

***Biological Assessments: Assessing
Multiple Samples from the Same AU***

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Statement of the Issue

- Just as is the case for any water quality parameter, there is a distribution of scores for the Index of Biotic Integrity (IBI) for any particular sample site, with mean, variance, etc.
- Variability of the IBI has not previously been considered in assessing ALU support.



Guidance for 2008 IR

- The average of two or more IBI scores is compared to the aquatic life use point score ranges for fish, and for benthic macroinvertebrates, depending on what field protocols were followed.
- If sample results from multiple events are very different, the reasons will be determined, if possible, and it will be determined if the samples are appropriate for use.
- An aquatic life concern is identified when only one sample event is available for assessment and nonsupport of the use is indicated.

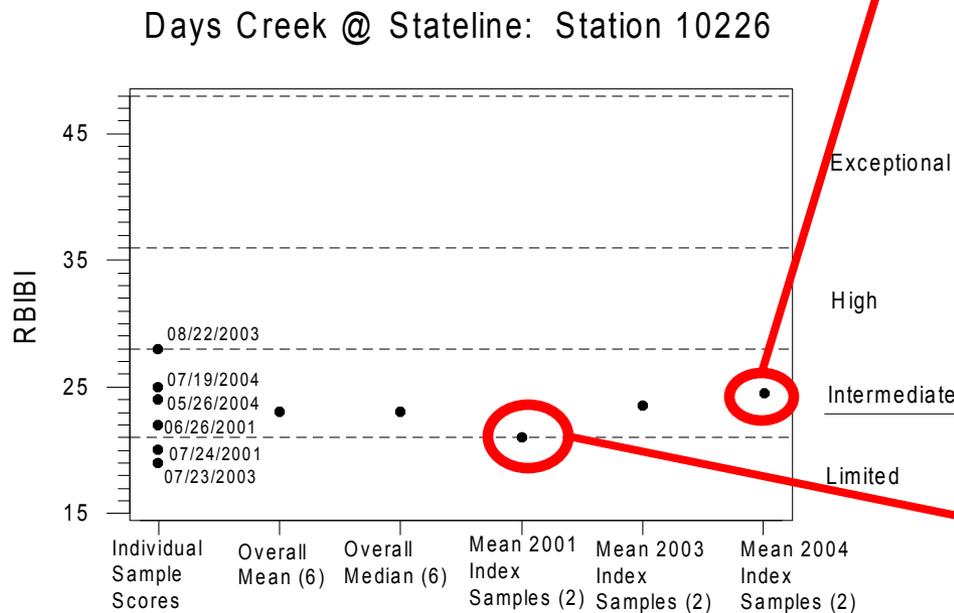


Determining Appropriate Aquatic Life Use (ALU) Category for Mean of Multiple IBI Scores from a Single Sample Site: Addressing Variability of IBI Scores

IBI scores at a stream show variability:

- single sample dates
- means for multiple samples

ALU determination straight forward when average falls mid-range for ALU category



-ALU determination Problematic when the average of multiple IBI scores falls at, or very close to ALU threshold.

-- Current Guidance, this would be interpreted as Limited ALU.

