Tennessee Stream Quantification Tool (SQT) and Debit Tool Q&As

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Summary:

The Tennessee Stream Quantification Tool (TN SQT) and the Tennessee Debit Tool is the preferred methodology to evaluate stream impacts and stream compensatory mitigation associated with permit authorizations under Sections 404/401 of the Clean Water Act and/or Sections 9 or 10 of the Rivers and Harbors Act of 1899. This living document provides answers to common questions fielded by U.S. Army Corps of Engineers (USACE) and Tennessee Department of Environment and Conservation (TDEC) regulatory staff related to the use of the TN SQT and Debit Tool. The Questions and Answers (Q&As) below are organized by the different components of the SQT and Debit Tool. Most of the items discussed in this Q&A apply where the applicant chooses to measure certain field parameters, rather than utilize a standard functional value. The latest versions of the TN SQT manuals, SQT and Debit tool, and Q&A documents can be downloaded from the TDEC and Nashville District USACE websites.

Rapid Assessment Form

1. **Q:** Do I need to fill out every part of the field form when assessing an ephemeral reach?

   A: No. We recommend that you review the Existing Condition Assessment Spreadsheet to determine which assessment parameters do not apply to ephemeral streams. This can be done by selecting “ephemeral” for the flow type. You can expedite your assessment by only collecting the data that is applicable to ephemeral streams.

2. **Q:** How do I determine if the stream has multiple reaches and assessment segments? Are there length criteria?

   A: Please refer to Part 2.1 of the *Rapid Data Collection Methods* manual for complete information on reach segmentation and determining locations of assessment segments. Length criteria are provided in the manual.

3. **Q:** How do I collect data on the various parameters for short stream reaches?

   A: Please refer to Part 2.1 of the *Rapid Data Collection Methods* manual for complete information on determining length of stream reaches and assessment segments. Additionally, the manual states: *"Riparian vegetation is evaluated for the entire length of each stream reach. [For floodplain connectivity, lateral stability, and bed form diversity,] if the entire stream reach is shorter than 20 times the bankfull width, then the entire reach should be assessed. If the stream reach is less than 100m, the LWD [large woody debris] assessment must extend proportionally into the upstream and downstream reach to achieve the 100m requirement."* In cases where the total stream length is less than 100m, LWD may be assessed for the entire stream, then a proportional multiplier applied to correspond to 100m. For example, if the stream is 50m long with one piece of LWD, then the LWD # of pieces would be two pieces per 100m.

4. **Q:** What do I do if I am unable collect complete or representative data for various parameters due to access restrictions or other site constraints?

   A: Should the practitioner be unable to collect complete or representative data for various parameters of the reach, the practitioner may choose to either complete the measurements during more favorable field or access conditions, or may utilize the default value for these parameters.

5. **Q:** We completed the Reach Walk as discussed in Section II.B of the field form. We determined a consensus value for the difference between the bankfull (BKF) stage and water surface (WS). In order to expedite our documentation, may I just list the consensus value and one indicator in Section II.B of the field form?

   A: No. Part 3.1 of the *Rapid Data Collection Methods* manual states *"Measure the distance between water surface elevation and bankfull indicators throughout the reach. Data is recorded during the reach walk in Section II of the field form."* The bankfull determination is a critical first step in accurately completing the assessment. In order to document this critical step has been completed, the practitioner must document multiple bankfull indicators and horizontal distance to water surface elevation on Section II of the field form. Additionally, by providing this documentation it assists the agencies in expediting field reviews of your assessment.

6. **Q:** For Section III of the field form, may I complete stable riffle cross section measurements at a riffle that is immediately adjacent to a culvert or other in-stream structure.

A: Generally no. Geomorphology is often unstable and not representative in locations where a stream enters or exits a structure, such as a culvert or bridge. Part 3.1 of the *Rapid Data Collection Methods* manual states *"Select a suitable riffle within the reach that has stable width and depth, no signs of bank erosion or headcutting, and a bank height ratio near 1.0…"* Such stable conditions are not typically found within the zone of influence of a structure. Please select a stable riffle that is not within the zone of influence of a structure, such as a culvert or bridge.

7. **Q:** We completed measurements of the stable riffle cross section, as described in Section III of the field form. The measured bankfull area is not close to the regional curve bankfull area. Can I move on to Section IV?

