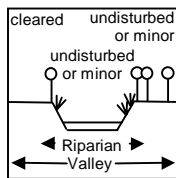
**Very high disturbance**



**Riparian vegetation** – some native vegetation present, but it is severely modified BOTH sides by grazing or the intrusion of exotic species. Native species severely reduced in number and cover.

**Valley vegetation** – agriculture and/or cleared land BOTH sides. Plants present are virtually all exotic species (willows, pines etc.)

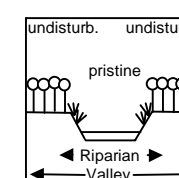
**Moderate disturbance**



**Riparian vegetation** – native vegetation on BOTH sides with canopy intact or with native species widespread and common in the riparian zone. The intrusion of exotic species is minor and of moderate cover.

**Valley vegetation** – agriculture and/or cleared land on ONE side, native vegetation on the other in reasonably undisturbed state

**Very low disturbance**




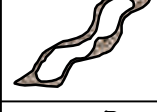




**Riparian vegetation** – native vegetation present on BOTH sides of the river and in an undisturbed state. Exotic species are absent or rare. Representative of natural vegetation in excellent condition

**Valley vegetation** – native vegetation present on BOTH sides of the river with an intact canopy. Exotic species are absent or rare. Representative of natural vegetation in excellent condition

**Physical barriers to local fish passage**










Choose one category for each flow condition

		Base flow	Low flow	High flow
	No passage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Very restricted passage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Moderately restricted passage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Partly restricted passage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Good passage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Unrestricted passage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Type and height of barrier(s) \_\_\_\_\_

**Type of bars**

Choose one or more categories

	Bars absent	<input type="checkbox"/>
	Side/point bars VEGETATED	<input type="checkbox"/>
	Side/point bars UNVEGETATED	<input type="checkbox"/>
	Mid-channel bars VEGETATED	<input type="checkbox"/>
	Mid-channel bars UNVEGETATED	<input type="checkbox"/>
	Bars around obstructions	<input type="checkbox"/>
	Braided channel	<input type="checkbox"/>
	Infilled channel	<input type="checkbox"/>
	High flow deposits	<input type="checkbox"/>




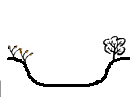
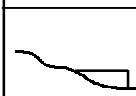



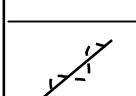
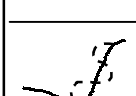
**Extent of bars**

% of streambed forming a bar of any type \_\_\_\_\_ %

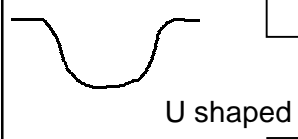

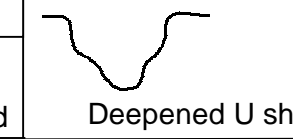

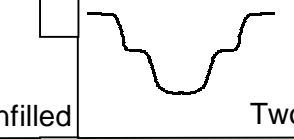


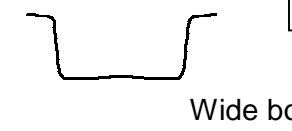
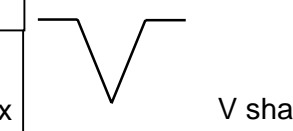
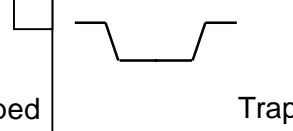

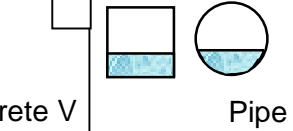
**Dominant sediment particle size on bars**

Boulder/cobble [  ] Pebble [  ] Gravel [  ]  
Sand [  ] Silt/clay [  ] or \_\_\_\_\_ mm

**Channel modifications** Choose one or more categories


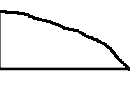



	No modifications	<input type="checkbox"/>		Reinforced	<input type="checkbox"/>
	Desnagged	<input type="checkbox"/>		Revegetated	<input type="checkbox"/>
	Dams and diversions	<input type="checkbox"/>		Infilled	<input type="checkbox"/>
	Resectioned	<input type="checkbox"/>		Berms or embankments	<input type="checkbox"/>
	Straightened	<input type="checkbox"/>	Signs of work still	Recently channelised	<input type="checkbox"/>
	Realigned	<input type="checkbox"/>	Works old and revegetated	Channelised in the past	<input type="checkbox"/>

**Channel shape** Choose one category only

	U shaped	<input type="checkbox"/>		Flat U shaped	<input type="checkbox"/>		Deepened U shape	<input type="checkbox"/>		Widened or infilled	<input type="checkbox"/>		Two stage	<input type="checkbox"/>		Multi stage	<input type="checkbox"/>
	Box	<input type="checkbox"/>		Wide box	<input type="checkbox"/>		V shaped	<input type="checkbox"/>		Trapezoid	<input type="checkbox"/>		Concrete V	<input type="checkbox"/>		Pipe or culvert	<input type="checkbox"/>

