

Developing Regional and Basin Monitoring Schedules for FY 2019

Basin monitoring schedules serve to coordinate the monitoring resources of participating entities by maximizing regional efforts while minimizing the potential for duplicative efforts. Monitoring will be conducted by Texas Commission on Environmental Quality (TCEQ) staff, Clean Rivers Program (CRP) partners, and other participating entities. The TCEQ has developed the following guidance for site selection and sampling requirements for routine, special study, and targeted monitoring.

The primary source of information (documents) used for monitoring planning is the biennial ***Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d) (IR)*** available on the TCEQ's Surface Water Quality Monitoring website, <https://www.tceq.texas.gov/waterquality/assessment/14twqi/14txir>

The approved 2014 IR will be the most recent report to guide monitoring planning, but information from the 2016 draft IR (if available) should also be considered.

Water Quality Categories and Management Strategy

The IR assigns one of five categories to each water body to provide information about water quality status, management plans, and management activities. Further, impairments (Categories 4 and 5) are applied to each combination of use and criteria (or parameter, such as depressed dissolved oxygen) for designating support. When an assessment unit has multiple impaired parameters, the highest category is assigned to the assessment unit. When a water body has multiple assessment units, an overall category is assigned to the entire water body.

The TCEQ has developed a specific water quality management strategy for each of these categories which includes routine water quality data collection, water quality standards review projects, projects to characterize non-support of water quality standards, and water quality remediation projects, including total maximum daily loads (TMDLs). These categories are described in detail below:

Category 1 - Attaining the water quality standard and no use is threatened

Category 2 - Attaining some water quality standards and no use is threatened; and insufficient data and information are available to determine if the remaining uses are attained or threatened

Category 3 - Insufficient data and information are available to determine if any water quality standard is attained.

Category 4 – The Standard is not supported or is threatened for one or more designated uses but does not require the development of a Total Maximum Daily Load (TMDL).

Category 4a – A TMDL has been completed and approved by EPA.

Category 4b - Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.

Category 4c - Nonsupport of the water quality standard is not caused by a pollutant.

Category 5 - The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants.

Category 5a - A TMDL is underway, scheduled, or will be scheduled.

Category 5b - A review of the water quality standards will be conducted before a management strategy is selected.

Category 5c - Additional data and information will be collected or evaluated before a management strategy is selected. This category may include Watershed Protection Plans.

Monitoring Planning for Categories 1, 2, and 3 Water Bodies

Routine monitoring is conducted on Category 1, 2, and 3 water bodies or AUs. Objectives for routine monitoring based on the results included in the IR are described in Table 1.

Monitoring Planning for Parameters Assigned to Categories 4a, 4b, 4c and 5a, 5b and 5c

Water bodies with parameters indicating nonsupport of the standards are listed in Categories 4 and 5. Each impaired AU/parameter combination is also assigned a category.

Monitoring for Category 4 and 5 parameters can be addressed with a special project. Many special studies are currently being implemented by different programs that are responsible for water quality management. For the Coordinated Monitoring Meetings, those water bodies identified by the Watershed Action Planning process in the previous year will remain on the list of water bodies to be discussed for any additional information and project updates.

Routine monitoring is also scheduled for Category 4 and 5 water bodies and AUs to describe water quality for parameters other than those which do not meet water quality standards. Table 1 includes monitoring objectives for impaired water bodies.

