

Binomial Approaches

December 9, 2004

Handout # 1

Discussion on the binomial approach is needed at the December 9 meeting because we have:

- no recommendation for continuing to use binomial as it is currently employed in assessment guidance
- no recommendation on acceptable level for Type 1 Error on listing or delisting
- no recommendation on acceptable level for Type 2 Error on listing or delisting

Suggested Listing Approaches:

When a water body actually exceeds just above the threshold of 10% (or 25% for bacteria) of the time, control for about 20% chance of Type 1 error (this is current listing approach; perhaps a few adjustments could be made for a few combinations of exceedances/number of samples)

Control for about a 10% chance of Type 1 error (requires more exceedances (and samples) than current listing practice)

Control for about a 50% chance of Type 1 error (requires fewer exceedances than current listing practice)

For all approaches, consider Type 2 error when near the threshold and when water quality conditions are worse (exceeds 20%, 30%, 50% of the time)

Suggested Delisting Approaches:

Control Type 1 error (for delisting in error) at about 50 %

Control Type 1 error (for delisting in error) at about 20 %

Keep current null hypothesis for assessing most recent data for both currently listed waters and those currently supporting or not previously assessed. Control Type 2 error when relisting at about 20% when poor water quality is not in doubt (rather than controlling Type 1 error when reassessing listed water bodies as is current practice).

Delist with one less than the number of samples required for listing

Delist with one less than the number of samples required for listing and review the mean of samples that exceed the criterion. Don't delist if:

- ▶ mean is greater than twice the criterion for acute toxicity,
- ▶ more than 1 ppm lower than the DO criterion
- ▶ more than 1 pH unit higher than the pH criterion
- ▶ more than 1 degree F higher than the temperature criterion
- ▶ delist bacteria only if geometric mean is less than criterion
- ▶ for ambient sediment toxicity - use line of evidence

If listed for one 303(d) cycle, delist with one less than listing (see above); if listed for two cycles or where TCEQ has taken restoration actions, then control Type 1 error on delisting at about 20%.

CIP Approaches

Do stakeholders agree that the CIP (Confidence Interval on a Percentile) is superior to the binomial approach for most parameters because it considers both the frequency and magnitude of the exceedances?

Suggested Listing Approaches:

For water bodies not currently listed...no more than 20% chance of Type 1 error for listing a water body that is not impaired, i.e., (for high pH) the lower confidence interval for the 90th percentile must exceed the criterion before listing

Suggested Delisting Approaches:

For water bodies that are currently listed...no more than 20% chance of Type 1 error when delisting a water body that has been previously identified as impaired, i.e., (for high pH) the upper confidence interval for the 90th percentile must be lower than the criterion before delisting