**From:** "Jensen, Paul A" <Paul.Jensen@atkinsglobal.com>
**To:** Michele.Blair@tceq.texas.gov
**CC:** Laurie.Curra@tceq.texas.gov
**Date:** 6/30/2011 12:03 PM
**Subject:** RE: SWQMGAWG Follow-up

## Recreational use assessments:

Please refer to the attached graph related to the effects of increasing sample size on confidence intervals for the 68 new impairments identified in 2010. This was requested at the meeting.

Should the TCEQ consider using sample size or confidence intervals to increase the certainty related to identifying new impairments?

Looking at the attached figure along with the larger figure of all units sent later suggests to me that sample size is at best indirectly related to confidence interval, and probably not related at all. The reason is that there are many factors contributing to EC (and EN) data variance. If you had an "IDEXX probe" that logged EC levels every 15 minutes for 5 years, I expect you'd still have about the same variance. Obviously some stations have more variance than others due to watershed characteristics (slope, impervious cover, amount of storage, etc). A small sample size might miss some high values and there is also the concern that some sampling entities are learning how to avoid high numbers in their sampling.

I think there is little to be gained in statistical exercises on bacteria monitoring data. Much more would be gained by focusing on the monitoring program to better target correctable anthropogenic factors.

Should this method be extended to the evaluation of recreational uses in tidal water (Enterococcus)?

I see no reason for separate data screening and analysis techniques.

Which method could be used to address delistings?

Listing and delisting should be same, except perhaps with a lag function to prevent oscillations between the list/no-list state. I can't imagine a technical basis for different thresholds for listing and delisting.

## Assessment of Nutrient Criteria:

For reservoirs included in Appendix G of the draft 2010 WQS, the TCEQ is proposing to assess Chlorophyll a data from dam sites only to determine attainment of the standard for the entire reservoir. A suggestion was made to evaluate Chlorophyll a for "Concerns" only at all other sites in these reservoirs with numeric criteria. Should other nutrient parameters be evaluated for "Concerns" in these reservoirs based on screening levels? For all other waterbodies (without numeric criteria), nutrient concerns will be assessed as they have been historically.

**TPWD Comments on TCEQ 2012 Guidance Proposals**
**Following Stakeholder Meeting on June 16, 2011**
**July 1, 2011**

The Texas Parks and Wildlife Department appreciates the opportunity to provide comment on the 2012 Guidance Proposals presented by TCEQ staff at the Surface Water Quality Monitoring Guidance Advisory Workgroup meeting held on June 16, 2011. We commend your efforts and your dedication to protecting water quality in our state. We concur with most of the proposed revisions but do have specific comments concerning those related to contact recreation, nutrients, and dissolved oxygen.

Recreational Use Assessments

We are supportive of the application of 80$^{th}$ percentile confidence intervals around the bacteria concentration geometric mean for determining attainment of recreational use. Similar to biological assessments, where confidence intervals are already being applied to determine aquatic life use attainment, their application in the contact recreation arena should result in a better reflection of the true water body condition, minimize the number of assessments that falsely indicate contact recreation use has been impacted, and provide a more dependable means of detecting when true changes have occurred so that appropriate action can be initiated.

We have concerns, however, with increasing the minimum number of samples required for contact recreation evaluation from 10 to 30. This increase would result in many more water bodies being classified as not assessed. Forty-five percent of the 1077 assessment units that had 10 or more *E. coli* samples taken within the 2010 Integrated Report period of record were based upon less than 30 samples. Although we recognize that a minimum number of samples are necessary, we do not believe this increase is supported by the data presented. For instance, it does not appear that confidence intervals uniformly become narrower with an increase in sample size (which could have been one justification for requiring a larger sample size). Interpretation of confidence interval size is also complicated by the possibility that some water bodies may have had a large sample size because of attainment issues. We suspect this given that the percent of water bodies that exceed the criteria increases with sample size. Assessment units with greater than 100 samples have 40% non-attainment, whereas those with less than 50 samples are less than 23%. We therefore recommend keeping the minimum number of samples required at 10.

