*Traditional stream restoration techniques focus on the number of linear feet of stream restored, but not enough on the quality of those restored streams. The **Stream Quantification Tool (SQT)** – developed by EDF in conjunction with scientists and technical experts – uses a different approach designed to bring greater confidence to stream mitigation and restoration projects.*

The SQT evaluates the quality of streams using a unit called "functional feet." This measure of quality (also referred to as functionality) accounts for a particular stream's watershed, stream bed, surrounding riparian area, aquatic habitat and other characteristics. By using this tool before and after a restoration project, mitigation practitioners can more precisely measure benefits and guarantee positive outcomes for streams and the people, watersheds and wildlife they support.

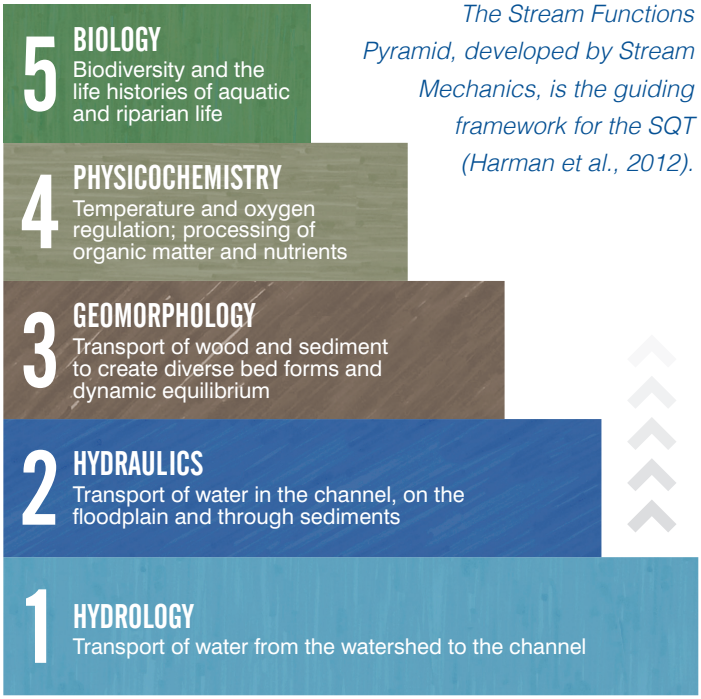
Key Attributes of the SQT

- **Science-based:** continually factors in the best available science – no guesswork involved
- **Consistent:** provides a common language – functional feet – for all parties
- **Comprehensive:** measures quantity and quality, site and watershed-scale conditions, direct and indirect impacts, and functional lift
- **Transparent:** provides an objective measure of impacts and benefits that everyone can understand – and tracks and reports outcomes to avoid "black box" decision making
- **Efficient:** using the SQT requires only the time to conduct a field-site survey and familiarity with existing stream assessment methodologies
- **Aligns with Clean Water Act standards:** enables agencies to meet the "no net loss" standard and goes one step further to incentivize techniques that create net benefit for streams
- **Achieves the highest return on investment:** directs conservation dollars – both public and private – to activities and projects that provide the greatest functional lift

Increasing Effectiveness

As an appraisal tool, the SQT has the flexibility to bring value and increased transparency to any restoration or mitigation project. It also allows mitigation practitioners to be rewarded for achieving conservation outcomes rather than following pre-defined practices.

The SQT provides the scientific integrity and streamlined efficiency needed to quantify project benefits at a faster pace, which benefits every stakeholder involved.



The Stream Functions Pyramid, developed by Stream Mechanics, is the guiding framework for the SQT (Harman et al., 2012).