**Bank shape**

Choose one category for each bank

		Left bank	Right bank
	Concave	<input type="checkbox"/>	<input type="checkbox"/>
	Convex	<input type="checkbox"/>	<input type="checkbox"/>
	Stepped	<input type="checkbox"/>	<input type="checkbox"/>
	Wide lower bench	<input type="checkbox"/>	<input type="checkbox"/>
	Undercut	<input type="checkbox"/>	<input type="checkbox"/>

**Factors affecting bank stability**



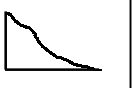
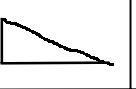

Choose one or more categories

- |  |   |
|--|---|
| <input type="checkbox"/> None                    | <input type="checkbox"/> Cleared vegetation   |
| <input type="checkbox"/> Mining                  | <input type="checkbox"/> Irrigation draw-down |
| <input type="checkbox"/> Runoff                  | <input type="checkbox"/> Reservoir releases   |
| <input type="checkbox"/> Stock access            | <input type="checkbox"/> Seepage              |
| <input type="checkbox"/> Human access            | <input type="checkbox"/> Flow and waves       |
| <input type="checkbox"/> Ford, culvert or bridge | <input type="checkbox"/> Drainpipes           |
| <input type="checkbox"/> Feral animals           |   |
| <input type="checkbox"/> Other                   |   |

Description \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Bank slope**

Choose one category for each bank

		Left bank	Right bank
	Vertical 80 - 90°	<input type="checkbox"/>	<input type="checkbox"/>
	Steep 60 - 80°	<input type="checkbox"/>	<input type="checkbox"/>
	Moderate 30 - 60°	<input type="checkbox"/>	<input type="checkbox"/>
	Low 10 - 30°	<input type="checkbox"/>	<input type="checkbox"/>
	Flat <10°	<input type="checkbox"/>	<input type="checkbox"/>

**Bedrock outcrops**

Assess % of each bank covered by bedrock outcrops

% bedrock outcrops Left bank \_\_\_\_\_  
 Right Bank \_\_\_\_\_

**Artificial bank protection measures**

Choose one or more categories

- |  |   |
|--|---|
| <input type="checkbox"/> None                | <input type="checkbox"/> Fenced stock watering points |
| <input type="checkbox"/> Fence structures    | <input type="checkbox"/> Vegetation plantings         |
| <input type="checkbox"/> Levee banks         | <input type="checkbox"/> Logs strapped to bank        |
| <input type="checkbox"/> Rock or wall layer  | <input type="checkbox"/> Concrete channel lining      |
| <input type="checkbox"/> Rip rap             |   |
| <input type="checkbox"/> Fenced human access |   |
| <input type="checkbox"/> Other               |   |

\_\_\_\_\_

**Sediment oils**

- absent  light  moderate  profuse

**Water oils**

- none  flecks  globs  sheen  slick

**Sediment odours**

- normal/none  sewage  petroleum  chemical  
 anaerobic  other \_\_\_\_\_

**Water odours**

- normal/none  sewage  petroleum  chemical  
 other \_\_\_\_\_

**Turbidity (visual assessment)**

- Clear  Slight  Turbid  Opaque

↓ ↓ ↓  
 Is water clarity reduced by:

- Suspended material (e.g mud, clay, organics)  Dissolved material (e.g plant leachates)

**Water level at the time of sampling**

- Dry  No flow  Low  Baseflow or near baseflow  
 High  Flood (don't sample)

**Artificial features at the sampling site**

Choose one or more categories

- Major  Minor  Ford  Bridge  Culvert  Other weir


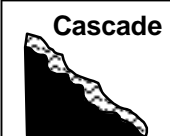
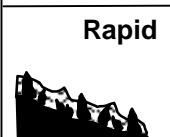


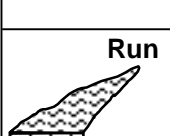
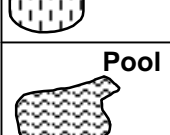
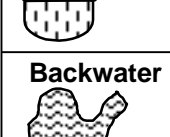
Description \_\_\_\_\_  
 \_\_\_\_\_

**Large woody debris**

Overall % cover of logs and branches greater than 10cm in diameter  
 \_\_\_\_\_ % Notes on visibility \_\_\_\_\_  
 \_\_\_\_\_