We recommend that some minimum number (perhaps 200 colonies/100 mL) be adopted (regardless of whether the confidence intervals extend below the criteria) that would trigger TCEQ to taking a closer look at the water body for attainment purposes, such as including the water body on the concerns list.

TPWD would also be supportive of the application of confidence intervals and a trigger value in tidal waters should an analysis similar to what was provided for freshwater systems warrant its use. TPWD would be interested in reviewing this data prior to its implementation.

Last, we recommend that geometric mean of water bodies on the 303(d) list be required to attain the appropriate recreational use criteria prior to delisting. It is not appropriate to use a confidence interval procedure to delist water bodies.

Golden Algae

The placement of concerns about golden algae under the narrative criteria for nutrient enrichment seems out of place. The relationship between nutrients and toxin formation are not well established. A better indicator would be TDS. We therefore recommend moving this information to the end of the "Chloride, Sulfate, and Total Dissolved Solids" section and changing it to read as "Physicochemical conditions, including TDS, can stimulate a bloom of golden algae and the subsequent formation of toxins by *Prymnesium parvum*. The excessive growth of golden algae is identified as a concern or impairment for general use attainment."

Application of Regression Equations for Site Specific DO Calculations

We support the use of the developed regression formulas for determining dissolved oxygen use attainment on a site specific basis. One concern, however, is that these formulas require a flow value for the water body being assessed. Participants at the workgroup meeting indicated flows are not always taken. In the absence of measured flow, we recommend that default criteria be used rather than listing the water body as not assessed.

Reservoir Nutrient Criteria

We support using dam site data to assess reservoirs that have numeric chlorophyll-*a* criteria. However, it is well-understood that dam sites do not provide an accurate representation of entire reservoirs. As a result, water quality data are collected at numerous stations within reservoirs. It is important to evaluate all the data that are collected. We recommend that data from all reservoir stations be evaluated for Concerns based on screening levels. Using data in this manner may help to detect problems early and provide an opportunity to correct them prior to exceedance of numeric criteria at the dam site.

**Tischler/Kocurek**
107 South Mays Street
Round Rock, Texas 78664

July 1, 2011

Via email

Ms. Michele Blair
Aquatic Scientist
Surface Water Quality Monitoring
Texas Commission on Environmental Quality

Re: 2012 Guidance for Assessing and Reporting Surface Water Quality in Texas

Dear Michele:

I appreciated the opportunity to participate in the June 16th Surface Water Quality Monitoring (SWQM) Advisory Work Group meeting. The comments in this letter follow up on my comments at the meeting. Also, the additional bacteria data that you provided was very helpful with respect to the issue of statistical analysis for recreational use assessments.

Recreational Use Assessments

The proposed approach to use a confidence interval on the geometric mean bacteria of data for a specific assessment unit (AU) to support evaluation of potential listing is an important enhancement to the SWQM methodology. My recommendation is to use the confidence interval on the geometric mean of the bacterial indicator counts as a basis for determining whether a unit should be listed as impaired. I see one approach as follows (all assume that the minimum data requirements are met, i.e., at least 10 samples):

1. If the geometric mean and both the upper and lower confidence intervals on the bacteria counts are below the bacteria standard the assessment unit meets the bacteria standard and the recreation use is attained (category 1).

2. If the geometric mean and both the upper and lower confidence intervals on the bacteria counts are above the bacteria standard the assessment unit does not achieve the bacteria standard and the recreation use is impaired. The unit should be placed on the category 5a list for TMDL scheduling.

3. If the geometric mean is below the standard but the upper confidence interval exceeds the standard then additional monitoring should be scheduled but the AU should be categorized as attainment (category 1).

4. If the geometric mean and upper confidence level exceed the standard, then the AU data should be analyzed by TCEQ SWQM staff to determine if the segment should be placed on the category 5c list.

One point that I made at the meeting is that selection of the confidence interval (e.g., 80%, 90%, 95%) on the geometric mean should take into consideration that the higher the probability level selected the wider will be the confidence interval. For example, the two-sided 90% confidence interval (used in TCEQ's example) actually translates to a 5% probability that the geometric mean exceeds the upper confidence. An 80% confidence interval on the mean gives a 10% probability that the "true" mean exceeds the upper bound (or is lower than the lower bound). TCEQ should consider reducing the confidence interval probability to 80% because it will reduce the effect of the extreme high and low bacteria concentrations on the confidence intervals and make interpretation less likely to be subject to infrequent extreme values.