STREAM QUANTIFICATION TOOL IN ACTION

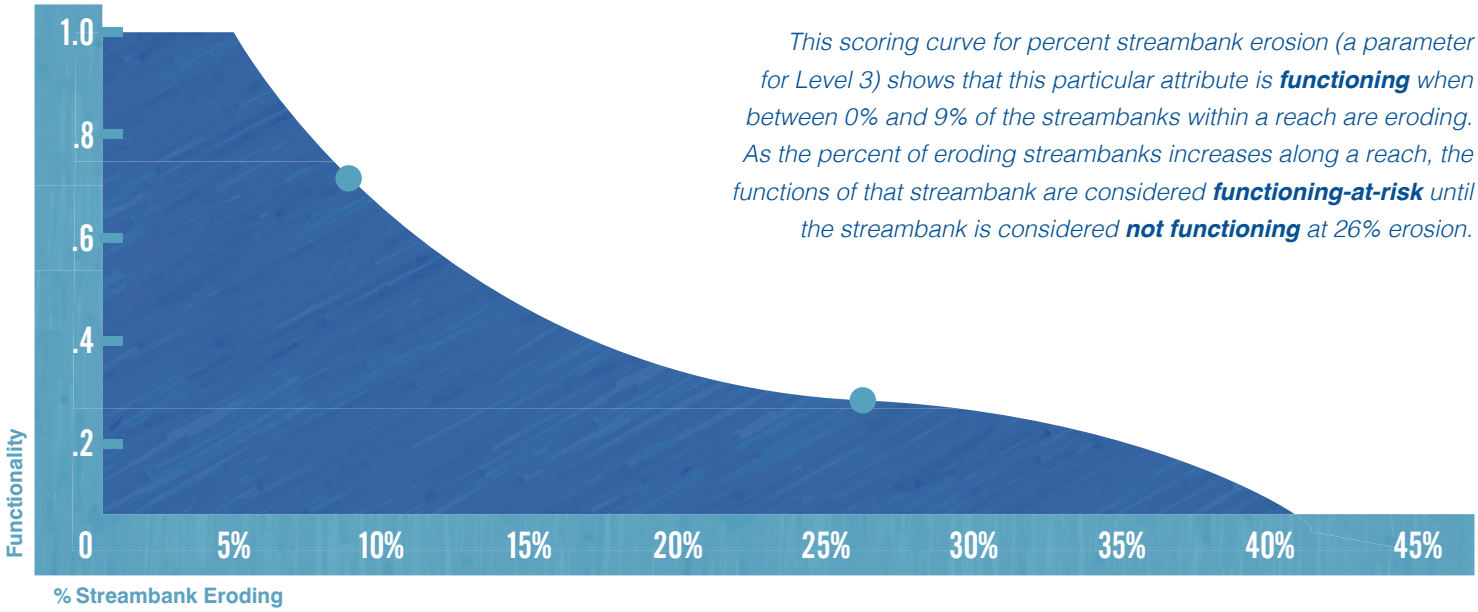
The Stream Quantification Tool can be customized for a state or ecoregion, bringing more certainty to stream mitigation efforts across the nation.

Customized Conservation

To determine overall stream function, the SQT organizes distinct stream functions into a hierarchical pyramid, in which lower-level functions influence higher-level functions. For example, degraded hydrologic characteristics (Level 1), as seen in an urban watershed, will impair a stream's hydraulic characteristics (Level 2), evidenced by eroded streambanks (Level 3).

The SQT includes specific parameters for each of the five levels of the Stream Functions Pyramid (Harman et al., 2012). Each parameter includes one or more measurements that can serve to gauge a specific aspect of a stream's health. Parameters for Level 4, Physicochemistry, for instance, include water temperature, nitrogen and organic carbon. Organic carbon is measured via leaf litter processing rate and percent of shredders.

Measurements for each parameter are converted to a score from 0 to 1, where 0 equals no function and 1 equals optimal (that is, 100%) functionality. The scores from each parameter in the functional category are rolled up to calculate a score for that functional category.



*This scoring curve for percent streambank erosion (a parameter for Level 3) shows that this particular attribute is **functioning** when between 0% and 9% of the streambanks within a reach are eroding. As the percent of eroding streambanks increases along a reach, the functions of that streambank are considered **functioning-at-risk** until the streambank is considered **not functioning** at 26% erosion.*

Each of the five functional scores are then averaged for an overall stream score, which will fall between 0 and 1. A score of 0.70 or greater is considered **functioning**. A score greater than 0.29 but less than 0.70 is considered **functioning-at-risk**. A score less than 0.29 is considered **not functioning**. The overall stream function score is then multiplied by the linear feet of stream to determine the functional foot score.

By including multiple measures to assess the health of a stream, the SQT helps regulators ensure that mitigation sites are selected based on their ecological potential, and it allows practitioners to target restoration where it is most needed while protecting stream features that are already functioning.

Harman, W., Starr, R., Carter, M., Tweedy, K., Clemmons, M., Suggs, K., Miller, C. 2012. A Function-Based Framework for Stream Assessment and Restoration Projects. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006

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Finding the ways that work

PUT THE SQT TO WORK FOR YOUR PROJECTS

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Bringing Solutions to Scale

Nationwide, stream restoration is a billion-dollar industry – yet the challenge of how to quantify impacts and restoration benefits remains unresolved. State agencies are taking notice of the SQT and the benefits that come with improved quantification, and regulators have recognized the SQT's potential to take the guesswork out of stream mitigation and ensure that restoration dollars result in tangible improvements to waterways.

Status of the SQT

The SQT and accompanying user manual are publicly available, and mitigation practitioners and agency staff in North Carolina are using the tool and conducting tests to ground-truth it in practice. Feedback collected from these practitioners will be used to calibrate and refine the SQT's measurements and use.

The SQT's approach to determining stream function can be customized to different regions and states. The next step in the SQT's development is to add a "species module" that also customizes parameters and measurement methods to calculate a functional score based on the needs of at-risk aquatic species, like the Carolina Heelsplitter mussel. Once species modules are added, the SQT will allow a single stream mitigation project to take into account functional metrics for multiple species.