

Appendix D

Qualitative Habitat Evaluation Index (QHEI) Scores for the Bokes Creek Basin

In the guidance document “Association Between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers and Streams” (Ohio EPA, 1999), the importance of habitat quality is discussed as below:

Ohio EPA uses the Qualitative Habitat Evaluation Index (QHEI; Rankin, 1989, 1995) to assess the physical habitat quality of streams and rivers. This index measures the important components of lotic macrohabitat that are essential to sustaining high value aquatic communities. The major categories of macrohabitat include substrate quality, instream cover (physical structure), stream channel morphology and condition, riparian quality and bank erosion, pool and run-riffle quality, and gradient. Comparisons between the QHEI and IBI resulted in a list of critical habitat components associated with the occurrence of IBI scores corresponding with the Warmwater Habitat (WWH) or Exceptional Warmwater Habitat (EWH) biocriteria (“warmwater attributes”) and a list of components that are associated with degraded communities (high and moderate influence “modified attributes”; Rankin, 1989, 1995). These modified attributes were further divided into “high” influence or “moderate” influence attributes based on the statistical strength of the relationships. By examining a combined database of least impacted reference sites and physically modified reference sites essentially free from point source associated chemical impacts, a relationship was developed between the IBI and the accrual of modified habitat attributes.

The “associations report” goes on to discuss how the accumulation of attributes representative of a modified condition increases, the likelihood that a stream will attain a WWH use designation is decreased. This phenomenon is depicted in Table D-1.

Table D-1. Modified habitat attributes and percent attainment.

Number of Modified Habitat Attributes	Percentage of Streams That May Attain a Warmwater Habitat Use Designation.
4	< 50%
6	< 25%
7	rare occurrence

The associations report gives the following as guidance for assessing future implementation of Best Management Practices (BMPs):

As a “rule of thumb”, goals for BMPs and habitat restoration should strive to reduce

the number of modified attributes (moderate influence) to four or fewer, reduce the number of modified to warmwater attributes to less than 6, and eliminate all high influence modified attributes. These measures are needed to have a reasonable probability of attaining the WWH biocriteria.

Figure D-1 presents a flow chart that may be useful for evaluating a watershed or stakeholder group's approach to BMP implementation in a watershed. Table D-2 provides the detailed QHEI results from the 1999 Bokes Creek water quality survey. These results can be used in conjunction with the processes depicted in Figure D-1 and the types of BMPs to be implemented to evaluate the likelihood of attaining a WWH use designation.

Procedure for Incorporating Habitat into the TMDL Process to Protect “Near-Field” Aquatic Life