In response to TCEQ's question, this approach should be applied to all bacteria standards — freshwater and marine/estuarine.

Nutrient assessments

I agree with the recommendation to use chlorophyll a data from other stations within a reservoir to identify potential concerns. With respect to data on the nutrients themselves (nitrogen and phosphorus), I think TCEQ should perform the same analysis that they have been using in the past and identify AUs where the nutrient concentrations exceed guidelines, but such identification should not be listed as a "concern" but rather serve as the basis for additional data collection.

Regression equations for site-specific dissolved oxygen assessments

In these cases, I recommend entering into the equation the 0.1 cubic feet/second (cfs) that TCEQ uses as the threshold for defining an intermittent stream. I don't believe that using a zero (0) flow value in the equations because the flow in the equations (0.01 cfs) is only there to assure that the logarithm value is determinate — it is not actually a flow.

Censored data

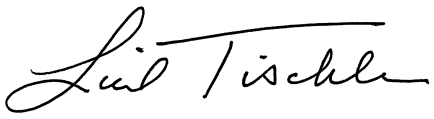
I strongly recommend that TCEQ use a statistical method designed for censored data sets whenever surface water quality monitoring data for a parameter consists of greater than 10% censored values (i.e., below reporting/detection limits). Substitution methods such as one-half the reporting limit, zero, or the reporting limit can result in severely biased estimates of the mean and variance of the monitoring data.

There are several approaches that can be used to evaluate censored databases. I provided TCEQ with several references for your consideration. I personally favor Cohen's maximum likelihood estimator (MLE) method, but other methods are also available.

I don't have any additional comments on the methods proposed for evaluating toxic constituent water quality criteria and sampling the near and surface layers. The approaches proposed by the SWQM staff are scientifically defensible and practical.

If you have any questions about these comments, please contact me.

Sincerely,



Lial F. Tischler, Ph.D., P.E., B.C.E.E
Partner

**RE:** Surface Water Quality Monitoring Team's Guidance Advisory Workgroup Comments

Ms. Blair:

The Texas Department of Agriculture (TDA) recognizes water quality standards revisions are a complex and difficult regulatory challenge and we applaud and support the Texas Commission on Environmental Quality (TCEQ) for undertaking these revisions and for the opportunity to comment.

**Recreational use assessments:**

TDA supports the tiered approach TCEQ has initiated for recreational stream classification and offers the following suggestions. TDA recommends TCEQ consider applying a higher minimum number of data sets in the revised water quality standards for bacteria. Due to the wide variability in Texas climate and individual watershed characteristics TDA believes requiring a minimum of 30 samples over 10 years would adequately provide sound scientific data to evaluate a fresh or inland saline waterbody as impaired. Generating sufficient data over this 10 year period to confirm the impairment would increase stakeholder confidence in the assessment process. TDA also supports requiring a minimum of 30 samples over 10 years in the evaluation of recreational uses in tidal waters. TDA recommends TCEQ use the geometric mean of 5-10 samples over a period of 1-5 years to delist a stream segment.

**Application of Regressions Equations for Site Specific DO calculations:**

TDA supports the use of DO samples taken only during periods of measured flow.

Thank you for allowing TDA to participate in this complex and difficult revision process. We look forward to continuing working on these and other shared concerns and issues in the future.

Richard Eyster, P.G.

Evaluation& Safety Specialist

Pesticide Division

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July 1, 2011

Michele Blair
Aquatic Scientist
Surface Water Quality Monitoring
Texas Commission on Environmental Quality
P.O. Box 11087
Austin, TX 78701-1087

Re: Comments on Surface Water Quality Assessment Guidance Concepts

Dear Ms. Blair:

The National Wildlife Federation (NWF) appreciates the opportunity to participate in the Surface Water Quality Monitoring Guidance Advisory Workgroup (Workgroup) and provide these comments on issues related to the Texas Commission on Environmental Quality's (TCEQ) Assessment Guidance for 2012. NWF appreciates that the June 16, 2011 meeting was a starting point for establishing several important new approaches for the assessment of water quality and recognizes the value in starting the discussion well before critical decisions have been made. However, NWF also believes that additional opportunities for public participation are needed as new approaches move closer to a complete proposal. At this juncture, NWF is able to provide comments only on general approaches.