Table 1: Routine Monitoring Objectives for Concerns and Impairments

Routine Monitoring Objectives to Address Water Quality Priorities			
Level of Support for Parameter	General Monitoring Objective	Routine Monitoring Priority	
Concern for standard support (CN) or not supporting (NS) with a limited data set (LD or ID) (small data set; 10-20 samples for new bacteria concerns).	The few samples collected in these AUs show problems. Samples should be collected until an adequate data set is available for assessment.	1st	
Concern near nonattainment of standard support (CN) with adequate data (AD) for water quality criteria. Concerns (CS) for DO grab samples.	Continue routine monitoring to establish that near nonattainment is ongoing. When DO grab samples identify a concern, schedule 24-hour sampling to determine if the mean criterion is supported.	2nd	
Concern for support (CS) with adequate data (AD) for narrative screening criteria, i.e., nutrients and sediment.	Continue monitoring to establish that concern is ongoing. Monitor other water quality causes and sources related to the parameter of concern.	3rd	
For water bodies where uses are fully supported (FS) with adequate data (AD), or no concern (NC) with limited data (LD).	Continue monitoring to establish that the designated uses are supported. Include conventional parameters on high use water bodies and water bodies of local interest. Monitor at least one station in each classified segment and important water body. Conduct toxics and biological monitoring in areas where this monitoring has not been performed.	4th	
For water bodies that have not been monitored previously (or recently) (NA).	Implement monitoring to develop an adequate data set to assess uses and concerns.	no specific priority	
For Water Bodies Where Uses Are Not Supported.	Rather than routine monitoring, for impaired parameters, strategies are coordinated through the Watershed Action Planning. Routine monitoring can be conducted to assess the condition for other parameters. Use the scheme at right to determine the priority for addressing the impaired parameter(s).	4a	5 th
		4b	3 rd
		4c	4 th
		5a	6 th
		5b	2 nd
		5c	1 st

Minimum Data Requirements for Assessment

Monitoring Sites: Each station represents a particular geographic coverage for determining designated use support and water quality concerns. General guidance for typical coverage includes the following:

- A single station represents less than 25 miles of stream reach.
- A single reservoir station can represent 25% of the total reservoir surface acres, but not more than 5,120 acres.
- A single estuary station can represent 25% of the total estuary square miles, but is typically less than eight square miles.
- Sites should characterize the water quality for a water body or portion of a water body. For example, to characterize an arm of a reservoir, the site should be located in the center of that arm; or for a perennial stream, where the stream is generally flowing and in the centroid of flow.
- Additional information can be found in Chapter 2 of the SWQM Procedures Manual Volume 1. https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg415/rg-415_chapter2.pdf.

Assessment Period and Temporal Distribution:

- The IR uses data collected over the most recent seven to ten-year period. The date range for the 2016 assessment was December 1, 2007 through November 30, 2014; and for the 2018 assessment, December 1, 2009 through November 30, 2016. For the 2020 assessment, the date range is December 1, 2011 through November 30, 2018.
- Water samples from an assessed water body should be temporally representative (preferably at monthly to quarterly intervals).
- Data should be collected over at least two years to reflect inter-year variation with no more than two-thirds of the data in any one year.
- At least two seasons must be represented in each annual data set to reflect inter-seasonal variation with some samples representing warm-weather conditions (March 15 to October 15). No more than two-thirds of the samples should be from either one of these two distinct times of the year. Twenty-four-hour DO monitoring events can be conducted year-round. To ensure unbiased, seasonally representative data, samples are allocated to various times of the year over a period of at least two years according to the following temporal distribution:
 - 20% of the total number of 24-Hour DO samples collected during the critical portion of the index period (July 1 - September 30)
 - 33.3 - 40% of the total number of 24-Hour DO samples collected during the non-critical portion of the index period (March 15 – June 30, and October 1- October 15)
 - 33.3 - 50% of the total number of 24-Hour monitoring events in the non-index period (October 16 - March 14)

This results in approximately 50 – 66.7% of the total number of 24-hour monitoring events collected over at least two years during the index period (March 15 – October 15), and 33.3 – 50% of 24-hour monitoring events in the non-index period (October 16 – March 14). **Note: Approximately one month must separate each 24-hour sampling event. The minimum number of samples collected in a year is two—one within the index period and one within the critical period.** A total of ten 24-hour measurements within a two to seven year period are recommended to assess the aquatic life use. When possible, a year round sampling schedule is recommended for 24-hour DO.