**Extent of bedform features**

Total % composition for all features must equal 100%

Height >1m Gradient >60°		<b>Waterfall</b> _____ % of site _____ Est. Av. Length (m) _____ Est. Av. Height (m) _____ Est. Av. Gradient (°)
Step Height <1m Gradient 5-60° Strong currents		<b>Cascade</b> _____ % of site _____ Est. Av. Length (m) _____ Est. Av. Height (m) _____ Est. Av. Gradient (°)
Gradient 3-5° Strong currents Rocks break surface		<b>Rapid</b> _____ % of site _____ Est. Av. Length (m) _____ Est. Av. Depth (m) _____ Est. Av. Width (m)
Gradient 1-3° Moderate currents Surface unbroken but unsmooth		<b>Riffle</b> _____ % of site _____ Est. Av. Length (m) _____ Est. Av. Depth (m) _____ Est. Av. Width (m)
Gradient 1-3° Small currents Surface unbroken and smooth		<b>Glide</b> _____ % of site _____ Est. Av. Length (m) _____ Est. Av. Depth (m) _____ Est. Av. Width (m)
Gradient 1-3° Small but distinct & uniform current Surface unbroken		<b>Run</b> _____ % of site _____ Est. Av. Length (m) _____ Est. Av. Depth (m) _____ Est. Av. Width (m)
Area where stream widens or deepens and current declines		<b>Pool</b> _____ % of site _____ Est. Av. Length (m) _____ Est. Av. Depth (m) _____ Est. Av. Width (m)
A reasonable sized (>20% of channel width) cut-off section away from		<b>Backwater</b> _____ % of site _____ Est. Av. Length (m) _____ Est. Av. Depth (m) _____ Est. Av. Width (m)

Note: An additional response variable planform channel pattern is measured in the office

**Macrophyte cover** Assess % cover of the sampling site by each category.

Overall % cover of macrophytes \_\_\_\_\_ % cover of emergent macrophytes \_\_\_\_\_  
 % cover of floating macrophytes \_\_\_\_\_  
 % cover of submerged macrophytes \_\_\_\_\_

Total should equal overall % cover of macrophytes

**Macrophyte composition**

Use a macrophyte field guide (i.e. Sainty and Jacobs, 1994) to aid identification. Listed macrophytes can be changed to reflect the common taxa present in each State or Territory. N denotes a native taxa and I denotes an introduced taxa.

**Emergent macrophytes**

	Present	% cover
<i>Brachiaria</i> (Para Grass) I	<input type="checkbox"/>	_____
<i>Crassula</i> (Crassula) N	<input type="checkbox"/>	_____
<i>Cyperus</i> (Sedge) I/N	<input type="checkbox"/>	_____
<i>Eleocharis</i> (Spikerush) N	<input type="checkbox"/>	_____
<i>Juncus</i> (Rush) I/N	<input type="checkbox"/>	_____
<i>Paspalum</i> (Water Couch) N	<input type="checkbox"/>	_____
<i>Phragmites</i> (Common Reed) N	<input type="checkbox"/>	_____
<i>Ranunculus</i> (Buttercup) I	<input type="checkbox"/>	_____
<i>Scirpus</i> (Clubrush) N	<input type="checkbox"/>	_____
<i>Triglochin</i> (Water Ribbon) N	<input type="checkbox"/>	_____
<i>Typha</i> (Cumbungi) N	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____

**Submerged macrophytes**

	Present	% cover
<i>Ceratophyllum</i> (Hornwort) N	<input type="checkbox"/>	_____
<i>Chara</i> (Stonewort) N	<input type="checkbox"/>	_____
<i>Elodea</i> (Canadian Pondweed) I	<input type="checkbox"/>	_____
<i>Myriophyllum</i> (Water Milfoil) I/N	<input type="checkbox"/>	_____
<i>Nitella</i> (Stonewort) N	<input type="checkbox"/>	_____
<i>Potamogeton</i> (Pondweed) N	<input type="checkbox"/>	_____
<i>Triglochin</i> (Water Ribbon) N	<input type="checkbox"/>	_____
<i>Vallisneria</i> (Ribbonweed) N	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____

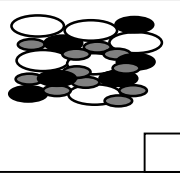
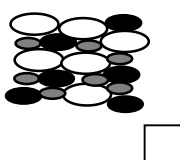
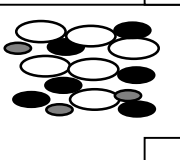
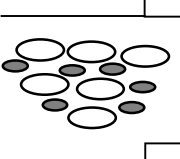
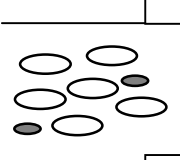
**Floating macrophytes**

	Present	%
<i>Azolla</i> (Azolla) N	<input type="checkbox"/>	_____
<i>Callitriche</i> (Starwort) I	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____
Other _____	<input type="checkbox"/>	_____