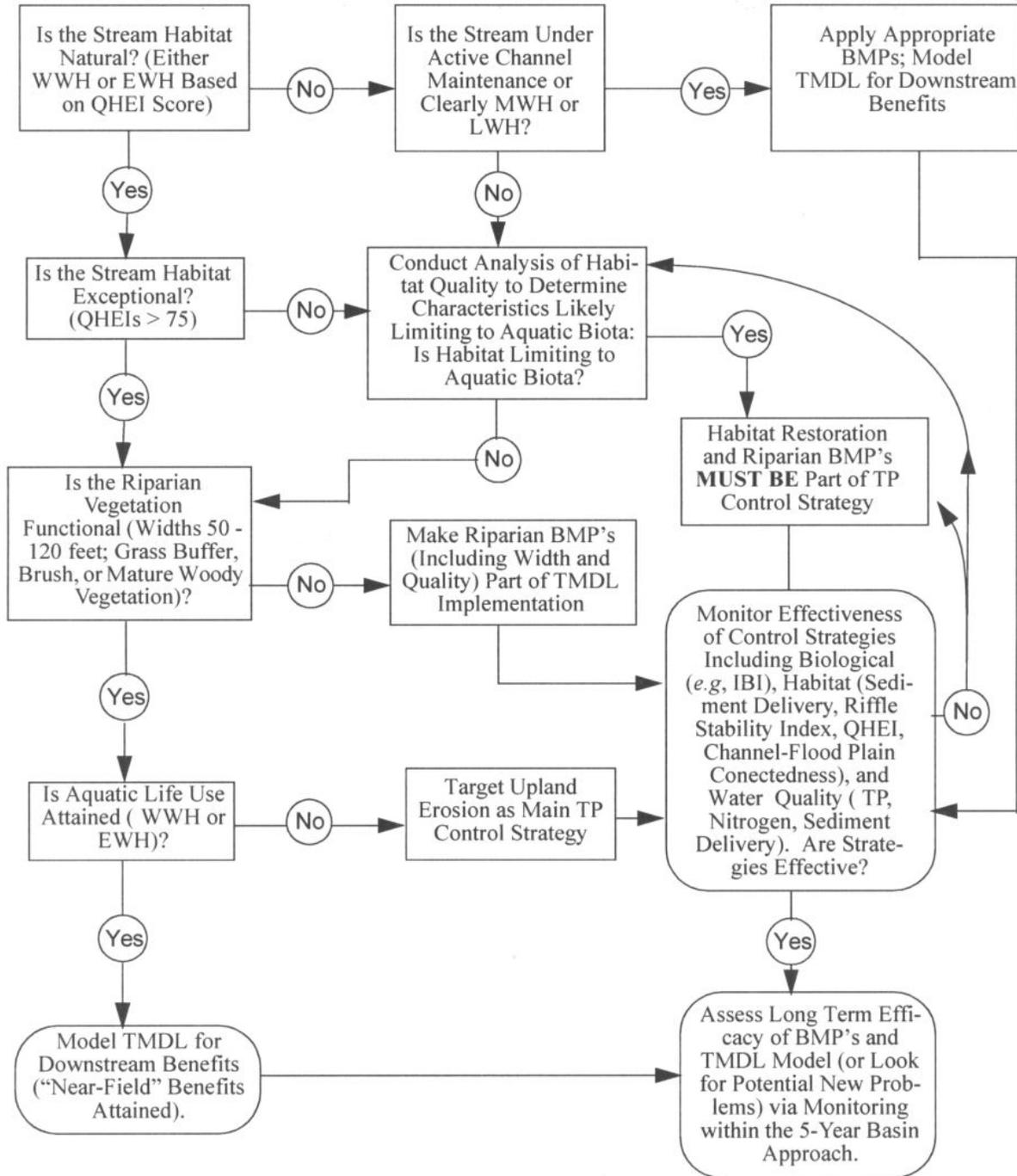


Figure D-1. Evaluation of habitat in BMP implementation (Ohio EPA, 1999).

Table D-2. (Continued)

River Mile	QHEI	Gradient (ft/mile)	WWH Attributes										MWH Attributes										Total M.L. MWH Attributes	(MWH H.I.+1)/(QHEI+1) Ratio	(MWH M.L.+1)/(QHEI+1) Ratio		
			No Channelization or Recovered Boulder/Cobble/Gravel Substrates	Silt Free Substrates	Good/Excellent Substrates	Moderate/High Sinuosity	Extensive/Moderate Cover	Fast Current/Vedgies	Low-Normal Overall Embedment	Max Depth > 4ft cm	Low-Normal Riffle Embedment	Total WWH Attributes	Channelized or No Recovery Silt/Muck Substrates	No Sinuosity	Sparse/No Cover	Max Depth < 40 cm (WD, HW)	Total H.I. MWH Attributes	Receiving Channel	Heavy/Moderate Silt Cover	Sand Substrates (Bcal)	Hardpan Substrate Origin	Fair/Poor Development				Low Sinuosity	Only 1-2 Cover Types
(02-227) North Fork West Mansfield Trib.																											
Year 1999																											
5.6	15.0	9.43	[Patterned]							0	[Patterned]			5	[Patterned]							8	6.00	*. **			
(02-228) Brush Run																											
Year 2000																											
0.5	49.0	5.95	[Patterned]							5	[Patterned]			2	[Patterned]							5	0.50	1.33			
(02-330) Trib. to Powderlick Run																											
Year 1999																											
0.1	52.0	20.00	[Patterned]							3	[Patterned]			2	[Patterned]							6	0.75	2.25			
(02-331) S. Br. W. Fk. West Mansfield Creek																											
Year 2000																											
0.1	51.0	5.38	[Patterned]							6	[Patterned]			1	[Patterned]							6	0.29	1.14			