- Biological and habitat assessment data may be collected in only one year, provided at least two complete data sets are collected during the index period (March 15 – October

15) with one data set collected during the critical period (July 1 - September 30), and one from outside the critical period (March 15-June 30 and/or October 1-October 15). The efforts should be about one month apart. If more than two bioassessments are conducted, sampling should occur over at least two index periods, with at least one-half, but no more than two-thirds of the samples from the critical period.

- Data from special studies such as storm water monitoring projects or datasets targeting non-ambient conditions (i.e. agricultural run-off, BMP effectiveness, etc.) are not typically included in the development of the Integrated Report.
- Samples should be collected during a scheduled routine monitoring event regardless of the low flow (7Q2) conditions in the stream. Flow measurements and flow severity should be reported for stream stations for each event. Some data collected at flows below the 7Q2 may not be used for determining attainment due to specifications included in the water quality standards, but this determination will be made during the assessment.
- The TCEQ SWQM Team introduced guidance for the consideration of drought conditions during monitoring events. Additional information about these considerations can be found online at:
http://www.tceq.texas.gov/assets/public/compliance/monops/water/wqm/interim_droughtguidance.pdf

Minimum Number of Samples: As a general rule, 10 or more samples or measurements are required at each site in order to determine use support and identify water quality concerns.

- Data sets should represent a defined recurrence frequency (monthly, quarterly or biannually) that will generate enough samples and measurements to meet at least the minimum requirements for the assessment. For example, a site monitored at a quarterly frequency for seven years would generate 28 samples.
- For the purpose of generating a statistical water quality trend, 20 to 60 samples collected over a period of five to 20 years are recommended.

Designated Use Assessments. 10 or more samples (20 for bacteria) are required to assess the following designated uses:

- Aquatic life (grab DO/minimum criterion, 24-hour DO/24-hour average criterion, 24-hour DO/minimum criterion, toxics in water, water and sediment toxicity tests) bioassessments will also be used to determine designated aquatic life use attainment. A minimum of two bioassessment data sets (data collection events) are required.
- Contact and noncontact recreation (20 samples are required). Starting with the 2014 IR, new concerns were identified for E.coli and Enterococci when there were between 10 and 20 samples and the geometric mean exceeded the criteria. These should be prioritized for additional sampling in order to meet the 20 sample minimum to assess this use in future IRs.

- Fish consumption (toxics in water, see Table 2 in the 2014 Texas Surface Water Quality Standards).
- General uses [water temp, pH, chloride, sulfate, TDS, and Enterococci (including segments 1006 and 1007 only) in surface water].

Identification of Water Quality Concerns. A water quality concern is identified when a designated use cannot be assessed due to an insufficient number of samples or exceedance of a screening level. The following represent considerations for monitoring in areas that include water quality concerns:

- Concerns for aquatic life, contact and noncontact recreation, fish consumption, public water supply (surface water samples only), and general uses identified when as few as four samples are available
- Concerns for aquatic life use, based on biological and habitat assessments, identified when only one set of measurements is available in a year
- Concerns for aquatic life use, based on a comparison of grab sample dissolved oxygen concentrations to the 24-hour average criteria that must meet a ten sample minimum requirement
- Concerns for nutrients, chlorophyll *a* in surface water that requires 10 or more samples (see reservoir nutrient section below)
- Since fish tissue and sediments tend to accumulate contaminants slowly, the samples are spatially composited, and concentrations in the samples generally do not vary greatly over time; only four samples are required as a minimum.
- Multi-year sampling of sediment for two or three years (including those for sediment toxicity tests) is preferred to yield a minimum of four samples. However samples for fish tissue and sediment which are collected during a one-time special monitoring event may be used in the assessment to meet the minimum sample requirement. For example, five fish or sediment samples collected throughout a reservoir or over a river segment on one day would meet the minimum sample requirement, providing environmental conditions are relatively homogeneous.