Overall % cover of native macrophyte taxa \_\_\_\_\_ } Total should equal overall % cover of macrophytes from above  
 Overall % cover of native macrophyte taxa \_\_\_\_\_ }


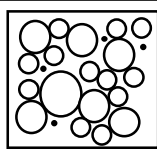
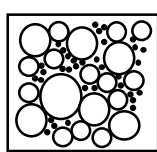
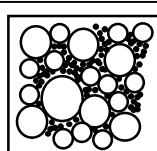
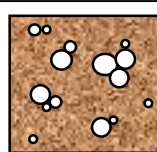
**Bed compaction**

Choose one category only

	Tightly packed, armoured Array of sediment sizes, overlapping, tightly packed and very hard to dislodge
	Packed, unarmoured Array of sediment sizes, overlapping, tightly packed but can be dislodged with moderate
	Moderate compaction Array of sediment sizes, little overlapping, some packing but can be dislodged with moderate
	Low compaction (1) Limited range of sediment sizes, little overlapping, some packing and structure but can be dislodged very easily
	Low compaction (2) Loose array of fine sediments, no overlapping, no packing and structure and can be dislodged very easily

**Sediment matrix**




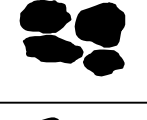
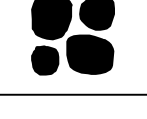

Choose one category only

	Bedrock
	Open framework 0-5% fine sediment, high availability of interstitial spaces
	Matrix filled contact framework 5-32% fine sediment, moderate availability of interstitial spaces
	Framework dilated 32-60% fine sediment, low availability of interstitial spaces
	Matrix dominated >60% fine sediment, interstitial spaces virtually absent

**Sediment angularity**

Choose one category only

Assess cobble, pebble and gravel fractions only

	Very angular
	Angular
	Sub-angular
	Rounded
	Well rounded
	Cobble, pebble and gravel fractions not present

In the USEPA Habitat Assessment on the following pages, be sure to use the correct form for high or low gradient streams

**Bed stability rating** Choose one category only

Unstable - eroding ← Stable → Unstable - depositing

<p><b>Severe erosion</b></p> <p>Streambed scoured of fine sediments. Signs of channel deepening. Bare, severely eroded banks. Erosion heads. Steep streambed caused by erosion.</p>	<p><b>Moderate erosion</b></p> <p>Little fine sediment present. Signs of channel deepening. Eroded banks. Streambed deep and narrow. Steep streambed comprised of unconsolidated (loosely arranged and unpacked) material</p>	<p><b>Bed stable</b></p> <p>A range of sediment sizes present in the streambed. Channel is in a 'relatively natural' state (not deepened or infilled). Bed and bar sediments are roughly the same size. Banks stable. Streambed comprised of consolidated (tightly arranged and packed) material.</p>	<p><b>Moderate deposition</b></p> <p>Moderate build-up of fine sediments at obstructions and bars. Streambed flat and uniform. Channel wide and shallow.</p>	<p><b>Severe deposition</b></p> <p>Extensive build up of fine sediments to form a flat bed. Channel blocked, but wide and shallow. Bars large and covering most of the bed or banks. Streambed comprised of unconsolidated (loosely arranged and unpacked) material.</p>
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**USEPA Habitat Assessment**  
Circle a score for each parameter

**HIGH GRADIENT STREAMS**

Habitat parameter	Condition category																				
	Excellent					Good					Fair					Poor					
<b>1. Epifaunal substrate / available cover</b>	Greater than 70% of substrate favourable for epifaunal colonisation and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonisation potential (i.e. logs/snags that are not new fall and not transient).					40-70% mix of stable habitat; well-suited for full colonisation potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonisation (may rate at high end of scale).					20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.					Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>2. Embeddedness</b>	Gravel, cobble and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.					Gravel, cobble and boulder particles are 25-50% surrounded by fine sediment.					Gravel, cobble and boulder particles are 50-75% surrounded by fine sediment.					Gravel, cobble and boulder particles are more than 75% surrounded by fine sediment.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>3. Velocity / depth regime</b>	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3m/s, deep is >0.5m).					Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).					Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).					Dominated by 1 velocity/depth regime (usually slow-deep).					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>4. Sediment deposition</b>	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.					Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.					Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition in pools prevalent.					Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>5. Channel flow status</b>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.					Water fills >75% of the available channel; or <25% of channel substrate is exposed.					Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.					Very little water in channel and mostly present as standing pools.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>6. Channel alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging (greater than 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0