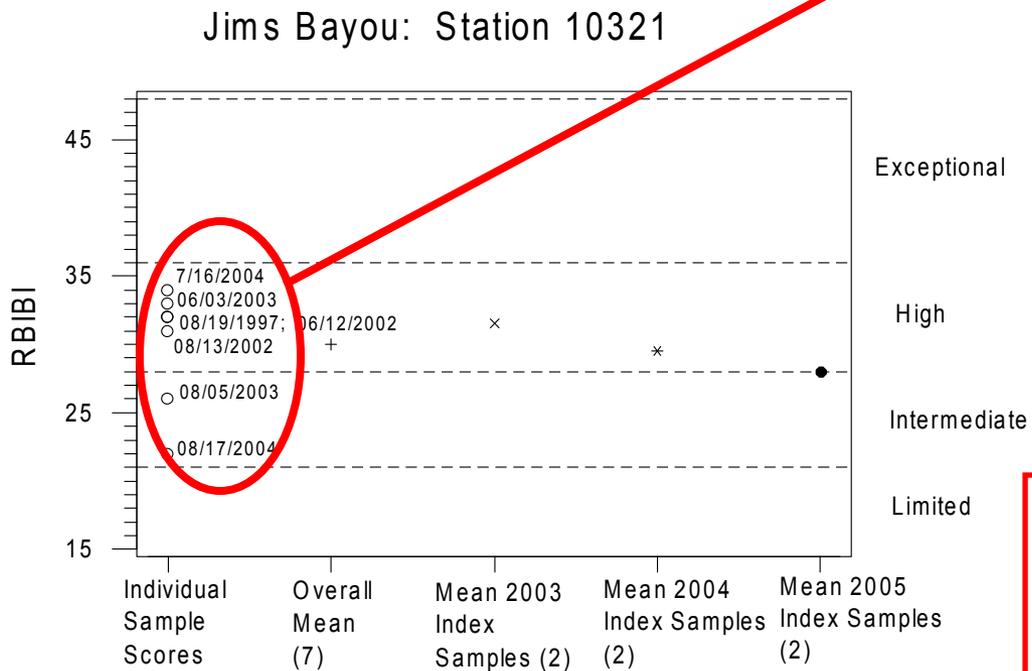


Determining Appropriate Aquatic Life Use (ALU) Category for Mean of Multiple IBI Scores from a Single Sample Site: Addressing Variability of IBI Scores

- The TCEQ and TPWD interagency workgroup on biological monitoring undertook an analysis of the variability of IBI scores.
- Approximately 290 fish and benthic macroinvertebrate sample sets were evaluated.
- Analysis restricted to sample sets with multiple paired samples (benthic macroinvertebrates and fishes) at a single site.
- The coefficient of variability (CV) was calculated for each sample set at each site.



Determining Appropriate Aquatic Life Use (ALU) Category for Mean of Multiple IBI Scores from a Single Sample Site: Addressing Variability of IBI Scores



Mean = 30
Std. Dev. = 4.36

Coefficient of Variation:
Std. Dev./Mean = 0.14

These statistics were calculated for each of the 290 sample sets from least disturbed ecoregion reference streams.

Proposed Guidance for 2010 IR

Ecoregion/ALU category specific coefficients of variation (CV) for use with **fish** samples. Each CV represents the average of all ecoregion/ALU category specific pairwise comparisons used to derive the CV's. The number of pairwise comparisons used to calculate the average is given in parentheses.

Aquatic Life Use	Ecoregion					
	24	25,26	27,29,32	30	33,35	34
			Fish			
Exceptional	2.22% (2)	-	6.28% (6)	4.41% (9)	3.87% (6)	-
High	6.13% (46)	-	6.95% (118)	5.14% (144)	5.61% (245)	6.04% (9)
Intermediate	7.6% (25)	4.1% (5)	6.4% (165)	7.92% (36)	5.86% (211)	3.3% (6)
Limited	8.25% (42)	14.29% (1)	12.82% (75)	-	6.66% (86)	3.85% (1)

The number of pairwise comparisons used to calculate the average is given in parentheses.



Proposed Guidance for 2010 IR

Ecoregion/ALU category specific coefficients of variation (CV) for use with **benthic macroinvertebrate** samples. Each CV represents the average of all ecoregion/ALU category specific pairwise comparisons used to derive the CV's.