Monitoring Nutrients in Reservoirs. The 2016 Draft IR includes methods to assess nutrients in selected reservoirs throughout the State. Appendix F of the 2016 Guidance for Assessing and Reporting Surface Water Quality in Texas describes a procedure for evaluating nutrient levels in reservoirs. Monitoring nutrients in reservoirs for assessment should target those included in Table 1 of Appendix F of the Guidance at the station located near the dam (WQS, Page 200 https://www.tceq.texas.gov/assets/public/waterquality/standards/tswqs_2014/TSWQ2014Rule.pdf and Table 3 in Appendix F of the 2016 Guidance). Specific parameters include Chlorophyll *a*, Total Nitrogen, Total Phosphorus, and Secchi depth. At least 10 samples of each of these parameters are needed to fully assess the use for impairments or concerns.

MONITORING TYPE CODE

The Monitoring Type Code provides the data user with information on the bias and intent of the specific monitoring event (Table 2). These codes have been expanded to better characterize the intent of monitoring and now consist of four characters. This expanded code is actually two codes in one, with the first two characters representing a code that defines the bias of the monitoring, and the last two characters defining the purpose of each monitoring activity. The first two characters are the same as were used previously. The third and fourth characters of the expanded monitoring type code describe the purpose of the monitoring.

For routine monitoring and biological monitoring with a BS code, the second set of characters- is optional. However, for other types of monitoring, this code is required.

Table 2: Monitoring Type Codes

Monitoring Type Code	Definition
First two characters (code to represent monitoring bias)	
RT	“Routine” -- Monitoring not intentionally targeted toward any environmental condition or event. Twenty four-hour deployment monitoring conducted outside the index or critical period.
BS	“Biased Season” -- Monitoring targeted toward a certain time of year (e.g., season or index period). Biological and 24-hour deployment monitoring conducted during the index or critical periods.
BF	“Biased Flow” -- Monitoring targeted toward certain flow conditions (e.g., runoff event). Monitoring is planned around a certain flow condition. These data are not typically used in the assessment.
Second two characters (code to represent monitoring intent)	
UA	Use Attainability Analysis - a structured scientific assessment of the factors affecting the attainment of uses of the water body being monitored.
SI	Source Identification - Monitoring intended to establish the origin of an impairment or degradation of a water body the project is monitoring.
RW	Receiving Water Assessment - a structured scientific water quality characterization of a water body that is or will be receiving run off or discharge from a permitted entity.
LF	Load Contributions - intended to define or quantify the amount of loading of a certain parameter or parameters a water body is receiving.
PD	Permit Development - related to permit actions not covered by another monitoring type code.
SD	Standards Development - related to standards development and is not covered by another code.
BA	BMP Effectiveness Monitoring - related to BMP effectiveness monitoring and is not covered by another code.
TF	Model Calibration and Verification - related to calibrating or verifying an environmental model and is not covered by another code.
WD	Watershed Characterization - solely intended to understand the basic physical, environmental, and human elements of the watershed.

Some Things to Consider When Developing the FY 2019 Schedule

Date range for 2016 IR assessment:

December 1, 2007 through November 30, 2014

Date range for 2018 IR assessment:

December 1, 2009 through November 30, 2016

Date range for 2020 IR assessment:

December 1, 2011 through November 30, 2018

- Do historical data indicate that changes need to be made to current monitoring efforts?
- Does the schedule include sampling by all participants willing to comply with TCEQ guidance for QA?
- Are the TCEQ SWQM Program's core set of parameters being analyzed? See Texas Surface Water Quality Monitoring and Assessment Strategy- Appendix A
http://www.tceq.texas.gov/assets/public/waterquality/swqm/monitor/swqm_strategy.pdf
- Does the schedule minimize duplication of effort?
- Do stations provide representative data that meet assessment needs?
- Have all preparation materials been considered (e.g., 2014/draft 2016 assessment status, priority tables, fact sheets, regional assignments)?
- Do monitoring sites and/or parameters consider basin priorities as identified by the steering committee or Watershed Action Planning process?
- Is an adequate set of parameters being analyzed at stations to allow for identification of the cause if an impairment is identified?
- Has drought affected the ability to sample this site adequately and if so, should it be moved?