

# Aquatic Life Rationales

Rationale for Segments and Parameters Proposed  
for Inclusion in  
Regulation No. 93

Water-Quality-Limited Segments Requiring  
Total Maximum Daily Loads  
(303(d) List)

October 4, 2011

**Comparison with Aquatic Life Thresholds:** Thresholds are established based on analysis of the biological condition at reference sites in each of three biotypes.

| Biotype |                | Attainment Threshold | Impairment Threshold |
|---------|----------------|----------------------|----------------------|
| 1       | Transition     | 52                   | 42                   |
| 2       | Mountains      | 50                   | 42                   |
| 3       | Plains & Xeric | 37                   | 22                   |

- Class 2 water bodies: When the MMI score falls within the gray zone (between the attainment and impairment thresholds discussed above) and the site is from a Class 2 stream, the stream is considered to be in support of the use.
- Class 1 water bodies: An MMI score in the gray zone for site on a Class 1 water requires examination of additional information – see Subsection 4 below.

**Recognition of Class 1 / Class 2 Distinction:** The Hilsenhoff Biotic Index and the Shannon Diversity Index are used as auxiliary metrics that supplement the MMI for Class 1 waters with MMI scores between the attainment and impairment thresholds. If a Class 1 site fails to meet the criteria shown in Table 2 for either auxiliary metric, the site will be considered impaired. For Class 2 waters, the premise that these “waters are not capable of sustaining a wide variety of cold or warm biota, including sensitive species” mitigates the need to further confirm attainment or impairment through use of auxiliary metrics. Accordingly, for Class 2 waters, a single threshold provides the basic determinant between attainment and impairment (see Table 1). Auxiliary metrics are not applicable to Class 2 waters.

| Biotype |                | Hilsenhoff Biotic Index | Shannon Diversity Index |
|---------|----------------|-------------------------|-------------------------|
| 1       | Transition     | <5.4                    | >2.4                    |
| 2       | Mountains      | <5.1                    | >3.0                    |
| 3       | Plains & Xeric | <7.7                    | >2.5                    |

## Aquatic Life Use Attainment Assessment Summary

**Segment WBID:** COSPBE01a

**Segment Description:** Mainstem of Bear Creek from the boundary of the Mt. Evans Wilderness area to the inlet of Evergreen Lake.

**Designation:** Reviewable

**Use Classifications:** Aquatic Life Cold 1, Recreation E, Water Supply, Agriculture

**Assessed Portion:** Bear Creek

**WBID/HUC Code:** COSPBE01a

**Collection Date of Sampling Event:** 20-Sep-10

**Organization:** WQCD

**Waterbody Class:** Class 1

**Biotype:** Biotype 1

| Date      | Location                          | Multimetric Index Score (MMI) | Hilsenhoff Biotic Index (HBI) | Shannon Diversity Index |
|-----------|-----------------------------------|-------------------------------|-------------------------------|-------------------------|
| 20-Sep-10 | Bear Creek at Key of the Green GC | 36.75                         | 3.5432526                     | 1.233836653             |

### Existing Water Quality Data:

Water Quality data for this segment currently exists, however all parameters have been evaluated and the segment is meeting the assigned standards. The WQCD anticipates collecting additional water quality and biological data for this segment in the next few years to continue the investigation into potential sources.

### Attainment Conclusions:

Multimetric Index (MMI) scores were calculated for the 2012 listing cycle, utilizing the Water Quality Control Commission's (WQCC) Policy 10-1, Aquatic Life Use Attainment. In accordance with Section 303(d) Listing Methodology for the 2012 Listing Cycle, approved by the Water Quality Control Commission in March 2011, this segment will be provisionally listed as impaired for Aquatic Life Use.

**Comparison with Aquatic Life Thresholds:** Thresholds are established based on analysis of the biological condition at reference sites in each of three biotypes.

| <b>Table 1. Aquatic Life Use Thresholds</b> |                |                      |                      |
|---|----------------|----------------------|----------------------|
| Biotype                                     |                | Attainment Threshold | Impairment Threshold |
| 1   | Transition     | 52                   | 42                   |
| 2   | Mountains      | 50                   | 42                   |
| 3   | Plains & Xeric | 37                   | 22                   |

- Class 2 water bodies: When the MMI score falls within the gray zone (between the attainment and impairment thresholds discussed above) and the site is from a Class 2 stream, the stream is considered to be in support of the use.
- Class 1 water bodies: An MMI score in the gray zone for site on a Class 1 water requires examination of additional information – see Subsection 4 below.

**Recognition of Class 1 / Class 2 Distinction:** The Hilsenhoff Biotic Index and the Shannon Diversity Index are used as auxiliary metrics that supplement the MMI for Class 1 waters with MMI scores between the attainment and impairment thresholds. If a Class 1 site fails to meet the criteria shown in Table 2 for either auxiliary metric, the site will be considered impaired. For Class 2 waters, the premise that these “waters are not capable of sustaining a wide variety of cold or warm biota, including sensitive species” mitigates the need to further confirm attainment or impairment through use of auxiliary metrics. Accordingly, for Class 2 waters, a single threshold provides the basic determinant between attainment and impairment (see Table 1). Auxiliary metrics are not applicable to Class 2 waters.

| <b>Table 2. Auxiliary Metric Thresholds For Class 1 Waters with MMI Scores Between the Attainment and Impairment Thresholds</b> |                |                         |                         |
|---|----------------|-------------------------|-------------------------|
| Biotype   |                | Hilsenhoff Biotic Index | Shannon Diversity Index |
| 1   | Transition     | <5.4                    | >2.4                    |
| 2   | Mountains      | <5.1                    | >3.0                    |
| 3   | Plains & Xeric | <7.7                    | >2.5                    |