NWF is providing these broad comments in an attempt to provide as much input as possible to help inform the TCEQ's development of draft guidance for the 2012 Assessment. However, NWF also specifically requests an opportunity to review and comment on the draft 2012 assessment guidance document before it is finalized.

One broad concern resulting from the discussion at the meeting is that some of the changes being discussed could create the potential for a reduction in the geographic scope of waters being assessed. That is a major concern. Specific aspects of that issue are discussed below. However, as a general proposition, we want to emphasize TCEQ's obligation to identify significant issues affecting water quality, and establish a strategic monitoring and assessment of water quality in each watershed and river basin of the state. In its simplest articulation, NWF believes it is critical to maximize the geographic extent of the surface waters in the state covered by the assessment.

NWF recognizes the relationship between flow and water quality and supports the concept, proposed by TCEQ, of coupling flow data with water quality data in the assessment. The methods to quantitatively measure flow are well established and are broadly used. It is important that the flow data used consist of actual measurements of stream discharge. Use of

qualitative characterizations is not an adequate substitute for the use of measured flow data. NWF is not aware of any other measurable variable that is allowed to be estimated for purposes of the assessment.

If the agency is unable to ensure that data collectors gather both water quality (chemical/biological) and flow data, then the assessment guidance should define procedures for use of the water quality data without attempting to characterize flow. It is extremely important not to, in effect, create a disincentive for collecting flow data. Simply put, the data collected must be sufficient to allow actual assessment of compliance with the water quality standards. TCEQ either needs to ensure that adequate flow data are collected or needs to discontinue using standards that are so heavily flow dependent.

**Contact Recreation**

The current assessment procedures were developed through exhaustive coordination and participation by a variety of stakeholders. As TCEQ staff presented at the 6-16-11 meeting, the current methods provide a somewhat conservative determination of use support, maximizes the use of data, and consider long term averages. However, it is essential to recognize the huge change in the underlying water quality standards that has reduced the level of protectiveness of the standards themselves. Any potential changes to assessment methodology must be considered in the context of those changes to the standards.

TCEQ presented "disadvantages" of the current method as not being appropriate to determine risk due to instantaneous exposure and not accounting for data variability. TCEQ has made no recommendation on any method that would determine the risk from instantaneous exposure for *E. Coli* samples, and in fact the agency excludes single sample violations as cause for listing a water body. The alternative methods proposed all involve serious deficiencies. NWF does not support a change to the current assessment methods for identifying water bodies that are impaired for contact recreation use based on exceedance of the *E. Coli* criteria. Any waterbody with a minimum of 10 samples collected during the previous seven years should be assessed for impairment of recreational uses based on the geometric mean.

TCEQ has three categories of impairment (5a- TMDL to be initiated, 5b- WQS need to be evaluated, 5c- additional data collection needed.) If the TCEQ determines it is necessary to improve the agency's confidence before allocating resources to implement corrective actions for bacteria criteria impairments, those steps should come into play in placing impairments into those categories. Based on the case study presented at the 6-16-11 meeting and subsequent communications, NWF does not see a clear indication that increased sample size significantly reduces the variability of samples consistently.

The presentation at the meeting illustrated that requiring a higher number of samples to conduct an assessment would result in fewer water bodies being assessed unless additional resources were allocated to increase the number of samples collected. Given the TCEQ's goal of reducing, not increasing, resource demands, the proposal to increase the required minimum sample size should be eliminated. The resulting reduction in assessments is not a reasonable result and is inconsistent with statutory directives.

