Habitat Modification Score Rules version 2003
Version 1 (2018)

Introduction
The Habitat Modification scoring system was corrected and updated in 2018. The scoring systems includes a new sub-score category that was not included in previous versions: the sub-score for realignment.

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.

<table>
<thead>
<tr>
<th>Bank Material</th>
<th>2003 acronym</th>
<th>‘94-97 acronym</th>
<th>Points per spot-check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>CC</td>
<td>CC</td>
<td>40</td>
</tr>
<tr>
<td>Sheet piling</td>
<td>SP</td>
<td>SP</td>
<td>50</td>
</tr>
<tr>
<td>Wood piling</td>
<td>WP</td>
<td>WP</td>
<td>30</td>
</tr>
<tr>
<td>Gabions</td>
<td>GA</td>
<td>GA</td>
<td>40</td>
</tr>
<tr>
<td>Brick/laid stone</td>
<td>BR</td>
<td>BR</td>
<td>50</td>
</tr>
</tbody>
</table>
Hydromorphology and geomorphology guidelines
Hydromorphological indices derivation

Produced by Riverdene Consultancy, 05/03/2017.
www.riverdeneconsultancy.com;  www.riverhabitatsurvey.org

<table>
<thead>
<tr>
<th>Rip rap</th>
<th>RR</th>
<th>RR</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tipped debris</td>
<td>TD</td>
<td>BW</td>
<td>20</td>
</tr>
<tr>
<td>Bioengineering</td>
<td>BI</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Fabric</td>
<td>FA</td>
<td>-</td>
<td>10</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Bank Profile</th>
<th>Points for Present</th>
<th>Points for Extensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reinforced whole bank</td>
<td>40</td>
<td>160</td>
</tr>
<tr>
<td>Reinforced top only</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>Reinforced toe only</td>
<td>20</td>
<td>80</td>
</tr>
</tbody>
</table>

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

F) 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.

G) 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 where channel modification is FO or 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–G.

HMS: Bank and Bed Resectioning sub-score

H) Spot-check Bank Modification – Resectioned (RS)
Score 40 points for each left bank spot-check which has RS recorded for bank modification.
Repeat for the right bank and add together the scores for both banks.

I) Sweep-up Bank Profiles – Resected
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.

J) Spot-check Channel Modification – Resected (RS)
Score 200 points for each spot-check which has RS recorded as channel modification.

K) 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 200 points, or if it is extensive score 800 points.

To derive the HMS Bank and Bed Resectioning sub-score, total up the scores from rules H–K

**HMS: Realigned sub-score**

L) Sweep-up Channel Modification – Realignment (2003 survey format only)
If channel realignment is recorded as present score 100 points, or if it is extensive score 400 points.

**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.

<table>
<thead>
<tr>
<th>Artificial Structure</th>
<th>Points for Major</th>
<th>Points for Intermediate</th>
<th>Points for Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weir/sluice</td>
<td>300</td>
<td>180</td>
<td>50</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Artificial Structure</th>
<th>Points for Major</th>
<th>Points for Intermediate</th>
<th>Points for Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge</td>
<td>250</td>
<td>200</td>
<td>100</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Artificial Structure</th>
<th>Points for Major</th>
<th>Points for Intermediate</th>
<th>Points for Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ford</td>
<td>200</td>
<td>120</td>
<td>40</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Artificial Structure</th>
<th>Points for Major</th>
<th>Points for Intermediate</th>
<th>Points for Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outfall</td>
<td>100</td>
<td>50</td>
<td>25</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Artificial Structure</th>
<th>Points for Major</th>
<th>Points for Intermediate</th>
<th>Points for Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deflector</td>
<td>150</td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>

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.

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**HMS Score and categories**

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

Use the table below to assign the Habitat Modification Class.

<table>
<thead>
<tr>
<th>HMC</th>
<th>HMC Description</th>
<th>HMS Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pristine/semi-natural</td>
<td>0-16</td>
</tr>
<tr>
<td>2</td>
<td>Predominantly unmodified</td>
<td>17-199</td>
</tr>
<tr>
<td>3</td>
<td>Obviously modified</td>
<td>200-499</td>
</tr>
<tr>
<td>4</td>
<td>Significantly modified</td>
<td>500-1399</td>
</tr>
<tr>
<td>5</td>
<td>Severely modified</td>
<td>1400+</td>
</tr>
</tbody>
</table>
Appendices
The appendices include rules for prior versions of the RHS form and manual.

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.

<table>
<thead>
<tr>
<th>Artificial Structure</th>
<th>Points for Major</th>
<th>Points for Intermediate</th>
<th>Points for Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revetment</td>
<td>50</td>
<td>25</td>
<td>10</td>
</tr>
</tbody>
</table>

R) Sweep-up Artificial Features – Weirs/dams/sluices
For 1994, 1995 & 1996 survey formats all weirs score 300 points each.

W) Sweep-up Artificial Features – Outfalls
For all survey formats prior to 2003, all outfalls score 25 points each.

X) Sweep-up Artificial Features – Deflectors
For all survey formats prior to 2003, all deflectors score 50 points each.