A: Generally no. Please review Part 3.2 of the *Rapid Data Collection Methods* manual for procedures, tips, and solutions in this situation. Your chosen bankfull elevation may need to be reviewed, or you may need to choose a different stable riffle to complete your cross section measurements. The manual states *"Compare the measured bankfull cross-sectional area from the stable riffle to the regional curve. The field data for the site should fall within the range of scatter of the regional curve in order for bankfull to be verified. Typically, the cross-sectional area curve is used to make this determination… If the field data are outside the range of scatter used to develop the regional curve, the user will need to determine if the wrong indicator was selected... If the wrong indicator was selected, then the user can review the bankfull indicators identified in the reach walk to determine if the bankfull indicator at the selected riffle needs to be revised and bankfull dimensions recalculated*." In order to complete Part III of the field form, the user may need to choose a different stable riffle outside of, but very close to, the project reach, which has a measured bankfull area within the range of data scatter of the regional curve bankfull area. If the reach is degraded such that bankfull indicators are scarce or cannot be found, the dimensions predicted by the regional curves are used to quantify the departure of the stream from a stable condition.

8. **Q:** The assessment segment has many riffles, and all of these are very similar or nearly the same. For the Riffle Data (IV.) section of the field form, can you just measure the representative riffle, instead of every riffle in order to expedite the assessment?

A: No. Part 3.4 of the *Rapid Data Collection Methods* manual states *"Measure the following at every riffle within the assessment segment and record values in Section*

IV.B of the field form…" The riffles and other geomorphic features may look similar, but may actually have different field values. If all the riffles are not measured, weighted bank height ratio and weighted entrenchment ratio cannot be calculated. All measurements are required to be measured at each riffle and riffle cross section in the assessment segment in order to complete Section IV.B of the field form.

9. **Q:** The weather has been dry recently, and my assessment segment is intermittent, but currently has no flowing water, can I collect measurements for Riffle Data (IV.) and Pool Data (VII.)?

A: Generally yes. These measurements are of the geomorphic characteristics of the stream channel, and may be recorded during a variety of flow conditions. The riffle and pool data are not dependent on the elevation of the water surface at the time of the survey. While it is advisable for practitioners to complete the rapid assessment while the assessment reach is flowing, the process of locating geomorphic channel features during dry conditions can be completed. If site conditions are so adverse during the field survey that these measurements cannot be obtained, the practitioner may choose to either complete the measurements during more favorable field conditions, or may utilize the default value for these parameters.

10. **Q:** How do I measure pool depth ratio in a stream that is not flowing?

A: The pool depth ratio is calculated by dividing the maximum bankfull pool depth by the mean bankfull riffle depth. During conditions of flow, the bankfull stage in a pool may be found by locating the water surface elevation and measuring vertically up the consensus value found at Part III.A of the field form. When the stream is not flowing, the two alternate methods described below may be used to find the bankfull stage in a pool:

1. <u>No Flow / Bankfull Indicators Observed at Pool:</u> Utilize the bankfull indicators to determine the bankfull stage at the pool.
2. <u>No Flow / No Bankfull Indicators at Pool:</u> Part 3.4 of the *Rapid Data Collection Methods* manual states *"the mean depth can be estimated as the difference between the edge of channel and the bankfull stage"*. The value for mean bankfull depth is calculated in Part III.C of the field form or may be calculated manually in the field as described towards the end (#5) of part 3.2 of the manual. Use this previously calculated value of mean bankfull depth and measure vertically up and level from the toe of slope at the pool to help determine where bankfull would be in a pool. This will provide an approximate measure of the bankfull stage in a dry pool where no bankfull indicators are present.

Once the bankfull stage is determined at a pool, the user simply measures the vertical distance between the deepest part of the pool and the bankfull stage to find

the maximum pool depth. The pool depth ratio is calculated automatically within the field form. If site conditions are so adverse during the field survey that these measurements cannot be obtained, the practitioner may choose to either complete the measurements during more favorable field conditions, or may utilize the default value for these parameters.

11. **Q:** For our Bank Erosion Hazard Index (BEHI) review, we found that several of the banks had the same BEHI score, in order to expedite our documentation, may we just input the representative BEHI/NBS score on Part IX. of the field form?