In recognition of the agency's stated need to address data variability to increase confidence before allocating resources for implementation of corrective actions, NWF is cautiously supportive of further discussion of the use of the confidence interval or other statistically valid data analysis approach for use in determining if impairments merit corrective action. The agency needs to be clear in the purpose of any method change such as use of a confidence interval and needs to ensure an even-handed approach in applying such a method. For example, if the intent is to develop a more robust statistical approach to evaluating the probability of criteria violations, how will water bodies with geometric means below the criteria but with the confidence intervals extending significantly above the criteria be assessed?

In evaluating any such approach, a full analysis of the variability of all *E. Coli* data from the 2010 assessment would be useful in addition to the analysis of impaired water bodies that was provided to the workgroup. Are there common features between water bodies that exhibit similar ranges of variation? Could consideration of these features help guide restoration efforts? The agency should also give consideration to setting a maximum value for the geometric mean above which a water body is listed in category 5a regardless of the confidence interval. Any changes to the requirements for listing waters should have similar changes to the requirements for delisting. NWF does not support changes to the methods for evaluation of recreational uses in tidal water at this time. NWF acknowledges the very recent distribution of additional information, but has not been able to review that information in advance of providing these comments.

The results of site-specific Recreational Use Attainability Analysis (RUAA) studies should not be used for the assessment until the RUAA results have completed a full public participation process such as a triennial water quality standards revision.

**Nutrient Criteria**

If the 2010 nutrient criteria are approved by EPA in time to be used for the 2012 assessment, all stations that meet minimum data requirements should be assessed against reservoir specific Chlorophyll a criteria. All reservoir stations, even if not representing the main pool, should be screened against the reservoir-specific Chlorophyll a criteria, with the potential for identifying a "Concern" for nutrients. These stations should also be screened for all nutrient parameters with exceedances being identified as "Concerns." Screening these additional stations is an important way to make effective use of monitoring resources, and to support the TCEQ's objective to identify significant issues affecting water quality.

**Application of Regressions Equations for Site Specific DO calculations**

As discussed above, NWF strongly advocates that where flow data are needed to make an assessment determination, TCEQ should require that the flow data be collected. If the water quality data are not paired with flow data, then the water quality data should be compared to non-flow adjusted criteria. For dissolved oxygen, the criteria can be established based on the tier of aquatic life use. Narrative flow condition information should not be used to make flow adjustments to assessment criteria. NWF is supportive of using appropriate drainage-area ratios between ungaged and nearby gaged streams to help provide flow data. Procedures to conduct drainage area ratios in the assessment should be subject to public review and comment before being implemented.

TCEQ has asked for comment on cases where no flow measurement was obtained but the criteria are determined using a flow value. NWF assumes this to be a situation where site-specific criteria have been adopted in the water quality standards based on flow. In those cases, the non-flow adjusted measurement should be compared to the established criteria. Site-specific criteria that are not adopted in the WQS should only be used in the assessment for sample events that have both water quality and flow measurements with each event assessed independently. The final water body assessment would be based on the summary of the use determination for each independent sample event.

Also, given the level of sophistication of the regression equation, NWF suggests that the calculated dissolved oxygen criteria only be truncated to tenths of a milligram.

**Wetlands**

NWF notes with concern that while TCEQ continues to routinely certify federal permits under section 401 of the federal Clean Water Act as being in compliance with the WQS, there remains no assessment of wetlands. Wetlands have been included in Texas' definition of waters in the state for many years. It is unclear to NWF how TCEQ staff is able to certify that federal dredge and fill permits in wetlands do not cause degradation of the state wetland resources, yet the agency is unable to provide any assessment of wetland uses including wetland water quality functions identified in the Texas WQS.

In July of 2007 the TCEQ stated "TCEQ will develop a strategy, identify indicators, and develop methods appropriate for assessing conditions in wetlands to implement in 2008." See http://www.tceq.texas.gov/assets/public/compliance/monops/water/06twqi/2006_wetlands_mon_prog.pdf for reference. At a minimum the public is entitled to an explanation of how the agency is ensuring that 401 certification activates are preventing degradation of existing state wetland water quality functions.

Again, NWF appreciates the opportunity for this initial input into this important review of TCEQ's 2012 Guidance for development of the 305(b) and 303(d) Integrated Report. Please do not hesitate to contact me if you have any questions or need clarification regarding these comments. NWF looks forward to the opportunity for continued participation in this important effort, particularly as specific proposals for assessment changes are developed.