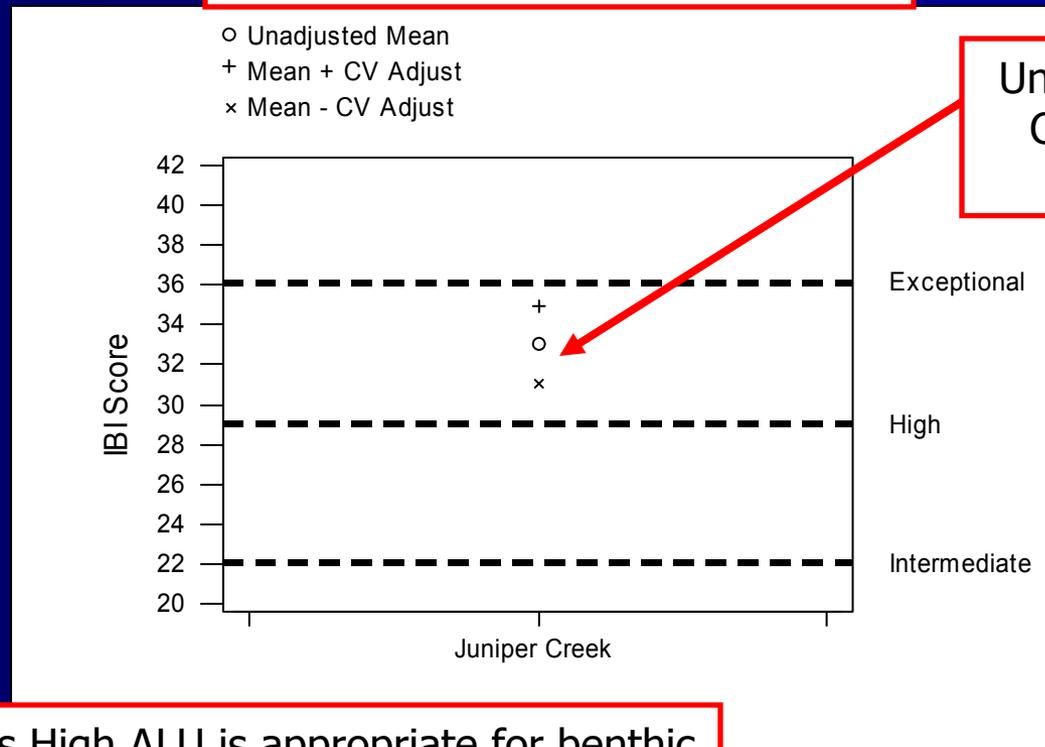
Aquatic Life Use	Ecoregion				
	27,29,32	30	31	33,35	34
	Benthic Macroinvertebrates				
Exceptional	-	6.47% (6)	-	4.45% (6)	-
High	5.22% (24)	5.95% (40)	6.90% (1)	6.28% (56)	5.09% (9)
Intermediate	6.06% (23)	6.43% (13)	8.76% (2)	8.98% (76)	6.31% (7)
Limited	9.78% (5)	-	-	7.42% (12)	-

The number of pairwise comparisons used to calculate the average is given in parentheses.



Proposed Guidance for 2010 IR

Juniper Creek with Unadjusted Mean IBI Score—High ALU



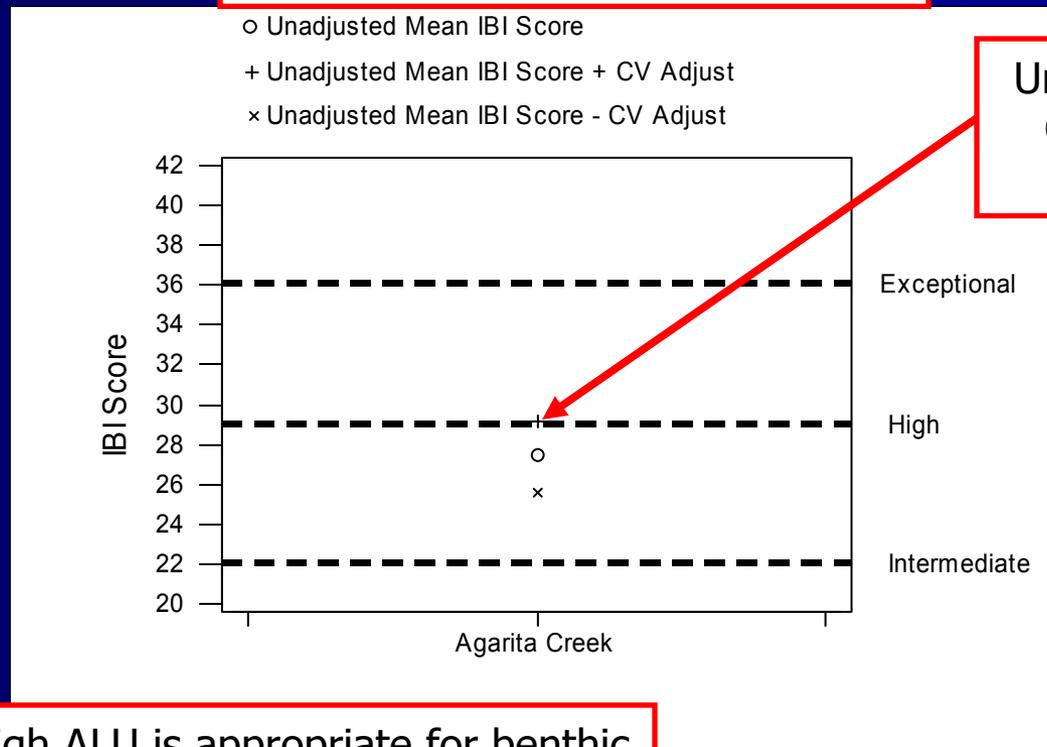
Unadjusted mean + CV adjust falls in High ALU

Indicates High ALU is appropriate for benthic macroinvertebrates in Juniper Creek, designated High ALU supported.



