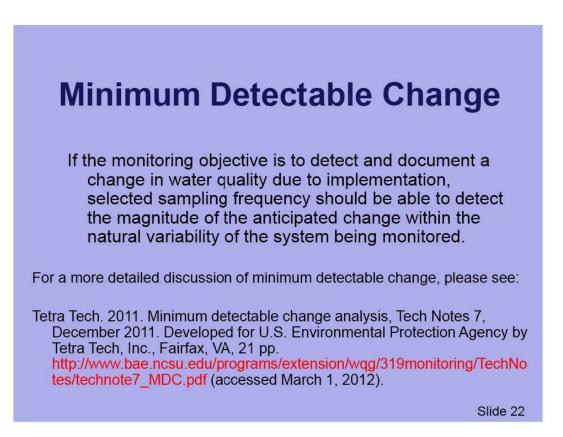
"Watershed Effectiveness Monitoring" - Don Meals and Steve Dressing, Tetra Tech, Inc.

An error was discovered in the equation for Minimum Detectable Change. The following information corrects the error and replaces slides 22-26 of the webcast.



Minimum Detectable Change

For a Step Change

$$MDC = t_{(n_{pre} + n_{post}^{-2})} \qquad \sqrt{\frac{MSE}{n_{pre}} + \frac{MSE}{n_{post}}}$$

Where:

t = the one-sided 2-sided Student's t value with $(n_{pre}+n_{post}-2)$ degrees of freedom (in this case selected at p=.05),

n = the number of samples taken in the pre- and post- groups (The pre- and post-BMP periods can have different sample sizes but should have the same sampling frequency), and

$$\begin{split} \text{MSE} &= \text{s}_{\text{p}}^2 = \text{Estimate of the pooled Mean Square Error (MSE) or,} \\ \text{equivalently, variance } (\text{s}_{\text{p}}^2) \text{ within each period. If post-BMP data are} \\ \text{not available, no autocorrelation is present, and no explanatory} \\ \text{variables are appropriate, MSE or s}_{\text{p}}^2 \text{ can be estimated by the} \\ \text{variance (square of the standard deviation) of pre-BMP data.} \\ \end{split} \\ \begin{array}{l} \text{Slide 23} \end{array}$$

Equation in Slide 23:

$$MDC = t_{(n_{pre}+n_{post}-2)} \sqrt{\frac{MSE}{n_{pre}} + \frac{MSE}{n_{post}}}$$

Minimum Detectable Change

Example:

Based on historical monitoring data from the Arod River, annual mean TSS concentration is 36.9 mg/L, with a standard deviation of 21.2 mg/L.

Evaluate the minimum detectable change for weekly, monthly, and quarterly sampling 1 year before and 1 year after implementation of erosion control measures

Slide 24

Minimum Detectable Change

Weekly sampling (n = 52), MSE = 449.44 t for 102 d.f. at p = 0.05 is 1.6599 MDC = 6.90 mg/L = 100*(6.90/36.9) = 19% Monthly sampling (n = 12), MSE = 449.44 t for 22 d.f. at p = 0.05 is 1.7171 MDC = 14.86 mg/L = 100*(14.86/36.9) = 40% Quarterly sampling (n = 4), MSE = 449.44 t for 6 d.f. at p = 0.05 is 1.9432 MDC = 29.13 mg/L = 100*(29.13/36.9) = 79%

Slide 25

Minimum Detectable Change

If a reduction of 25% in mean annual TSS concentration is a goal of an implementation project, a weekly sampling schedule could document such a change with statistical confidence, but monthly sampling could not.

A reduction of 40% or more in TSS concentration would need to occur to be detected by monthly sampling.

 Quarterly sampling for TSS would be ineffective for this project

Slide 26

Link in Slide 22 for additional information on minimum detectable change analysis:

http://www.bae.ncsu.edu/programs/extension/wqg/319monitoring/TechNotes/technote7_MDC.pdf