Sincerely,

Myron J. Hess
Manager, Texas Water Programs/Counsel

**From:** "Hoffman, William" <William.Hoffman@h-gac.com>
**To:** Michele.Blair@tceq.texas.gov
**CC:** todd.running@h-gac.com
**Date:** 6/30/2011 6:19 PM
**Subject:** Comments on bacteria assessment methods

Application of confidence limits to the determination of compliance with the contact recreation standard is problematic for several reasons.

1. Confidence intervals of a mean are often misinterpreted. A statement of a 90 percent confidence interval does not mean that there is a ninety percent chance that the "true" mean lies between the upper and lower bounds, but that if repeated samples were drawn, and new means and limits calculated, ninety percent of the confidence intervals would include the "true' mean.

2. The high degree of variability of the bacteria data will result in rather wide confidence intervals, particularly for smaller sample sizes.

3. I do not believe the confidence interval of a mean for data collected over a long period of time can be interpreted in the same manner as a confidence interval calculated for multiple samples taken from the same population in a short period of time, or multiple samples taken in the same general area on the same day. As an example, if the level of the indicator bacteria in a water body begins to rise as a result of a prolonged disturbance (construction of an increasingly popular dog park along the shoreline, for instance), the confidence interval for the mean will increase over time as a result of the increased variability of data in the series. We will likely miss these sorts of impairments for several years if the decision level is set at the lower confidence limit. The Type II error rate would increase to an unacceptable level.

As an (admittedly contrived) experiment, I calculated geometric means and 75 percent confidence limits for a water body that has an initial bacterial density of 50 MPN/100 mL, which I increased by 100 MPN each sampling period. The lower confidence limit did not exceed 126 MPN/100 mL until the 23rd iteration (sample size of 23), when the "contrived" MPN was 2350 in the 23rd sample. The geometric mean of the 23 samples was 860 MPN/100 mL. This situation would not likely be encountered, but the experiment suggests one difficulty presented when the bacterial density is changing over time.

I believe the confidence interval of a mean is applicable to sampling performed on a population that is believed to have a "true" mean. Can a dynamic system such as a flowing stream, sampled over several years, be said to have a "true" mean? A more meaningful way to determine the certainty of the data would be to take repeated samples at the same station on the same day or similar short period, and calculate confidence limits from those. An "average" confidence limit, expressed as a percentage or z score, could then be applied to the mean of data spanning multiple years This is not a suggestion, but a simple observation.

4. Uncertainty in the calculated geometric mean is only one source of uncertainty. An individual analytical result also has a fairly significant uncertainty, which varies with the calculated MPN, but is in the neighborhood of ± 40 percent for an MPN of 200 calculated from the results of a 1:10 dilution of the sample. Consistency would require incorporating this uncertainty into the assessment. One alternative to employing confidence intervals of the mean as the estimate of uncertainty is to take the analytical uncertainty into account instead, as it is not subject to bias introduced by trends in bacterial density in the water body or by extreme values in the dataset.

5. Finally, identifying nonsupport only when the lower bound of the confidence interval exceeds 126 would result in fewer designations of nonsupport. Many water bodies identified as currently impaired would potentially come into compliance with the standard as a result of an essentially administrative maneuver. The analogy is not perfect, but the EPA has declared in another situation that achieving compliance with a drinking water MCL by "rounding" an analytical result is unacceptable. I am not familiar enough with all existing regulations to know the extent to which EPA has allowed the incorporation of statistical uncertainty when determining compliance with an established standard, but I doubt it is accepted across-the-board. If the use of confidence-level based uncertainties were limited to resource allocation decisions - and not to establish formal nonsupport - it would not be very controversial.

If changes are to be made to the assessment methodology, I believe that increasing the sample size required to make a decision of nonsupport is a better way to establish priorities for the allocation of resources, without elevating the Type II error rate to a level that is not sufficiently protective of human health.

I believe the current protocol for delisting a water body is adequate; if it is based on confidence intervals, and the same degree of certainty is required as for the decision to establish nonsupport (assuming that was the path chosen), it seems unlikely that a water body, once listed, would be delisted until several years after it was in compliance with the standard in "reality".

