

CARAVAGGIO 2008 - Core Assessment of River hAbitat VAue and hydro-morpholoGical cOndition

BANKS









BANKTOP, LAND-USE AND VEGETATION STRUCTURE (Section A)

Banktop criteria	Description						
B = Break in slope	first major break in slope; negative (e.g. where cultivation or development would be possible) or positive (e.g. under an older river terrace)						
S = Stable use	where stable land use (e.g. houses) can be recognized						
V = non-hygrophilic Vegetation	break-point between hygrophilic and non-hygrophilic vegetation (e.g. <i>Alnus</i> vs <i>Quercus</i>)						
T = Trashline	signs of high flow level (e.g. notches)						
R = Rock cover discontinuous	discontinuous cover of rocks/bedrock on the banks (e.g. vegetation or soil removed from side walls during spates)						
M = Meander	banktop cannot be indicated because the spot-check section crosses a river meander						
examples of:	<table border="0"> <tr> <td>hygrophilic vegetation</td> <td>non-hygrophilic vegetation</td> </tr> <tr> <td><i>Alnus, Fraxinus, Myricaria</i></td> <td><i>Acer, Carpinus, Castanea, Fagus</i></td> </tr> <tr> <td><i>Nerium oleander, Populus, Salix, Tamarix</i></td> <td><i>Picea, Quercus, Tilia</i></td> </tr> </table>	hygrophilic vegetation	non-hygrophilic vegetation	<i>Alnus, Fraxinus, Myricaria</i>	<i>Acer, Carpinus, Castanea, Fagus</i>	<i>Nerium oleander, Populus, Salix, Tamarix</i>	<i>Picea, Quercus, Tilia</i>
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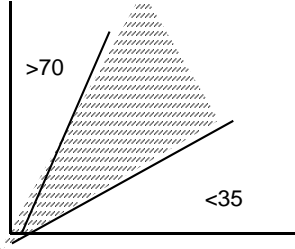
Land-use within 5m (Section A) & 50m (Section I) of banktop

Natural	Agriculture	Urban
BL = Broadleaf/mixed woodland (also semi-natural and Mediterranean forest) CW = Coniferous woodland (semi-natural) MN = Dehezza/Montado/Sugherete (semi-natural) MM = Mediterranean 'macchia' SH = Scrub & shrubs TH = Tall herb/rank vegetation GR = Natural grassland MH = Moorland/heat RD = Rock, scree or sand dunes OW = Natural open water WL = Wetland (e.g. bog, marsh, fen)	BP = Broadleaf/mixed plantation CP = Coniferous plantation EU = <i>Eucaliptus</i> plantation PO = <i>Populus</i> plantation OR = Orchard OL = Olive trees VI = Vineyard TL = Tilled land RP = grassland/pasture WM = Winter water meadows RF = Rice fields FM = Farming/Breeding	UR = Urban IN = Industry SU = sparse houses (Suburban development) WT = Water treatment plan MS = Main road (usually > 10.5m) SR = Road (usually < 10.5m) WR = White road/Muletrack RA = Railway QU = Quarrying PG = Parkland or gardens AW = Artificial open water

Banktop and Bankface vegetation structure - To be assessed within a 10m wide transect (Section A)

Banktop	Code	Description	Vegetation types
bare	B	bare earth/rock etc.	
uniform 	U	predominantly one type (no scrub or trees)	 bryophytes  short/creeping herbs or grasses
simple 	S	two or three vegetation types	 tall herbs/grasses  scrub or shrubs
complex 	C	four or more types	 saplings and trees

PHYSICAL ATTRIBUTES (Section B)

Bank material	Marginal and bank features	Slope of the bank
NV = Not Visible BE = BEdrock BO = BOulder CO = CObble GS = Gravel/Sand EA = EArth (crumbly) PE = PEat CL = sticky CLay CC = ConCrete SP = Sheet Piling WP = Wood Piling GA = GAbion BR = BRick/laid stone RR = Rip-Rap TD = Tipped Debris FA = FABric LR = Local Restoration BI = Blo-engineering materials CW = Crib Walls	NV = Not Visible (e.g. far bank) NO = NOne CN = CoNfluence NB = Natural Berm AB = Artificial Berm (two stage channel)	V = Vertical (>70°) S = Steep (35°-70°) G = Gentle (<35°)
	Bank modifications NK = not known NO = none RS = resectioned (reprofiled) RI(N) = reinforced* RT(N) = Reinforced Top only RE(N) = Reinforced toE only PC(B) = poached (bare) EM = embanked TR = trash + (N) if 'naturalistic' bank reinforcement	

