Section 8

Evaluating Success

Photo Credit: Jessica Casillas

Section 8. Evaluating Success

The WPP is designed as a roadmap for implementation, charting the course to the Partnership's water quality goals. Progress toward those end goals is measured by the observable changes in water quality in the watershed and by achieving programmatic milestones (Section 7). Water quality monitoring data and other monitoring or reported data related to water quality permits will be the primary means for measuring observable change. Records of programmatic achievements compared to established milestones will serve as a measure of the level of effort by the Partnership. These sources of data are compared to established criteria to gauge success. A key to successful implementation of this WPP is continual focus on adaptive management, in which evaluations of success are used to revise decisions for better effectiveness.

Monitoring Program

CRP partners (H-GAC, TCEQ, and others) will conduct long-term ambient surface water quality monitoring in Spring Creek. TST volunteers are an additional source of supplemental data[1]. The Partnership will also evaluate compliance by permitted wastewater dischargers using DMR and SSO data reported to TCEQ. Special studies, including microbial source tracking or other DNA-based categorization of *E. coli* or host species, may be used to supplement these ongoing data collection efforts if the Partnership deems them necessary in the future. The combination of ambient surface water quality data, permitted discharge data, and other sources (as appropriate) will be used by the Partnership to understand the end result of WPP actions on the project waterways. Assessments will be conducted in conjunction with CRP annual reporting (Basin Highlights Report/Basin Summary Report) efforts. Formal full water quality evaluations will be conducted by the Partnership at the end of every phase of implementation (2025 and 2030) or as necessary in interim periods.

Clean Rivers Program Data

Ongoing monitoring in Spring Creek and its tributaries includes eleven long-term sites (six on Spring Creek, and 14 on tributaries). All sites are monitored at least quarterly. The current sites are listed in Table 6 and shown in Figure 18, both in Section 3 of this document.

The quality-assured data from these sampling efforts are the primary means for evaluating compliance with water quality standards and will serve as the primary indicator of success under this WPP. The ambient parameters sampled are the same as to those sampled during the WPP development project.

[1] Stream team data will be used for qualitative assessment, and not as part of formal quantitative assessments of water quality.

While data from all the stations will be reviewed, the most downstream stations of each of the attainment areas (11314 and 11313 for the headwaters and downstream, respectively[2]) for this WPP are the ultimate focus of evaluation. However, special attention will also be given to tributary stations to evaluate whether additional attention or modeling is needed to isolate the tributaries. Monitoring will be conducted under an approved quality assurance project plan (QAPP).

Additional Data

In addition to CRP/TCEQ monitoring, other state, regional, and local sources will be used to evaluate specific aspects of water quality in the waterways. These sources include:

- DMR (TCEQ) – The Partnership will review outfall discharge monitoring data from WWTFs in the watershed.
- SSOs (TCEQ) – SSOs reported to TCEQ will be assessed periodically to evaluate progress in reducing this source.
- TST volunteers – TST volunteer data will be used to supplement CRP data as an indicator of change over time and site-specific areas of concern. Observations made by volunteers can provide important information on localized conditions.

The combination of these data will provide the Partnership with a robust picture of the changing health of the waterways. The ambient stations at the end of each attainment area and the WWTF permit data will be the primary point of comparison to indicators of success for the WPP.

Supporting Research

In addition to the solutions identified in Sections 5 and 6, and the implementation strategies outlined in Section 7, the Partnership identified several areas of data in which additional research was warranted to ensure informed future decisions by the Partnership. These proposed research activities may or may not be pursued by the Partnership but are identified areas of inquiry, under a future QAPP, that would benefit future WPP updates.

Wildlife Source Estimation

The current *E. coli* load totals assume a conservative additional load for warm-blooded animals (not including deer) for which there was insufficient data as part of the safety margin category. This source has been an appreciable contributor to instream loads in some other watersheds (especially in more rural areas), exceeding 40-50% in some

[2] Shown in Figure 43, Section 4.

microbial source tracking studies[3]. Absent any microbial source tracking data for the Spring Creek watershed, and in consideration of its more developed character, a conservative estimate of 10% of total source load in current conditions was assigned to the safety margin which includes undocumented wildlife. However, additional data, in either the form of microbial source tracking information or wildlife population data estimates or established statewide wildlife loading assumptions based on land cover, could refine those estimates. This need is especially relevant given the propensity for wildlife to use stream corridors to traverse developing areas like this watershed. The Partnership will work with AgriLife, Texas A&M University and other academic institutions, and TPWD to determine the feasibility of establishing general or species-based estimates for wildlife populations not usually addressed in WPPs. The intent is to establish loading estimates for the background concentrations of fecal bacteria to ensure WPP projections are as accurate to watershed conditions as possible.

