# CHAPTER 10
# MEASURING SUCCESS

## INTRODUCTION

Implementing this WPP requires the coordination of many stakeholders over the next 10 years. Implementation will focus on addressing the most readily manageable sources of *E.coli* in the watershed in order to achieve water quality targets. The management measures identified in this WPP are voluntary but supported at the recommended levels by watershed stakeholders.

Measuring the impacts of implementing a WPP on water quality is a critical process. Planned water quality monitoring at critical locations will provide data needed to document progress toward water quality goals. While improvements in water quality are the preferred measure of success, documentation of implementation accomplishments can also be used to measure success. The combination of water quality data and implementation accomplishments helps facilitate adaptive management by illustrating which recommended measures are working and which measures need modification.

## WATER QUALITY TARGETS

An established water quality goal defines the target for future water quality and allows the needed bacteria load reductions to be defined. The appropriate goal for water quality in Kickapoo Creek in Henderson County is the existing primary contact recreation standard for *E.coli* of 126 cfu/100mL (Table 10.1). If there are revisions or adoption of new water quality standards (such as nutrients), these targets may be revised or amended as appropriate.

## ADDITIONAL DATA COLLECTION NEEDS

Continued monitoring of water quality in Kickapoo Creek in Henderson County watershed is necessary to track changes in water quality resulting from WPP implementation. Currently, water quality monitoring is mainly conducted by ANRA on a quarterly basis around the watershed at the stations identified in Figure 10.1.

Table 10.1 The water quality targets for impaired water bodies in Kickapoo Creek in Henderson County

| Station ID | AU | Current Concentation (cfu/100mL) | 5 Years After Implementation | 10 Years After Implementation |
|---|---|---|---|---|
| **10517** | 0605A_01 | 237 | 181.5 | 120 |
| **21618** | 0605A_01 | 317 | 221.5 | 120 |
| **22163** | 0605A_01 | 104 | 115 | 120 |
| **16796** | 0605A_02 | 168 | 147 | 120 |
| **16797** | 0605A_02 | 306 | 216 | 120 |
| **22164** | 0605A_02 | 184 | 155 | 120 |
| **22165** | 0605A_02 | 404 | 265 | 120 |
| **22166** | 0605A_02 | 505 | 315.5 | 120 |
| **22167** | 0605A_02 | 377 | 251.5 | 120 |

There are sufficient historical records of water quality measures on the main stem and continued monitoring of each segment and its tributaries are suggested throughout implementation to monitoring effectiveness. Focused water quality monitoring plans can be assessed and implemented as needed with implementation plans. Monitoring for BMP effectiveness and specialized projects will occur as identified by stakeholders and the watershed coordinator.

Through the adaptive management process and WPP updates, future water quality monitoring recommendations may include targeted water quality monitoring efforts to better track the effects of specific implementation projects on bacteria and nutrient reductions in the watershed. Targeted water quality monitoring may include studies on multiple watersheds, paired watershed studies, or multiple watershed studies. Targeted monitoring can also include more intensive monitoring along identified stream segments to better identify potential pollutant sources. Any additional monitoring projects will follow quality assurance guidelines.

## DATA REVIEW

Watershed stakeholders will use two methods to evaluate WPP implementation impacts on instream water quality. First, will be the TCEQ's statewide biennial water quality assessment approach, which uses a moving seven-year geometric mean of *E.coli* data collected through the state's CRP program. This assessment is published in the *Texas Integrated Report* and 303(d) list, which is available online at: https://www.tceq.texas.gov/waterquality/assessment/305_303.html

It is noted that a two-year lag occurs in data reporting and assessment, therefore the 2024 and 2026 reports will likely be the first to include water quality data collected during the implementation of the WPP.