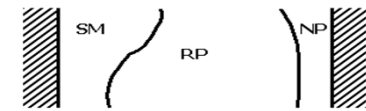
Selected Channel features (Section C₂)

- DR** = Dry channel. River channel thread/s is/are dry.
- CN** = Confluence(s). Where a river tributary enters the river under investigation.
- CB** = Concave bar(s). Depositional feature usually located at the concave bank of a river bend (external side) , in highly dynamic or meandering streams and rivers.
- AB** = Alternate bars. Side-bars located along the opposite margins of a river, alternatively distributed on one bank and on the other.
- TB** = Transverse bar(s). Depositional feature with a diagonal arrangement in the channel, emerged or partly submerged, being a natural slope adjustment structure.
- BS** = Bedscarp. A distinct change in grade in the bottom of a stream channel that moves progressively upstream. The change in grade may form a small waterfall. Also, the location where a streambed is actively eroding downward to a new base level. Built up with unstable river materials.
- NI** = Channel Nickpoint or Headcut. An abrupt break in slope in the river bed channel that forms a (usually small) "waterfall," which causes the underlying (consolidated) soil to dramatically erode.
- ER** = Exposed Roots visible in the channel (middle). Roots exposed or visible along the banks (TP) are recorded in sections H e K.
- ED** = Eroded alluvial deposits. When the erosion (usually in the river channel, but sometimes more visible along the banks) leads to ancient, consolidated deposits to
- LE** = Local erosion. Erosion at a clearly localized area (< 3m wide) e.g. base of the bank only, foot of a bridge.
- OD** = Over-deepened channel. When a river channel shows clear signs of incision, even at a quite restricted location.

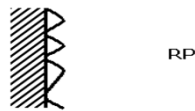
Flow-type (Section D)

Description

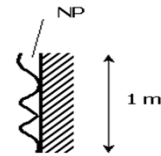
- NV** = not visible
 - FF** = free fall
 - CH** = chute flow
 - BW** = broken standing waves
 - UW** = unbroken standing waves
 - CF** = chaotic flow
 - RP** = rippled
 - UP** = upwelling
 - SM** = smooth
 - NP** = no perceptible flow
 - DR** = no flow (dry)
- clearly separates from back-wall of vertical feature - associated with waterfalls
 low curving fall in contact with substrate - often associated with cascades
 white-water tumbling waves must be present - mostly associated with rapids
 upstream facing wavelets which are not broken - mostly associated with riffles
 a chaotic mixture of three or more of the four fast flow-types with no predominant one obvious
 no waves, but general flow direction is downstream with disturbed rippled surface - mostly associated with runs
 heaving water as upwellings break at the surface - associated with boils
 perceptible downstream movement is smooth (no eddies) - mostly associated with glides
 no net downstream flow - associated with pools, ponded reaches and marginal deadwater
 dry river bed