## Aquatic Life Use Attainment Assessment Summary

**Segment WBID:** COSPBE01e

**Segment Description:** Mainstem of Bear Creek from the outlet of Evergreen Lake to the Harriman Ditch.

**Designation:** Reviewable

**Use Classifications:** Aquatic Life Cold 1, Recreation E, Water Supply, Agriculture

**Assessed Portion:** Bear Creek

**WBID/HUC Code:** COSPBE01e

**Collection Date of Sampling Event:** 20-Sep-10

**Organization:** WQCD

**Waterbody Class:** Class 1

**Biotype:** Biotype 1

| Date      | Location                   | Multimetric Index Score (MMI) | Hilsenhoff Biotic Index (HBI) | Shannon Diversity Index |
|-----------|----------------------------|-------------------------------|-------------------------------|-------------------------|
| 20-Sep-10 | Bear Creek below Evergreen | 39.1                          | 3.76190476                    | 3.208339786             |

### Existing Water Quality Data:

Water Quality data for this segment currently exists, however all parameters have been evaluated and the segment is meeting the assigned standards. The WQCD anticipates collecting additional water quality and biological data for this segment in the next few years to continue the investigation into potential sources.

### Attainment Conclusions:

Multimetric Index (MMI) scores were calculated for the 2012 listing cycle, utilizing the Water Quality Control Commission's (WQCC) Policy 10-1, Aquatic Life Use Attainment. In accordance with Section 303(d) Listing Methodology for the 2012 Listing Cycle, approved by the Water Quality Control Commission in March 2011, this segment will be listed as impaired for Aquatic Life Use.

**Comparison with Aquatic Life Thresholds:** Thresholds are established based on analysis of the biological condition at reference sites in each of three biotypes.

| <b>Table 1. Aquatic Life Use Thresholds</b> |                |                      |                      |
|---|----------------|----------------------|----------------------|
| Biotype                                     |                | Attainment Threshold | Impairment Threshold |
| 1   | Transition     | 52                   | 42                   |
| 2   | Mountains      | 50                   | 42                   |
| 3   | Plains & Xeric | 37                   | 22                   |

- Class 2 water bodies: When the MMI score falls within the gray zone (between the attainment and impairment thresholds discussed above) and the site is from a Class 2 stream, the stream is considered to be in support of the use.
- Class 1 water bodies: An MMI score in the gray zone for site on a Class 1 water requires examination of additional information – see Subsection 4 below.

**Recognition of Class 1 / Class 2 Distinction:** The Hilsenhoff Biotic Index and the Shannon Diversity Index are used as auxiliary metrics that supplement the MMI for Class 1 waters with MMI scores between the attainment and impairment thresholds. If a Class 1 site fails to meet the criteria shown in Table 2 for either auxiliary metric, the site will be considered impaired. For Class 2 waters, the premise that these “waters are not capable of sustaining a wide variety of cold or warm biota, including sensitive species” mitigates the need to further confirm attainment or impairment through use of auxiliary metrics. Accordingly, for Class 2 waters, a single threshold provides the basic determinant between attainment and impairment (see Table 1). Auxiliary metrics are not applicable to Class 2 waters.

| <b>Table 2. Auxiliary Metric Thresholds For Class 1 Waters with MMI Scores Between the Attainment and Impairment Thresholds</b> |                |                         |                         |
|---|----------------|-------------------------|-------------------------|
| Biotype   |                | Hilsenhoff Biotic Index | Shannon Diversity Index |
| 1   | Transition     | <5.4                    | >2.4                    |
| 2   | Mountains      | <5.1                    | >3.0                    |
| 3   | Plains & Xeric | <7.7                    | >2.5                    |

## Aquatic Life Use Attainment Assessment Summary

**Segment WBID:** COSPBE02

**Segment Description:** Mainstem of Bear Creek from the outlet of Bear Creek Reservoir to the confluence with the South Platte River.

**Designation:** Reviewable

**Use Classifications:** Aquatic Life Warm 1, Recreation E, Water Supply, Agriculture

**Assessed Portion:** Bear Creek

**WBID/HUC Code:** COSPBE02

**Collection Date of Sampling Event:** 8-Jan-09, 25-May-06

**Organization:** WQCD, Riverwatch

**Waterbody Class:** Class 1

**Biotype:** Biotype 1

| Date      | Location            | Multimetric Index Score (MMI) | Hilsenhoff Biotic Index (HBI) | Shannon Diversity Index |
|-----------|---------------------|-------------------------------|-------------------------------|-------------------------|
| 8-Jan-09  | Bear Cr Pierce St   | 45                            | 6.21686747                    | 3.447175449             |
| 25-May-06 | Bear Creek at mouth | 31.4901426                    | 6.15625                       | 2.711222645             |

### Existing Water Quality Data:

Water Quality data for this segment exists with the following exceedances: *E.coli*

### Attainment Conclusions:

Multimetric Index (MMI) scores were calculated for the 2012 listing cycle, utilizing the Water Quality Control Commission's (WQCC) Policy 10-1, Aquatic Life Use Attainment. In accordance with Section 303(d) Listing Methodology for the 2012 Listing Cycle, approved by the Water Quality Control Commission in March 2011, the Division proposes that this segment be provisionally listed as impaired for Aquatic Life Use.