The foregoing comments apply to the assessment of tidal waters (enterococci data) as well.

These opinions are my own, and do not represent those of any other member of the H-GAC staff.

Bill Hoffman
Environmental Planner / Data Specialist
Houston-Galveston Area Council
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**M E M O R A N D U M**

**TO:** Michele Blair
Surface Water Quality Monitoring
Texas Commission on Environmental Quality
michele.blair@tceq.texas.gov

**FROM:** Edward D. Peacock, P.E., Section Manager
Water Resources Evaluation Section
Watershed Protection Department
City of Austin

**DATE:** June 25, 2011

**SUBJECT:** Comments on 2012 Guidance Revisions

The City of Austin (COA) sincerely appreciates the opportunity to provide comments the proposed revisions to the 2012 Guidance for Assessing and Reporting Surface Water Quality in Texas following the advisory work group meeting on June 16, 2011.

Contact Recreation

COA is concerned about the proposed requirement of more than 10 data points for assessing contact recreation impairments. Although we recognizes the large variability in bacteria data, requiring more data points for contact recreation assessment than for other parameters is inconsistent as most environmental quality data is inherently variable. Any change in the number of data points required to conduct an assessment must take into consideration the typical data collection strategies for data gatherers, which frequently relies on quarterly sampling with some fraction of samples unable to be collected because of a lack of stream flow. For a 7 year assessment period, no more than 21 samples should be required. Extension of the number of years to be included in the assessment will extend the time period that impaired segments which have shown improvement remain on the 303(d) list and will delay the listing of segments which have become recently impaired.

COA understands the reasoning behind potential exclusion of storm-influenced bacteria data from the assessment. Any method for exclusion of storm-influenced samples should be reflected in changes to the recommended data collection procedures described in the Surface Water Quality Monitoring Procedures manual to avoid unnecessary sample collection efforts.

The use of confidence intervals on the geometric mean to determine impaired status, while potentially reducing uncertainty, is arbitrary and inconsistent with the approach used for other parameters. The Recreational Use Attainability Analysis (RUAA) approach for determining applicable standards is a more appropriate, risk-based approach to limiting the number of bacteria

impairments. While confidence intervals should not be used to determine impairments, COA fully supports the use of confidence intervals to further categorize or prioritize impairments.

Nutrients in Reservoirs

TCEQ has proposed to only use the representative station listed in Appendix F for a given reservoir in assessing the chlorophyll-*a* numeric criteria. This discourages monitoring from other stations in the reservoir which may be useful for identifying localized problems or future trends. Data from all stations in the reservoir should be assessed against the numeric criteria where sufficient data exists, even if only to determine concern status. Screening levels for individual nutrient species should continue to be assessed in reservoirs for all stations with sufficient data.

Dissolved Oxygen

COA is concerned with exclusion of dissolved oxygen (DO) data when instream flow measurements do not exist. It can be logistically difficult to measure flow with all water quality monitoring events, especially for sampling in large areas while attempting to meet short bacteria sample holding times. Flow estimates should be used when measured flow does not exist. Data could be excluded (assumed to be < 7Q2) when flow is missing using the flow severity code (exclude values of "No Flow").

Dealing with Censored Observations

COA fully supports proposed improvements to the current substitution methods used by TCEQ for calculating summary statistics of datasets with censored observations. We successfully use a variety of distribution and robust methods which have been demonstrated to be superior to substitution or exclusion methods. We encourage TCEQ to review the references listed below including the documents by Dr. Helsel at USGS whose primary statistics text was noted during the SWQMGAW meeting on June 16, 2011. Note that caution should be used when interpreting the results of these methods for datasets with more than 50% censored values or datasets with censored values higher in magnitude than any detected (uncensored) value.

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Helsel, D.R. 2005. Nondetects and Data Analysis: Statistics for Censored Environmental Data. John Wiley & Sons, New Jersey.

Helsel, D.R. and T.A. Cohn. 1988. Estimation of descriptive statistics for multiply censored water quality data. Water Resources Research 24(12):1997-2004.