**USEPA Habitat Assessment**  
Circle a score for each parameter

**HIGH GRADIENT STREAMS**

Habitat parameter	Condition category																						
	Excellent					Good					Fair					Poor							
<b>7. Frequency of riffles (or bends)</b>	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.					Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.					Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.					Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.							
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
<b>8. Bank stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; 'raw' areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.							
<b>SCORE</b>	Left bank		10	9	8	7	6	5	4	3	Right bank		10	9	8	7	6	5	4	3	2	1	0
<b>SCORE</b>	Right bank		10	9	8	7	6	5	4	3	Left bank		10	9	8	7	6	5	4	3	2	1	0
<b>9. Vegetative protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understorey shrubs, or non woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimetres or less in average stubble height.							
<b>SCORE</b>	Left bank		10	9	8	7	6	5	4	3	Right bank		10	9	8	7	6	5	4	3	2	1	0
<b>SCORE</b>	Right bank		10	9	8	7	6	5	4	3	Left bank		10	9	8	7	6	5	4	3	2	1	0
<b>10. Riparian zone score (score each bank)</b>	Width of riparian zone >18 metres; human activities (i.e. roads, lawns, crops etc.) have not impacted the riparian zone.					Width of riparian zone 12-18 metres; human activities have impacted the riparian zone only minimally.					Width of riparian zone 6-12 metres; human activities have impacted the riparian zone a great deal.					Width of riparian zone <6 metres; little or no riparian vegetation is present because of human activities.							
<b>SCORE</b>	Left bank		10	9	8	7	6	5	4	3	Right bank		10	9	8	7	6	5	4	3	2	1	0
<b>SCORE</b>	Right bank		10	9	8	7	6	5	4	3	Left bank		10	9	8	7	6	5	4	3	2	1	0

**TOTAL HIGH GRADIENT HABITAT SCORE**

**USEPA Habitat Assessment**  
Circle a score for each parameter

**LOW GRADIENT STREAMS**

Habitat parameter	Condition category																				
	Excellent					Good					Fair					Poor					
<b>1. Epifaunal substrate / available cover</b>	Greater than 50% of substrate favourable for epifaunal colonisation and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonisation potential (i.e. logs/snags that are not new fall and not transient).					30-50% mix of stable habitat; well-suited for full colonisation potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonisation (may rate at high end of scale).					10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.					Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>2. Pool substrate characterization</b>	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.					Mixture of soft sand, mud or clay; mud may be dominant; some root mats and submerged vegetation present.					All mud or clay or sand bottom; little or no root mat; no submerged vegetation.					Hard-pan clay or bedrock; no root mat or vegetation.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>3. Pool variability</b>	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.					Majority of pools large-deep; very few shallow.					Shallow pools much more prevalent than deep pools.					Majority of pools small-shallow or pools absent.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>4. Sediment deposition</b>	Little or no enlargement of islands or point bars and less than 20% of the bottom affected by sediment deposition.					Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.					Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions and bends; moderate deposition in pools prevalent.					Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>5. Channel flow status</b>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.					Water fills >75% of the available channel; or <25% of channel substrate is exposed.					Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.					Very little water in channel and mostly present as standing pools.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>6. Channel alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e. dredging (greater than 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Continued over