Primary flow type = RP
Secondary flow type = NP



Primary flow type = RP
No secondary flow type



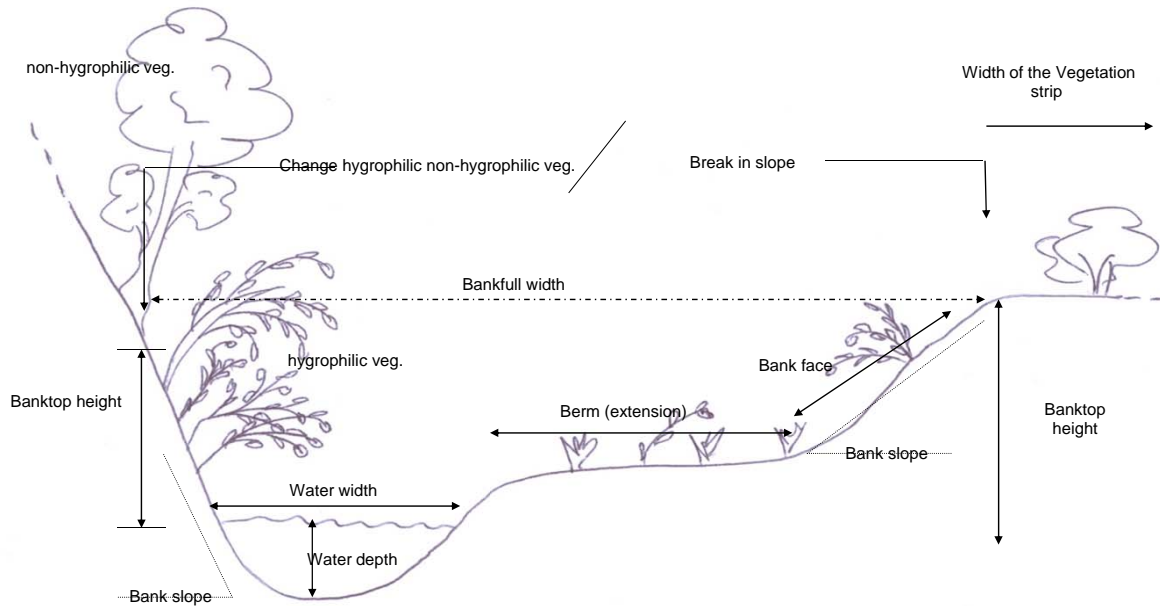
Primary flow type

The flow type occupying the greatest percentage of the cross section

Secondary flow type

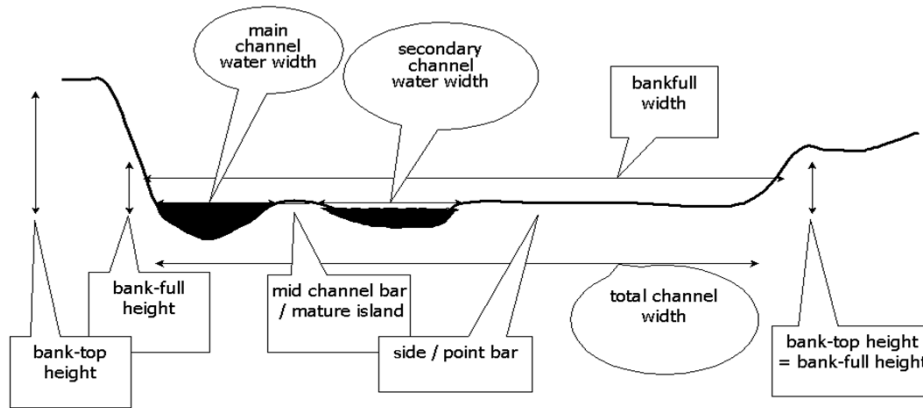
The second-most dominant flow-type of the cross section. This should be recorded even when relatively inferior to the primary flow type (small areas can be relevant for macroinvertebrates, fish or other biota). As a rough guide flow types occupying < 10% of the transect should be ignored

Channel Dimension Guidance (Sections A, B & E)



Definition of river features

- River bank** Permanent side to river
- Total channel width** Measured from the base of one bank to the base of the other, i.e. the width of the river bed
- River bed** The entire area between the base of the right bank and the left bank. Includes wetted area and dry bed (such as mid/side/point bars)
- Base of bank** The break in slope between the river bed and the river bank
- Number of wetted channels** The total number of distinct, flowing channels in the cross-section at the time of survey
- Water width primary/ secondary channels** To be measured/estimated for each transect



PHYSICAL ATTRIBUTES OF BANKS AND CHANNEL (Sections E/F)

EROSION/DEPOSITION FEATURES (Section E)

Banks	
Erosion/Habitat	Deposition
NV = Non Visible NO = No erosion feature EC = Eroding Cliff (<i>ring</i> if sandy substrates) SC = Stable Cliff (<i>ring</i> if sandy substrates) EB = Eroding Bank ET = Eroding bank, Top only EE = Eroding bank, base only TO = TOe LE = Local Erosion of the bank	NV = Non Visible NO = No deposition feature PB (b) = unvegetated Point bar VP (b) = Vegetated Point bar SB (b) = unvegetated Side Bar VS (b) = Vegetated Side bar AB = Alternate Bars CB = Concave Bar BB = Big Block SD = Sand Deposit SP = Sparse deposit (b) indicates the presence of a backwater area Possible causes of deposition /BB = Big Block /AR = Artificial

Channel																			
Deposition	Channel position																		
NV = not visible NO = none RO = exposed boulders EB = exposed bedrock VR = vegetated rock BB = Big Block MB = unvegetated mid-channel bar VB = vegetated mid-channel bar MI = mature island MU = Multiple bars Possible causes of deposition /BB = Big Block / Emergent rocks /AR = Artificial	<table border="1"> <thead> <tr> <th></th> <th>main channel</th> <th>secondary channel</th> </tr> </thead> <tbody> <tr> <td>RCL</td> <td>-</td> <td>-</td> </tr> <tr> <td>CL</td> <td>-</td> <td>-</td> </tr> <tr> <td>L</td> <td>-</td> <td>C</td> </tr> <tr> <td>L</td> <td>-</td> <td>RC</td> </tr> <tr> <td>C</td> <td>-</td> <td>R</td> </tr> </tbody> </table>		main channel	secondary channel	RCL	-	-	CL	-	-	L	-	C	L	-	RC	C	-	R
	main channel	secondary channel																	
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CHANNEL HABITAT AND MODIFICATION (Section F)