Kaplan, E.L. and P. Meier. 1958. Nonparametric Estimation from Incomplete Observations. Journal of the American Statistical Association 53: 457-481.

**TRANSPORTATION AND NATURAL RESOURCES**

NATURAL RESOURCES AND ENVIRONMENTAL QUALITY

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July 1, 2011

Thank you for providing a stakeholder meeting and the opportunity to provide input to the 2012 water quality Assessment. I provide input on the following topics discussed on June 16, 2011.

## Topic 1: Contact Recreation Assessment – Addressing Uncertainty

I am supportive of requiring a dataset of 20 or greater samples, before assessments of primary contact recreation uses are conducted. I agree this would reduce uncertainty over whether the geometric mean detects an actual impairment or not. Making this change could avoid "parking" of 303(d) impairments in Category 5(c) that then leads to additional data collection and the potential for de-listing and public confusion on the status and remedies for the water body.

I believe that increasing sample size is a preferred alternative compared to the 90 percent confidence interval approach also discussed. I believe the use of a geometric mean as a criterion already informs us as to the overall magnitude of the impairment. A higher level of confidence is not appropriate considering the wide fluctuation of conditions that exist in Texas waters – conditions ranging from drought to flood and non-uniform patterns of pollutant discharge quality.

If larger datasets of 20 or more samples becomes the method used by the TCEQ, I recommend that use impairments detected by the method be assigned to either:

- Category 5(a) for development of total maximum daily loads or equivalent actions to restore the use; or
- Category 5(b) for recreational use attainability analysis, when there is also evidence that recreation in the water body is not appropriate.

## Topic 2: Nutrient Concern Category

TCEQ adopted a state rule in 2010 that establishes numeric nutrient criteria for many significant reservoirs (using chlorophyll *a*). Unfortunately, the USEPA has not approved these standards as yet. In the assessment years of 2012 and beyond, prior to federal approval, TCEQ now has the opportunity to assess chlorophyll *a* data against state-adopted, scientifically valid criteria. It is understandable that TCEQ would not proceed with listing a nutrient impairment while the outcome of the federal review is pending.

At the stakeholder meeting, TCEQ staff suggested continuing a practice of assessing nutrient data with an 85$^{th}$ percentile value for the various nutrient parameters, until USEPA approves nutrient criteria. The current practice assigns a “nutrient concern” for the water bodies ranked in the highest 15% of all reservoirs, freshwater streams, and tidal waters.

I suggest this practice does not take advantage of the progress made to establish the criteria in some of Texas’ most important reservoirs. Therefore, I recommend the current 85$^{th}$ percentile practice *only* be utilized for assessment units and water bodies where no numeric criteria has been adopted by TCEQ. For reservoirs with numeric chlorophyll standards, evaluate them against the state-adopted criteria and list them as new concerns when the mean (or median, if more appropriate) value exceeds a criterion. I recall that TCEQ has two types of concern categories; this could be a third concern category.

The value of assigning a nutrient concern to a reservoir is to inform the public of a water quality status that may benefit from preliminary, non-regulatory, or investigative strategies to address degraded conditions. It could also be used to prioritize monitoring strategies.

## Topic 3: Nutrient Concern Category – Detection of Low Chlorophyll *a* Values

It is further recommended that TCEQ evaluate reservoir nutrient concerns against the parenthetical median criteria determined during the water quality standards development process (for instance, 3.58 ug/l for Lake Austin and 3.66 ug/l for Lake Travis) rather than against a default value of 5.0 ug/l.

Lake Travis, Lake Austin, and several other Texas Hill Country reservoirs have outstanding clarity and are currently void of significant plant nutrients like phosphorus. Recognizing this existing water quality, TCEQ and the Clean Rivers Program have already begun using analytical methods that detect chlorophyll *a* at very low concentrations. Historical data using the combination of new and older (less sensitive) analytical methods show that the most accurate chlorophyll *a* standard is very likely lower than 5.0 ug/l. For the 2012 assessment on concerns in the eight reservoirs with the lower 5.0 medians, TCEQ should use datasets with only values based on the Fluorometric method, excluding data based on less sensitive methods.

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