**USEPA Habitat Assessment**  
Circle a score for each parameter

**LOW GRADIENT STREAMS**

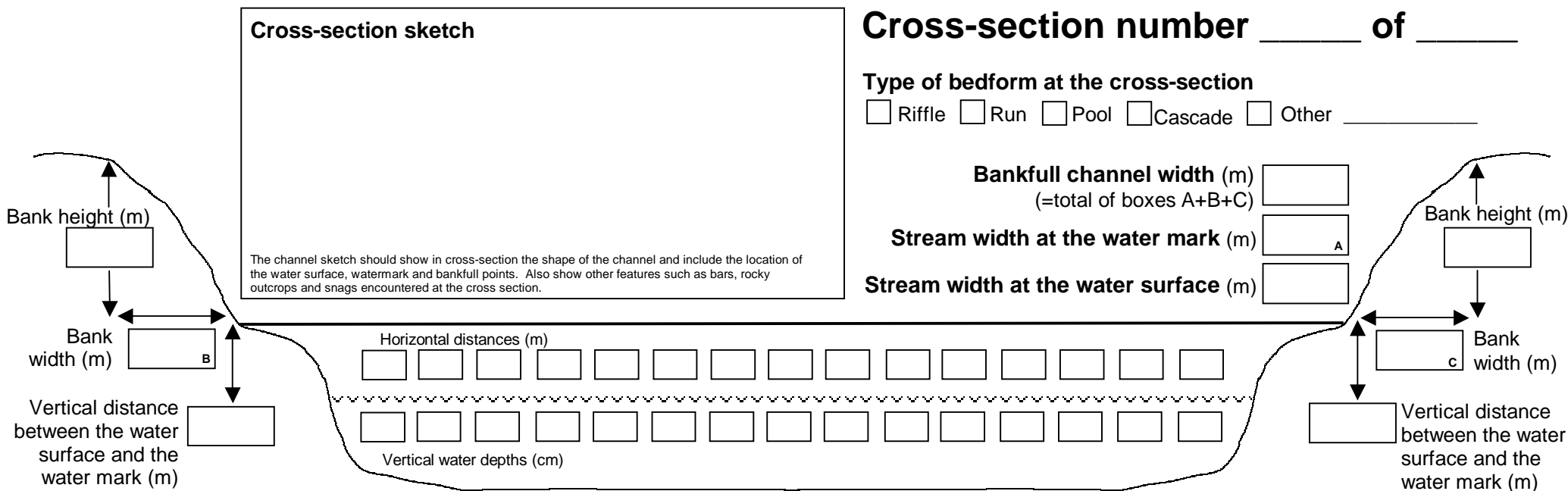
Habitat parameter	Condition category																				
	Excellent					Good					Fair				Poor						
<b>7. Channel sinuosity</b>	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note – channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas).					The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.					The bends in the stream increase the stream 1 to 2 times longer than if it was in a straight line.				Channel straight; waterway has been channelized for a long distance.						
<b>SCORE</b>	<b>20</b>	<b>19</b>	<b>18</b>	<b>17</b>	<b>16</b>	<b>15</b>	<b>14</b>	<b>13</b>	<b>12</b>	<b>11</b>	<b>10</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>8. Bank stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.				Unstable; many eroded areas; 'raw' areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.						
<b>SCORE</b>	Left bank		<b>10</b>	<b>9</b>		<b>8</b>	<b>7</b>	<b>6</b>			<b>5</b>	<b>4</b>	<b>3</b>			<b>2</b>	<b>1</b>	<b>0</b>			
<b>SCORE</b>	Right bank		<b>10</b>	<b>9</b>		<b>8</b>	<b>7</b>	<b>6</b>			<b>5</b>	<b>4</b>	<b>3</b>			<b>2</b>	<b>1</b>	<b>0</b>			
<b>9. Vegetative protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understorey shrubs, or non woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.				Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimetres or less in average stubble height.						
<b>SCORE</b>	Left bank		<b>10</b>	<b>9</b>		<b>8</b>	<b>7</b>	<b>6</b>			<b>5</b>	<b>4</b>	<b>3</b>			<b>2</b>	<b>1</b>	<b>0</b>			
<b>SCORE</b>	Right bank		<b>10</b>	<b>9</b>		<b>8</b>	<b>7</b>	<b>6</b>			<b>5</b>	<b>4</b>	<b>3</b>			<b>2</b>	<b>1</b>	<b>0</b>			
<b>10. Riparian zone score (score each bank)</b>	Width of riparian zone >18 metres; human activities (i.e. roads, lawns, crops etc.) have not impacted the riparian zone.					Width of riparian zone 12-18 metres; human activities have impacted the riparian zone only minimally.					Width of riparian zone 6-12 metres; human activities have impacted the riparian zone a great deal.				Width of riparian zone <6 metres; little or no riparian vegetation is present because of human activities.						
<b>SCORE</b>	Left bank		<b>10</b>	<b>9</b>		<b>8</b>	<b>7</b>	<b>6</b>			<b>5</b>	<b>4</b>	<b>3</b>			<b>2</b>	<b>1</b>	<b>0</b>			
<b>SCORE</b>	Right bank		<b>10</b>	<b>9</b>		<b>8</b>	<b>7</b>	<b>6</b>			<b>5</b>	<b>4</b>	<b>3</b>			<b>2</b>	<b>1</b>	<b>0</b>			

**TOTAL LOW GRADIENT HABITAT SCORE**

**Channel cross-sections and variables to be measured in the area around a cross section**

Detailed instructions on the measurement of channel cross-sections are provided in the protocol manual. Be familiar with these before proceeding.

Two cross-sections are required at homogeneous sampling sites (generally lowland streams) and three cross-sections at heterogeneous sampling sites (generally upland streams). Where the water level at the time of sampling is at or near the water mark level, stream width at the water surface will be equal to stream width at the water mark. In this case, vertical distance between the water surface and the water mark should be entered as 0.



**Notes on cross-section measurement**

**Riparian zone width**

Left bank \_\_\_\_\_ (m) Right bank \_\_\_\_\_ (m)

**Bank material**

Assess % composition for each bank

	Left bank	Right bank
Bedrock	_____	_____
Boulder (>256mm)	_____	_____
Cobble (64-256mm)	_____	_____
Pebble (16-64mm)	_____	_____
Gravel (2-16mm)	_____	_____
Sand (0.06-2mm)	_____	_____
Fines (silt and clay, <0.06mm)	_____	_____
	} Total 100% each	

**Substrate composition**

Assess % composition in the area of bed 5m either side of the cross-section.