Water quality improvements are often harder to identify using the seven-year data window utilized for the *Texas Integrated Report*. Therefore, progress toward achieving the established target of 126 cfu/100 mL will also be evaluated using the geometric mean of the most recent three years of water quality data identified within the TCEQ's SWQMIS. Trend analysis and other appropriate statistical analyses will also be used to support data assessment as needed. By reporting statistical trends in concentrations, stakeholders will be made aware of significant progress (or degradation) of instream water quality conditions. Trend analysis of constituent loads (using loads estimated from measured data) can also indicate progress towards instream conditions. Importantly, constituent load analysis can control for changes in flow, so stakeholders can be made aware of the impacts of land management on the amount of NPS pollutants reaching water bodies.

The Watershed Coordinator will be responsible for tracking implementation targets and water quality in the watershed to quantify WPP success. Data will be summarized and reported to watershed stakeholders at least annually.

## INTERIM MEASURABLE MILESTONES

Implementing the Kickapoo Creek in Henderson County WPP will occur over a 10-year period. Milestones are useful for incrementally evaluating the implementation progress of specific management measures recommended in the WPP. Milestones outline a clear tracking method that illustrates progress toward the implementation of management measures as scheduled. Responsible parties and estimated costs are also included in the schedule. Milestones associated with each management measure are included in Table 10.2. In some cases, funding acquisition, personnel hiring, or program initiation may delay the start of implementation. This approach provides incremental targets that can be used to measure progress. If sufficient progress is not made, adjustments will ensure increased implementation and meet established goals. Adaptive management may also be utilized to adjust the planned approach if the original strategy is no longer feasible or effective.

## ADAPTIVE MANAGEMENT

Due to the dynamic nature of watersheds and the countless variables governing landscape processes, some uncertainty is to be expected when a WPP is developed and implemented. As the recommended restoration measures of the Kickapoo Creek in Henderson County WPP are put into action, it will be necessary to track the water quality response over time and make any needed adjustments to the implementation strategy. To provide flexibility and enable such adjustments, adaptive management will be utilized throughout the implementation process.

Adaptive management is often referred to as "learning by doing" (Franklin et al. 2007). It is the ongoing process of accumulating knowledge of the causes of impairment as implantation efforts progress, which results in reduced uncertainty associated with modeled loads. As implementation activities are instituted, water quality is tracked to assess impacts and guide adjustments, if necessary, to future implementation activities. This ongoing, cyclical implementation and evaluation process serves to focus project efforts and optimize impacts. Watersheds in which the impairment is dominated by NPS pollutants are good candidates for adaptive management.

Progress toward achieving the established water quality target will also be used to evaluate the need for adaptive management. Due to the numerous factors that can influence water quality and the time lag that often appears between implementation efforts and resulting water quality improvements,

sufficient time should be allowed for implementation to occur fully before triggering adaptive management. In addition to water quality targets, if satisfactory progress towards achieving milestones is determined to be infeasible due to funding, the scope of implementation, or other reasons that would prevent implementation, adaptive management provides an opportunity to revisit and revise the implementation strategy.

Kickapoo Creek in Henderson County WPP is a living document, intended to be reviewed and revised as needed in order to meet water quality goals. As new data and methods to improve water quality become available, or as we learn what measures are and are not working in the watershed, the number and type of management measures may need to be revised. Stakeholders will continue to give guidance and approval in these situations to make sure the document still has local support.

Stakeholders will also formally review the progress of the WPP in meeting goals at least every five years. Progress will be reviewed using the following assessments:

**Water Quality** – Stakeholders will review water quality assessments of Kickapoo Creek in Henderson County. Additional water quality analysis, as available will also be used. An increase in pollutant concentrations or percent exceedances will be considered a negative outcome.

**Implementation Progress** – Stakeholders will review the overall progress of the WPP in meeting anticipated measurable milestones. Substantial delays or lower-than-expected achievements in milestones will be considered a negative outcome.

**External Factors** – Stakeholders will evaluate, as appropriate, available data concerning trends in population growth, land use, economic factors, new water quality criteria, and other relevant issues to evaluate changes to the amount or number of potential pollutant sources outlined in the WPP. A significant increase in potential pollutant sources or hydrologic changes will be considered a negative outcome.

If negative outcomes are identified by two or more of the above assessments during the formal review, stakeholders will make changes based on adaptive management.