Microbial Source Tracking

Microbial source tracking (MST) (also referred to as bacterial source tracking or fecal typing in this context) is a general name for a range of methods[4] that use genetic information to identify the origins of biological pollutants present in a water body. Identification of *E. coli* is based on the genetic detection of bacteria strains specific to different animal types in surface water samples. MST can help characterize uncertainties in modeling efforts (*e.g.*, undocumented wildlife) and give more information on what sources are represented instream, as opposed to source loads. However, MST or similar methods can have an appreciable amount of uncertainty and reflects the period of time in which samples were collected, so it should be considered in addition to other data sources.

More narrowly focused approaches of testing for host-specific DNA (instead of host-specific bacterial DNA) are also used and may help overcome some uncertainties related to representativeness of *E. coli* strains across the watershed area or across time. The stakeholders recommended that source tracking or analysis of the most applicable type be employed as needed in the Spring Creek Watershed, with an intended focus on specified areas during narrow time frames for purposes such as illicit discharge detection, understanding localized spikes, *etc.* The Partnership recognizes the potential value of these tools for guiding decisions when opportunity and resources allow.

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[3] For example, the Watershed Protection Plan for the Leon river Below Proctor Lake and Above Belton Lake indicated that its bacterial source tracking conducted at three stations showed "…between 41 and 55 percent of bacteria sources originate from wildlife or invasive species (*e.g.*, avian species, wild animals, and feral hogs)…". Accessed 5/21/2021 at: http://leonriver.tamu.edu/media/1110/final-leon-wpp.pdf. Accessed 5/21/2021

[4] For the purpose of this discussion, the term is being used to include a broad range of other assays and identification methods using genetic or species-specific markers.

Hydrologic Impacts on Water Quality

Several large studies and efforts are currently evaluating various aspects of the hydrology/hydraulics within the Spring Creek system and in adjacent watersheds. Additionally, there is significant investment planned for flood mitigation activities that may change flow patterns in the waterway. The potential for these factors to influence water quality conditions is unknown. While flood mitigation measures are expected to have a relatively positive impact (*e.g.*, settling of pollutants in wet bottom detention basins), water quality impacts have not been a primary focus of the ongoing efforts. The Partnership does not have a specific recommendation, other than ongoing coordination with these efforts, but expressed an interest in subsequent research that might help predict water quality impacts. H-GAC, EPA and USACE are currently involved in a WMOST modeling effort that may provide additional detail prior to, or immediately subsequent to, the approval process for this WPP. This information will help guide future decisions and WPP updates, but additional research will likely be needed given the scale of potential flood mitigation efforts in and around the watershed.

Indicators of Success

The Partnership identified key criteria for success for use in evaluating the progress of the WPP. The success indicators are used to measure the effectiveness of the implementation effort and the pace of progress (**Table 1**). Ultimate success in the waterways of the Spring Creek watershed is found in achieving the water quality goals of the stakeholders. However, the changing nature of the watershed may mask some achievements in early years, as pollutant sources continue to increase rapidly even as implementation begins. However, the future focus of the WPP takes these considerations into account. To ensure that progress can be evaluated against this background, programmatic metrics will also be used as indicators of successful progress.

Compliance with Water Quality Standards

The primary, quantitative goal of the WPP is to achieve and maintain compliance with SWQSs at the representative stations for each of the attainment areas. A secondary goal is to ensure source reduction by meeting TPDES water quality permit limits. Therefore, the primary indicators of success are listed below.