Bedrock	_____
Boulder (>256mm)	_____
Cobble (64-256mm)	_____
Pebble (16-64mm)	_____
Gravel (2-16mm)	_____
Sand (0.06-2mm)	_____
Fines (silt and clay <0.06mm)	_____

Total 100%

**Filamentous algae cover**

Assess in the area 5m either side of the cross section

<10%  10-35%  35-65%  65-90%  >90%

**Periphyton cover**

<10%  10-35%  35-65%  65-90%  >90%

**Moss cover**

<10%  10-35%  35-65%  65-90%  >90%

**Detritus cover**

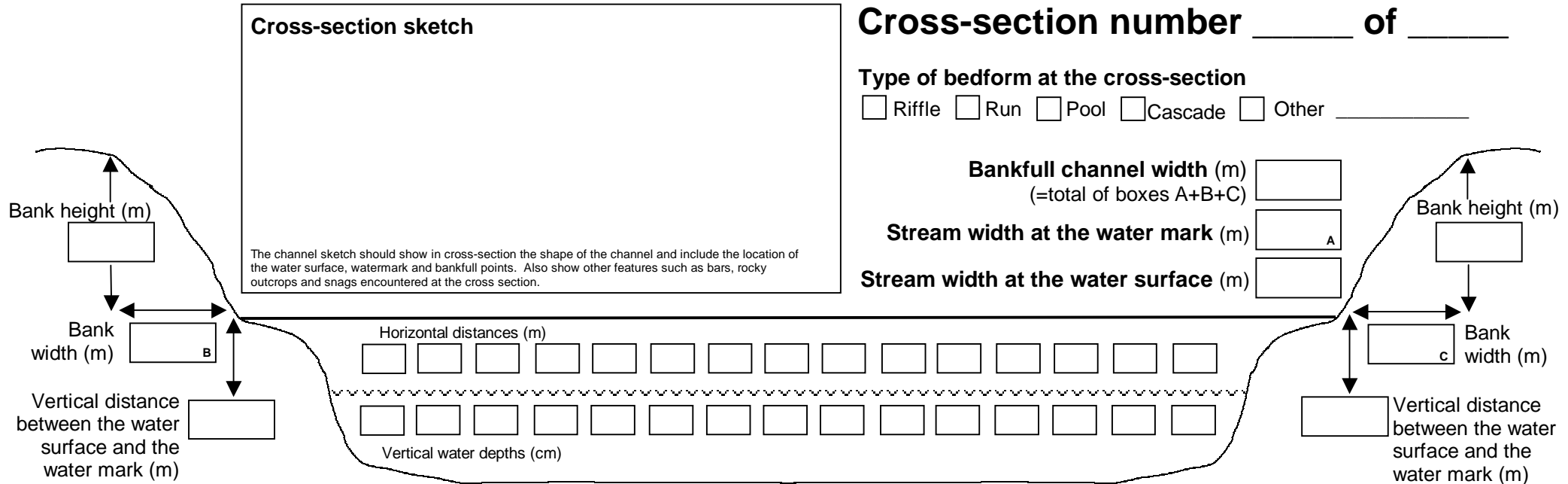
<10%  10-35%  35-65%  65-90%  >90%

**Channel cross-sections and variables to be measured in the area around a cross section**

Detailed instructions on the measurement of channel cross-sections are provided in the protocol manual. Be familiar with these before proceeding.

Two cross-sections are required at homogeneous sampling sites (generally lowland streams) and three cross-sections at heterogeneous sampling sites (generally upland streams).

Where the water level at the time of sampling is at or near the water mark level, stream width at the water surface will be equal to stream width at the water mark. In this case, vertical distance between the water surface and the water mark should be entered as 0.



**Notes on cross-section measurement**

**Riparian zone width**

Left bank \_\_\_\_\_ (m) Right bank \_\_\_\_\_ (m)

**Bank material** Assess % composition for each bank

	Left bank	Right bank
Bedrock	_____	_____
Boulder (>256mm)	_____	_____
Cobble (64-256mm)	_____	_____
Pebble (16-64mm)	_____	_____
Gravel (2-16mm)	_____	_____
Sand (0.06-2mm)	_____	_____
Fines (silt and clay, <0.06mm)	_____	_____
	Total 100% each	

**Substrate composition**

Assess % composition in the area of bed 5m either side of the cross-section.