    A: No. Please review Part 3.9 of the *Rapid Data Collection Methods* manual for procedures and solutions. The manual states "The dominant BEHI/NBS measurement method assesses all meander bends, whether they are eroding or not, and other banks within the assessment segment that are eroding." In Part IX. of the field form, please input all data for every bank with an assessed BEHI/NBS score. This data is needed for accuracy of calculations and assists the agencies in expediting field reviews of your assessment.

12. **Q:** Do we need to measure BEHI for non-eroding banks at a meander bend?

    A: Yes. Please review Part 3.9 of the *Rapid Data Collection Methods* manual for procedures and solutions. The manual states *"The dominant BEHI/NBS measurement method assesses all meander bends, whether they are eroding or not, and other banks within the assessment segment that are eroding."*

13. **Q:** What are the dimensions of a riparian vegetation rapid plot? Should I use a vegetation plot with alternate dimensions if there is a narrow and long buffer along the stream?

    A: Data should be collected in accordance with the Carolina Vegetation Survey EEP Level 3 protocol, which utilizes standard 10 meter x 10 meter vegetation plots. A rapid method field form has been developed for the TN SQT, and is provided in Section 6 of the *Rapid Data Collection Methods* manual, which also includes 10 meter x 10 meter vegetation plots. The dimensions of the vegetation plots should not be adjusted to account for narrow buffers. Users should ensure plots are located in areas that provide a representative portrayal of the vegetation present within the assessment reach. Changes to plot dimensions will only be considered in areas where site constrains (property ownership, etc.) occur.

14. Q: If there are dead trees in a plot, should these be used in measurements (e.g. such as average DBH?)

A: No. Only living vegetation should be used in any evaluation of current stream function.

15. Q: My assessment reach has a narrow riparian buffer consisting of two rows of trees along the banks, then beyond that the buffer is mowed grass. Where should my riparian vegetation rapid plot be located?

A: Users should ensure plots are located in areas that provide a representative portrayal of the vegetation present within the assessment reach. Some plots may be close enough to the stream bank to pick up these trees, but placing all plots at top of bank may not be representative.

16. Q: What is the minimum number of riparian vegetation plots required for the rapid condition assessment?

A: The minimum number of plots for the rapid method would be based on an assessment 2% of the total riparian buffer area. For the detailed method, there is also an additional minimum requirement of at least four plots. See page 7, section 2.3 in the Rapid Assessment Manual.

17. Q: My assessment reach is immediately adjacent to a road or wide mowed area, then beyond that area is a forested area. How should I measure the buffer width for Part X. of the field form?

A: Part 3.10 of the *Rapid Data Collection Methods* manual discusses procedures and states *"Riparian buffers… are measured horizontally from the top of the stream bank to the edge of riparian tree/shrub community."* In this case, the buffer width would be zero, since the road and grass zone abut the stream bank, and the forested zone is not adjacent to the stream.

18. Q: My assessment reach is immediately adjacent to a road or wide mowed area that is 5 meters wide, then beyond that area, there is a forested area that starts 5 meters from the stream bank. What are the dimensions of the riparian vegetation rapid plot of this area?

A: Data will be collected in accordance with the Carolina Vegetation Survey EEP Level 3 protocol, which utilizes standard 10 meter x 10 meter vegetation plots. A rapid method field form has been developed for the TN SQT, and is provided in

Section 6 of the *Rapid Data Collection Methods* manual, which also includes 10 meter x 10 meter vegetation plots. The vegetation plot would be 10 meter x 10 meter, including both the 5 meter wide mowed or road zone and the 5 meter wide forested zone. Users should ensure plots are located in areas that provide a representative portrayal of the vegetation present within the assessment reach.

19. **Q:** After determining the SQT reach breaks, how many long-term monitoring reaches are required? Note that this typically applies to mitigation.

    A: This entirely depends on the values of the Proposed Condition Scores for each reach. If a stream was determined to have multiple SQT reaches, but each reach has the same exact Proposed Condition Score, then you can monitor one representative location (which would establish a longitudinal profile and cross section which would be extrapolated to the entire reach).

