

# Instructions for calculating the Habitat Modification Score using River Habitat Survey data

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These rules were derived by the Environment Agency in 2003 and supersede the previous scoring system (Environment Agency, 1998).

## **HMS: Culverts sub-score**

### ***A) Spot-check Channel Modification – Culverts (CV)***

For each spot-check where CV is recorded and the associated entries for bank material, bank modification and channel substrate are all recorded as either NV or NK, score 400 points.

For each spot-check where CV is recorded and the associated entries for bank material, bank modification and channel substrate are not NV or NK, calculate scores as per rules *C) Spot-check Bank Material*, *D) Spot-check Bank Modification – Reinforced* and *G) Spot-check Channel Substrate*. Total these scores together and add a further 50 points to obtain the score for that spot-check.

Total up the scores for culverts recorded in spot-checks.

### ***B) Sweep-up Artificial Features – Culverts***

Subtract the number of occurrences of CV in spot-checks from the number of culverts recorded in Artificial Features and for each remaining culvert score 400 points.

e.g. if there are 4 culverts recorded in Artificial Features and 2 occurrences of CV in spot-checks you would score 800 points.

**To derive the HMS Culverts sub-score, total up the scores from rules A & B.**

## **HMS: Bank and Bed Reinforcement sub-score**

### ***C) Spot-check Bank Material***

Score appropriate points for each spot-check on the left bank which have the artificial bank materials listed below recorded. Exclude spot-checks which have already been used to calculate the culvert sub-score.

Bank Material	2003 acronym	'94-97 acronym	Points per spot-check
Concrete	CC	CC	40
Sheet piling	SP	SP	50
Wood piling	WP	WP	30
Gabions	GA	GA	40
Brick/laid stone	BR	BR	50
Rip rap	RR	RR	40
Tipped debris	TD	BW	20
Bioengineering	BI	-	20
Fabric	FA	-	10

Repeat for the right bank and add together the scores for both banks.

#### D) Spot-check Bank Modification – Reinforced (RI)

Score 20 points for each spot-check on the left bank which does not have artificial bank material but has RI recorded for the bank modification. Exclude spot-checks which have already been used to calculate the culvert sub-score.

Repeat for the right bank and add together the scores for both banks.

#### E) Sweep-up Bank Profiles – Reinforced

**If a culvert is recorded in spot-checks or Artificial Features ignore this rule and proceed to rule F.**

If there is no RI bank modification recorded for spot-checks on the left bank, score points as per the table below for left bank reinforcement recorded in sweep-up.

Bank Profile	Points for Present	Points for Extensive
Reinforced whole bank	40	160
Reinforced top only	20	80
Reinforced toe only	20	80

Repeat for the right bank and add together the scores for both banks.

#### F) Sweep-up Artificial Features – Revetments (1997 survey format only)

If there is no artificial bank material or bank reinforcement recorded at spot-checks or in sweep-up, score points as per the table below for revetments.

Artificial Structure	Points for Major	Points for Intermediate	Points for Minor
Revetment	50	25	10

#### G) Spot-check Channel Substrate

Score 200 points for each spot-check where AR is recorded as the channel substrate. Exclude spot-checks where channel modification is FO or which have already been used to calculate the culvert sub-score.

### **H) Spot-check Channel Modification – Reinforcement (RI)**

Score 200 points for each spot-check which does not have AR recorded for channel substrate but has RI recorded for the channel modification. Exclude spot-checks which have already been used to calculate the culvert sub-score.

**To derive the HMS Bank and Bed Reinforcement sub-score, total up the scores from rules C–H.**

## **HMS: Bank and Bed Resectioning sub-score**

### ***I) Spot-check Bank Modification – Resectioned (RS)***

Score 40 points for each left bank spot-check which has RS recorded for bank modification.

For surveys conducted between 2003 and 2005, add 40 points for each spot-check where EM is recorded with no associated RS.

Repeat for the right bank and add together the scores for both banks.

### ***J) Sweep-up Bank Profiles – Resectioned***

If there is no RS bank modification recorded for spot-checks on the left bank, score points for left bank resectioning recorded in sweep-up. If resectioned is present score 40 points, or if it is extensive score 160 points.

Repeat for the right bank and add together the scores for both banks.

### **K) Spot-check Channel Modification – Resectioned (RS)**

Score 200 points for each spot-check which has RS recorded as channel modification.

### ***L) Sweep-up Channel Modification – Over-deepened (2003 survey format only)***

If RS is not recorded as the channel modification at any spot-check score points for channel obviously over-deepened in Artificial Features. If over-deepening is recorded as present score 40 points, or if it is extensive score 160 points.