Bedrock	_____
Boulder (>256mm)	_____
Cobble (64-256mm)	_____
Pebble (16-64mm)	_____
Gravel (2-16mm)	_____
Sand (0.06-2mm)	_____
Fines (silt and clay <0.06mm)	_____

Total 100%

**Filamentous algae cover** Assess in the area 5m either side of the cross section

<10%  10-35%  35-65%  65-90%  >90%

**Periphyton cover**

<10%  10-35%  35-65%  65-90%  >90%

**Moss cover**

<10%  10-35%  35-65%  65-90%  >90%

**Detritus cover**

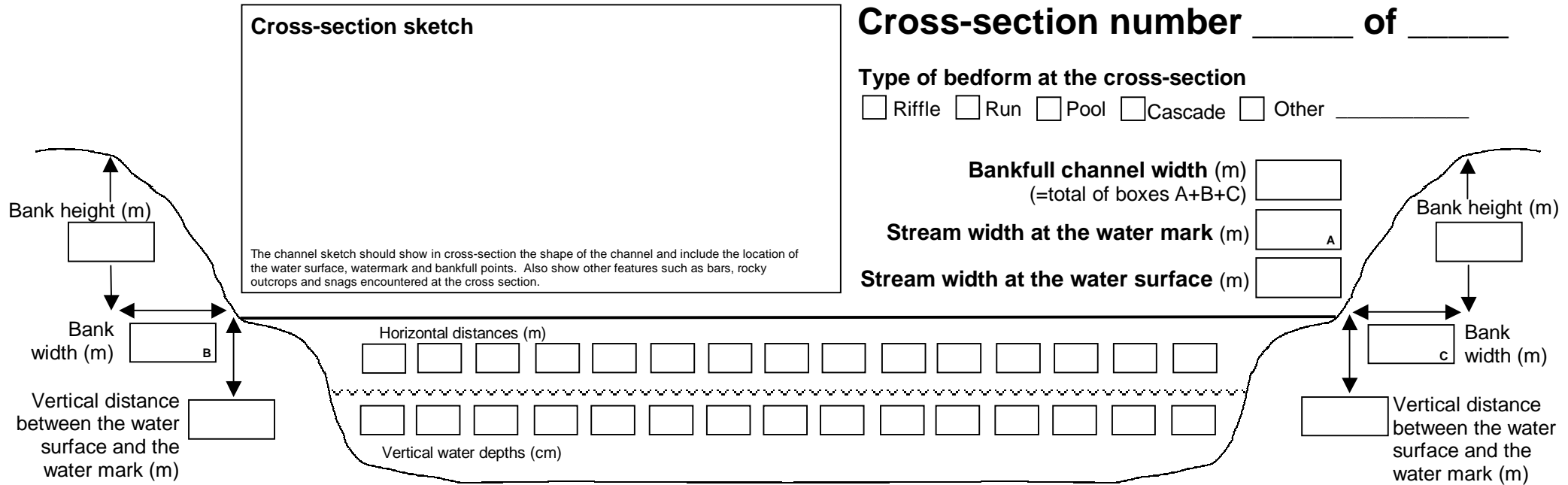
<10%  10-35%  35-65%  65-90%  >90%

**Channel cross-sections and variables to be measured in the area around a cross section**

Detailed instructions on the measurement of channel cross-sections are provided in the protocol manual. Be familiar with these before proceeding.

Two cross-sections are required at homogeneous sampling sites (generally lowland streams) and three cross-sections at heterogeneous sampling sites (generally upland streams).

Where the water level at the time of sampling is at or near the water mark level, stream width at the water surface will be equal to stream width at the water mark. In this case, vertical distance between the water surface and the water mark should be entered as 0.



**Notes on cross-section measurement**

**Riparian zone width**

Left bank \_\_\_\_\_ (m) Right bank \_\_\_\_\_ (m)

**Bank material** Assess % composition for each bank

	Left bank	Right bank
Bedrock	_____	_____
Boulder (>256mm)	_____	_____
Cobble (64-256mm)	_____	_____
Pebble (16-64mm)	_____	_____
Gravel (2-16mm)	_____	_____
Sand (0.06-2mm)	_____	_____
Fines (silt and clay, <0.06mm)	_____	_____
	Total 100% each	

**Substrate composition**

Assess % composition in the area of bed 5m either side of the cross-section.

Bedrock	_____
Boulder (>256mm)	_____
Cobble (64-256mm)	_____
Pebble (16-64mm)	_____
Gravel (2-16mm)	_____
Sand (0.06-2mm)	_____
Fines (silt and clay <0.06mm)	_____

Total 100%

**Filamentous algae cover**

Assess in the area 5m either side of the cross section

<10%  10-35%  35-65%  65-90%  >90%

**Periphyton cover**

<10%  10-35%  35-65%  65-90%  >90%

**Moss cover**

<10%  10-35%  35-65%  65-90%  >90%

**Detritus cover**

<10%  10-35%  35-65%  65-90%  >90%