Channel substrate	Primary substrate type	Secondary substrate type
NV = not visible BE = bedrock BO = boulder CO = cobble GP = gravel/pebble (<i>ring</i> G or P if predominant) SA = sand SI = silt CL = clay PE = peat RR = rip rap CC = concrete AR = artificial	The substrate type occupying the greatest percentage of the cross section	The second-most dominant substrate-type of the cross section. Substrate types may be recorded as secondary <i>either</i> if they form discrete patches of differently sized material <i>or</i> if they are mixed with the primary substrate type.
	<p>Primary substrate type = BO Secondary substrate type = GP</p>	<p>Primary substrate type = BO Secondary substrate type = GP</p>

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CNR-IRSA, Italy

FIELD KEY

page 4

CHANNEL HABITAT AND MODIFICATION (Section F) - continues

Channel modification(s)	Channel modification indicators
NO = none CV = culverted RS = resectioned RI = reinforced DA = dam/weir/sluiice FO = ford (man made) TR = trash (urban debris)	1. Uniform bank profile 2. Straightened planform 3. Uniform / low energy flows 4. No trees / uniform-aged trees along the bank 5. Intensive / urban land use



_INHABIT feb11

ARTIFICIAL FEATURES* (Sections F & G)

Level of modification: major: m; intermediate: i; minor: s

Cross-sectional structure

B - Bridges

Major = with one or more in-channel supports and/or a very evident narrowing of the channel and /or massive presence of artificial structures in the channel

Intermediate = with supports on the lower banks and/or artificial narrowing of channel width

Minor = without in-channel supports, with no bank abutments (e.g viaducts); usually, resectioning is present

W - Weirs/Dams

Major = with one or more in-channel supports and/or a very evident narrowing of the channel and /or massive presence of artificial structures in the channel

Intermediate = semi-permanent structure extending across the entire width of the channel but permeable and not causing too high impediment to flow

Minor = small permeable and usually temporary structure

F - Fords

Major = crossing place with artificial bank and channel material

Intermediate = with supports on the lower banks and/or artificial narrowing of channel width

Minor = crossing place with no artificial bank or channel material

C - Culverts/Tunnels

Major = They determine an important narrowing of river channel ($\geq 30\%$) and/or there is not continuity of water and/or sediment from upstream to downstream. The length of the culvert is >4 times the width of the river.

Intermediate = They determine a small narrowing of river channel ($< 30\%$), there is continuity of water and sediment from upstream to downstream. The length of the culvert is higher than river width.

Minor = They do not determine a narrowing of river channel. There is continuity of water and sediment from upstream to downstream. The length of the culvert is smaller than river width.

Lateral structures

D - Deflectors/groyne/croy

Major = extend $\geq 30\%$ of channel width and/or it causes intensive erosion and deposition phenomena

Intermediate = extends 10-30% of channel width. If causes some erosion and deposition phenomena

Minor = extends $\leq 10\%$ of channel width. It does not causes particular erosion and deposition phenomena

O - Outfalls / I - Intakes (including pipes)

Major = extent along the bank $\geq 100\%$ channel width and/or ≥ 25 m and/or diameter of the outfall ≥ 1 m

Intermediate = extent along the bank $\geq 50\%$ channel width and/or 10-25 m long and/or diameter of the outfall ≥ 0.5 m

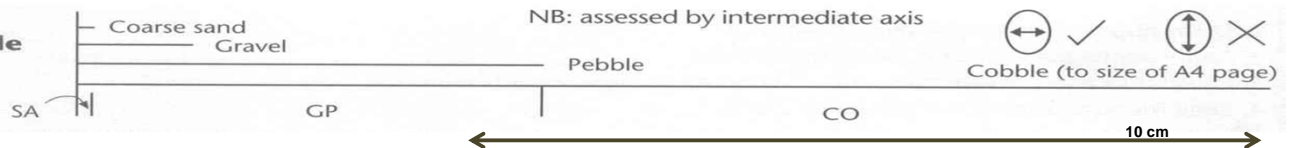
Minor = extent along the bank $< 50\%$ channel width, < 10 m long and diameter of the outfall < 0.5 m

Indicate here the position of the feature recorded in Section G (Artificial features) an



*if OD (over-deepened channel) is reported, indicate its maximum depth
 **circle Artificial feature code (reported in Section G) if eroded

Scale



CNR-IRSA Water Research Institute, Brugherio (MI), Italy - e-mail: caravaggio@irsa.cnr.it, tel ++39 039 216941, fax ++39 039 2004692
 The CARAVAGGIO method was developed with the collaboration of CNR-ISE (Pallanza, VB, I), APPA Bolzano (Italy), INAG (Lisbon, P) and University of Evora (P)