Proposed Guidance for 2010 IR

Agarita Creek with Unadjusted Mean IBI Score—Intermediate ALU



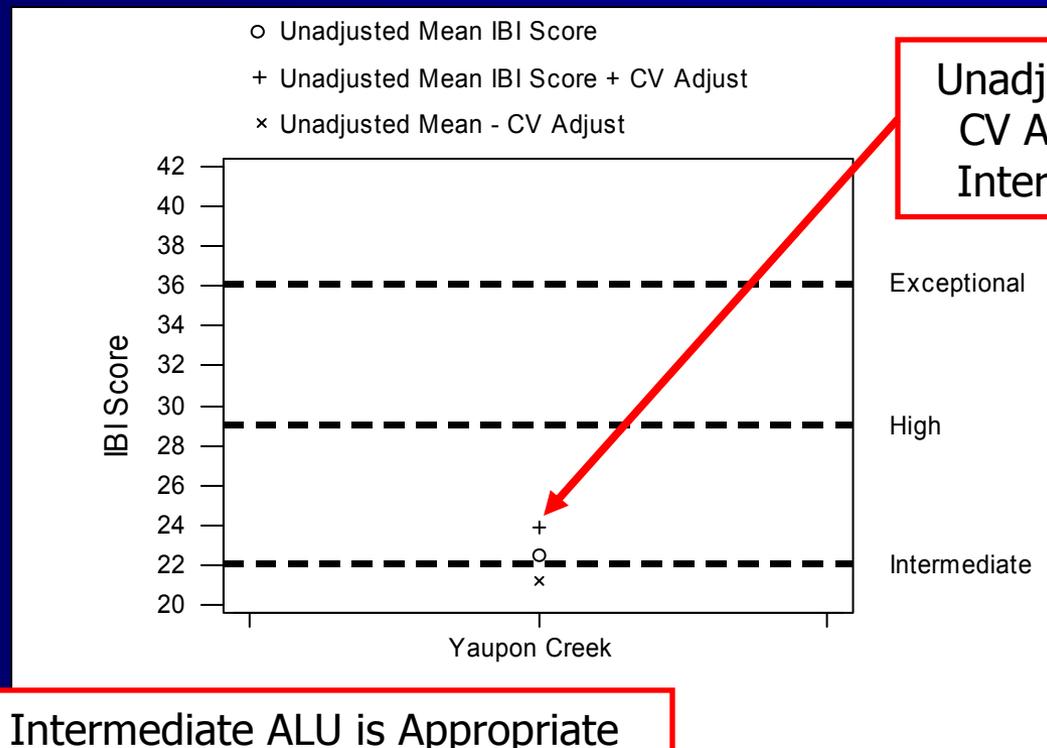
Unadjusted mean + CV adjust falls in High ALU

Indicates High ALU is appropriate for benthic macroinvertebrates in Agarita Creek, designated High ALU supported.



Proposed Guidance for 2010 IR

Yaupon Creek with Unadjusted Mean IBI Score—Intermediate ALU



Unadjusted Mean + CV Adjust Falls in Intermediate ALU

Indicates Intermediate ALU is Appropriate for Benthic Macroinvertebrates in Yaupon Creek, Designated High ALU Not Supported.

Proposed Guidance for 2010 IR

- To assess attainment of the ALU category for an assessment unit (AU), the mean of a minimum of two samples collected from each of one or more representative sites within the AU will be used in conjunction with the ecoregion Coefficient of Variability (CV) for the designated ALU.
- All samples from all of the sites in the AU will be used to calculate the mean for that AU.
- If it is determined that a site is not representative of aquatic habitat in the AU, then results for bioassessments conducted at that site will not be included in the calculation of the mean.
- The highest ALU category included in the interval described about the mean by the CV will be used to determine attainment.



Proposed Guidance for 2010 IR

- If separate samples from an assessment unit fall in different aquatic life use categories and the CV for the samples is greater than twice the ecoregion CV for the ALU category containing the mean.
- Then the water body will be identified as a concern, and additional data collection will be scheduled.
- Identification of the water body as a concern will occur even if the mean indicates support of the designated use.