- The status of the waterways on the most current Integrated Report, with specific focus on the SWQSs for contact recreation standard (bacteria criteria for primary contact recreation 1), and aquatic life use (DO, *etc.*), are the main benchmarks of success. Success is measured by fully supporting all uses, and progress in abating concerns.
- A positive or stable trend in WWTF compliance, as indicated in the DMRs/SSOs will also indicate successful implementation.

While the goal of the WPP is to move water quality toward compliance, the changing nature of the watershed may mean that in interim years, a reduction of projected degradation will also be considered as interim progress. Based on known development and current trends, westward growth spanning toward the headwaters area is likely to continue to be strong but not necessarily linear. Large blocks of developed area can come online in shorter time frames, meaning sudden influxes of sources rather than steady growth or decline. Increased development west of SH 249, especially, is likely to result in short term increases in source load that may overshadow beneficial actions in the same time frame. This dynamic environment differs from a watershed in which a similar effort each year can be expected to attain and maintain compliance. While the end goal for 2030 remains the focus of the WPP, some interim periods will be better measured by programmatic milestones or water quality change in localized areas related to implementation efforts rather than a broad survey instream quality.

Programmatic Achievement

The ability to maintain the Partnership, fund implementation, and put solutions in place are qualitative indicators of the success of the implementation efforts. Additional program elements include the progress partners make toward related requirements (MS4 permits, *etc.*). These programmatic indicators are:

- implementing solutions at a pace that is sufficient to meet interim milestones,
- a Partnership group that continues to be active and engaged in implementation, and
- acquisition of funding levels and technical resources sufficient to realize implementation goals.

Table 1. Indicators of success

Goal	Indicator of Success	Source of Identification
Quantitative, Compliance with SWQSs	Fully support all designated uses	CRP data; Integrated Report status
	Comply with TPDES permit limits	WWTF DRM/SSO
Qualitative, Implementation of WPP	Solutions implemented (based on implementation milestones)	Partnership records; MS4 Annual Reports; partner information
	Implementation funded sufficiently	Funding sources identified and acquired
	Maintain Partnership	At least annual meetings held

Adaptive Management

As conditions change within the watershed, the practices and approach we use to address water quality issues must adapt. This WPP is a living document used to guide implementation of the solutions developed by local stakeholders. It is designed to be flexible to changing conditions. The WPP will engage in a process of continual review and revision called **adaptive management** to ensure it remains relevant to its purpose and the stakeholders' decisions. Adaptive management is a structured process by which changes in conditions and evaluation of progress and programmatic achievements are used to identify potential revisions to the WPP. Feedback on progress shapes future planning. The Partnership understands that a continual process of review and revision will be needed in the future to ensure the WPP's success. The content and efforts of this WPP will be reviewed at several points during implementation, with the fundamental questions being as to whether the solutions are having their desired effects, and whether progress is being made on water quality standards compliance (**Table 2**).

Table 2. Adaptive management process

Adaptive Management Process	
Component	**Description**
Ad hoc review	Each partner responsible for implementing any activity will do due diligence in evaluating the continuing effectiveness of the activity. This review happens on an informal or project-specific basis. Partners are encouraged to share any insights on what is working well or what is working poorly with the Partnership at large. Facilitation staff will talk regularly with partners to assess progress.
Annual Review	Every year the Partnership will review progress made during that year during a public meeting. The results of the annual reviews will be summarized for dissemination to the stakeholders and the WPP may be amended as needed.
Formal WPP Reviews	At least every four years[5], the Partnership will conduct a formal review and revision (as appropriate) of the WPP. This process will include at least a 30-day review period and open public meeting. The result of the review will be an amended WPP. Criteria for review will include but not be limited to: • Stakeholder feedback on implemented solutions and resources (stakeholders) • Water quality data summary of segment conditions (H-GAC or successor watershed coordinator) • Review of progress in meeting programmatic milestones • Progress in complementary efforts (MS4 permits, *etc.*)
Continuity Review	Two years prior to 2030, the Partnership will discuss during its Annual Review, how it will plan for the next period of implementation (if needed). At this time, the Partnership will identify any modeling, data analysis and collection, or other information needed to make further projections for future implementation periods.

[5] Corresponding to the implementation phases of early (2021-2025), and late (2025-2030) implementation. Some partners use different planning cycles. The 4-year milestone is a minimum.