Existing Condition Assessment Spreadsheet

1. **Q:** The evaluation stream segment has areas of solid bedrock bed material, but there are also some riffles and a small pool, where the bed material is composed of cobble or other materials. There may be bedrock located underneath the areas of cobble. On the spreadsheet, what should I choose as the "Existing Bed Material"?

   A: The practitioner should only select "Bedrock" if the bed material is dominated by exposed, solid bedrock in the bed of the stream. Bedrock may be located underneath other substrate, but in such cases, the practitioner should categorize the existing bed material based upon the bed material that is exposed in the bed of the stream; the underlying geologic layers below the stream bed are not categorized within the rapid assessment and are not quantified when determining if the stream reach is bedrock dominated. "Bedrock" should only be chosen when it dominates the channel to such as extent that it precludes the development and ability to assess bed form diversity. Bed Form Diversity parameters should not be assessed for stream reaches that are bedrock dominated.

2. **Q:** The weather has been dry recently, and my evaluation stream reach is intermittent. I have collected measurements on the Rapid Assessment Form for Riffle Data (IV.) and/or Pool Data (VII.); however, since the channel is not currently flowing, I don't observe any riffles or pools. On the Existing Conditions Spreadsheet, may I report values of "0" for "Pool Spacing Ratio", "Pool Depth Ratio", and "Percent Riffle"?

   A: Generally no. These reported measurements evaluate geomorphic features of the stream channel. The geomorphic features should be identifiable under a range of flow conditions, including conditions of no flow. Some highly disturbed systems may not have identifiable riffles or pools. Assessors should consider the level of degradation

at that site and provide evidence if bedform features are absent. If there is difficulty in assessing the site, the practitioner may choose to either complete the measurements during more favorable field conditions, or may utilize the default value for these parameters.

3. **Q:** The 2019 *Tennessee Stream Mitigation Guidelines* describe a lower limit Existing Condition Score (ECS) of 0.4 for highly degraded perennial and intermittent streams. Does the USACE Nashville District recognize this lower limit ECS for perennial and intermittent streams? Has the USACE Nashville District established a lower limit ECS for ephemeral streams?

   A: Yes to both. The USACE Nashville District utilizes the lower limit ECS of 0.4 for highly degraded perennial and intermittent streams, as described in the *Guidelines*. The USACE Nashville District has established a lower limit ECS of 0.16 for highly degraded ephemeral streams. These lower limit condition scores do not apply to degraded streams proposed for compensatory mitigation and evaluating functional lift.

4. **Q:** We are expecting an increase in Water Quality and/ or Biology. How do I estimate a proposed lift?

   A: It may be preferable to utilize only the Existing Condition Score (ECS) for Proposed Condition Score (PCS) purposes. If the scores improve and are documented during monitoring, the generated mitigation credit can be adjusted accordingly. Credits will not be given unless the existing data was submitted during the initial review. If a higher PCS for a water quality parameters, or biological parameters, is proposed, it should be conservative due to many possible factors that may can influence the degree and timelines of recovery.

Agency Field Reviews

1. **Q:** The regulatory agencies will be field verifying my assessments, how should I prepare?

   A: It is important that you flag your bankfull indicators on right and left bank at a minimum of three riffles within your reach. Field verification of bankfull is the most critical measurement to review. Please be sure to clearly flag and georeference the location of the beginning/ending of the assessment segment, as well as the location of the stable riffle cross section. This will assist with identifying assessment locations during the field review. Georeferenced cross section locations should be included in maps associated with project documentation.

Final Determination of Credits and Debits

1. **Q:** How many significant digits should I round to for the final functional foot value?

   A: Debits and Credits should be rounded to the tenths level. While the 'Project Assessment' tab of the SQT is shown to the hundredths level, and the 'Functional Lift Summary' rounds to whole numbers, the final functional foot value should be round up to the nearest tenth. For example, 33.45 functional feet would be rounded to 33.5 feet.

Compensatory Mitigation Questions

1. **Q:** If we are proposing preservation reaches within our project, do we need to conduct the SQT for these areas?

   A: Yes. In order to propose a reach for preservation, you must develop an Existing Condition Score (ECS). The Nashville District allows for 10% of the ECS score to be counted for preservation. It should be noted that use of the standard default score for any measurement is not allowed for determination of ECS for preservation crediting. The minimum overall ECS for a system to be eligible for preservation is 0.6.