**To derive the HMS Bank and Bed Resectioning sub-score, total up the scores from rules I–L.**

## **HMS: Berms & Embankments sub-score**

### ***M) Spot-check Bank Modification – Berms (BM)***

Score 20 points for each left bank spot-check which has BM recorded for bank modification.

Repeat for the right bank and add together the scores for both banks.

**N) Spot-check Bank Modification – Embankments (EM)**

Score 20 points for each left bank spot-check which has EM recorded for bank modifications.

Repeat for the right bank and add together the scores for both banks.

**O) Sweep-up Bank Profiles – Artificial two-stage**

If there is no BM bank modification recorded for spot-checks on the left bank, score points for artificial two-stage channel recorded for the left bank in sweep-up. If artificial two-stage is present score 20 points, or if it is extensive score 80 points.

Repeat for the right bank and add together the scores for both banks.

**P) Sweep-up Bank Profiles – Embanked**

If there is no EM bank modification recorded for spot-checks on the left bank, score points for embanked recorded for the left bank in sweep-up. If embanked is present score 20 points, or if it is extensive score 80 points.

Repeat for the right bank and add together the scores for both banks.

**Q) Sweep-up Bank Profiles – Set-back Embankment**

Score 4 points if set-back embankment is recorded as present on the left bank. If it is recorded as extensive score 16 points.

Repeat for the right bank and add together the scores for both banks.

**To derive the HMS Berms and Embankments sub-score, total up the scores from rules M–Q.**

**HMS: Weirs/Dams/Sluices sub-score**

**R) Sweep-up Artificial Features – Weirs/dams/sluices**

For 1996, 1997 and 2003 survey formats;

Score 75 points if 'is water impounded by weir/dam?' is recorded as present in <33% of the site. Score 300 points if it recorded as being present in >33% of the site.

For 1997 & 2003 survey formats, Score points as per the table below for each weir and sluice recorded in Artificial Features.

Artificial Structure	Points for Major	Points for Intermediate	Points for Minor
Weir/sluice	300	180	50

For 1994, 1995 & 1996 survey formats all weirs score 300 points each.

**To derive the HMS Weirs/Dams/Sluices sub-score, total all the points scored for impoundment and weirs and sluices.**

## **HMS: Bridges sub-score**

### ***S) Sweep-up Artificial Features – Bridges***

Score points as per the table below for each bridge recorded in Artificial Features.

<b>Artificial Structure</b>	<b>Points for Major</b>	<b>Points for Intermediate</b>	<b>Points for Minor</b>
Bridge	250	200	100

For 1994, 1995 & 1996 survey formats, footbridges are considered as minor and roadbridges are considered major.

**To derive the HMS Bridges sub-score, total all the points scored for bridges.**

## **HMS: Poaching sub-score**

### ***T) Spot-check Bank Modification – Poaching (PC or PC(B))***

Score 10 points for each left bank spot-check which has PC or PC(B) recorded for bank modification.

Repeat for the right bank and add together the scores for both banks.

### ***U) Sweep-up Bank Profiles – Poached***

If there is no PC or PC(B) bank modification recorded for spot-checks on the left bank, score points for poached recorded for the left bank in sweep-up. If poached is present score 10 points, or if it is extensive score 40 points.

Repeat for the right bank and add together the scores for both banks.

**To derive the HMS Poaching sub-score, total up the scores from rules T-U.**

## **HMS: Fords sub-score**

### ***V) Sweep-up Artificial Features – Fords***

Score points as per the table below for each ford recorded in Artificial Features.

Artificial Structure	Points for Major	Points for Intermediate	Points for Minor
Ford	200	120	40

For all survey formats prior to 2003, all fords were recorded as major.

**To derive the HMS Fords sub-score, total all the points scored for fords.**

## **HMS: Outfalls/Deflectors sub-score**

### ***W) Sweep-up Artificial Features – Outfalls***

Score points as per the table below for each outfall recorded in Artificial Features.

Artificial Structure	Points for Major	Points for Intermediate	Points for Minor
Outfall	100	50	25

For all survey formats prior to 2003, all outfalls score 25 points each.

### ***X) Sweep-up Artificial Features – Deflectors***

Score points as per the table below for each deflector recorded in Artificial Features.

Artificial Structure	Points for Major	Points for Intermediate	Points for Minor
Deflector	150	100	50

For all survey formats prior to 2003, all deflectors score 50 points each.

**To derive the HMS Outfalls/Deflectors sub-score, total up the scores from rules W-X.**

## **HMS final site score**

To derive the total HMS score, add up all of the sub-scores above.

Use the table below to assign the Habitat Modification Class.

HMC	HMC Description	HMS Score
1	Pristine/semi-natural	0-16
2	Predominantly unmodified	17-199
3	Obviously modified	200-499
4	Significantly modified	500-1399
5	Severely modified	1400+