

CHAPTER 10 MONITORING

Monitoring provides data and information that allows for assessment and adaptive management. By monitoring discharges and receiving waters, it is possible to evaluate the progress toward completion of implementation actions. By identifying the actions that work best, monitoring data enables more efficient distribution of funds and resources and subsequent improvements in BLRPs and permit requirements. By assessing implementation actions and instream data, it is possible to evaluate the progress toward attainment of the TMDLs/loading capacities. And finally, monitoring data provides the feedback that indicates if modifications of the TMDL targets and water quality standards are necessary.

This chapter describes TMDL requirements and implementing parties for monitoring, assessment, and adaptive management, while also providing an umbrella stewardship approach for cooperation and collaboration in the Russian River Watershed.

10.1 STEWARDSHIP & THE RUSSIAN RIVER WATERSHED MONITORING PROGRAM

There are many opportunities for cooperation and collaboration in regards to monitoring in the Russian River Watershed. Residents, recreators, cities, counties, state agencies, federal agencies, and other stakeholders have a vested interest and/or specific TMDL requirements to address sources of pathogens and indicator bacteria and monitor the effect of those actions. By forming a monitoring coalition to identify problems, develop and implement solutions, coordinate monitoring, evaluate progress, and make adjustments, more progress toward a healthy watershed can be made with less cost. These elements are keys to the concept of watershed stewardship.

Regional Water Board staff will work to form a Russian River Watershed monitoring coalition to help coordinate and conduct required monitoring. The watershed-wide monitoring program will be modeled on the Klamath Basin Monitoring Program and San Francisco Bay Regional Water Board's Regional Monitoring Program. It will likely include:

- Coordinating instream sampling efforts to reduce duplication of efforts and costs
- Coordinating sampling methods, protocols, and Quality Assurance/Quality Control requirements so data from multiple entities are comparable
- Compiling and sharing data with possible upload of data to the California Environmental Data Exchange Network
- Assessing and interpreting data to inform load reduction actions
- Reporting and sharing data and information with stakeholders and the public

- Conducting regular meetings to share and discuss implementation activities, data results, research, and other information critical to water quality and the health of the Russian River Watershed

10.2 MONITORING & REPORTING OF IMPLEMENTATION ACTIONS

As described in Chapter 8, dischargers and parties responsible for sources of pathogens and indicator bacteria are required to develop and implement a BLRP. The BLRP includes requirements to report the status of individual implementation actions to the Regional Water Board. Dischargers and implementing parties are also required to monitor, assess, and report on the effectiveness of their implementation actions required under a BLRP. The purpose is to understand if actions are improving pathogen and indicator bacteria concentrations (and loads) in the Russian River and tributaries. Regional Water Board staff will evaluate this information on an implementing-party-by-implementing-party basis to ensure implementation actions are executed as planned and on schedule, and are being maintained and working as expected. If this is not the case, staff will work with implementing parties to revise the BLRP and use alternative implementation actions.

Regional Water Board staff will compile the above information, assess progress and effectiveness on a watershed or sub-watershed scale, and provide a report on a regular basis, likely every five years. The report may be accomplished through an informational presentation to the Regional Water Board or as part of a larger stewardship report.

10.3 MONITORING & REPORTING OF TMDL ATTAINMENT

The Sonoma County Department of Health Services, Environmental Health and Safety Section currently conducts this monitoring at several of the beaches listed in Table 10.1. In past years, the Regional Water Board has provided funding and staffing. There may be future opportunities for the Regional Water Board and other stakeholders to partner with the counties to ensure this monitoring is funded and executed. Additionally, this monitoring effort may be used to satisfy effectiveness monitoring requirements in the counties' BLRPs.

In order to assess changes in in-stream conditions and attainment of the TMDLs/loading capacities, indicator bacteria data should be collected in mainstem Russian River and tributary sites. The County of Sonoma, the County of Mendocino, City of Healdsburg, City of Sebastopol, and the City of Santa Rosa should participate in a the Russian River Watershed Regional Monitoring Program. It is recommended that water sample for *E. coli* and enterococci bacteria concentrations be collected at the mainstem Russian River beaches listed in Table 10.1 and shown in Figure 10.1 be at least weekly from May 15 through September 30. All water quality data collected should be collected in accordance with a Quality Assurance and Project Plan developed per U.S. EPA (2002c). Additionally, such

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data shall be uploaded by the coalition or individual into the California Environmental Data Exchange Network.

Table 10.1 TMDL Attainment Monitoring Locations		
Hydrologic Subarea	Russian River Watershed Beach	Location
Coyote Valley	Russian River at Mill Creek Park	Potter Valley
Forsythe Creek	Russian River at Mariposa Swimming Hole	Redwood Valley
Geyserville	Russian River at Cloverdale River Park	Cloverdale
Guerneville	Russian River at Veteran Memorial Beach	Healdsburg
	Russian River at Riverfront Park	Windsor
	Russian River at Steelhead Beach	Forestville
	Russian River at River Access Beach	Forestville
	Russian River at Sunset Beach	Forestville
	Russian River at Johnson's Beach	Guerneville
	Russian River at Monte Rio Beach	Monte Rio
	Green Valley Creek at Martinelli Road and River Road	Forestville
Laguna	Laguna de Santa Rosa at Sebastopol Community Park	Sebastopol
Santa Rosa	Matanzas Creek at Doyle Park and Bethards Drive	Santa Rosa
	Santa Rosa Creek at Highway 12	Santa Rosa
	Santa Rosa Creek at Railroad Street	Santa Rosa
Ukiah	Russian River at Vichy Springs Park	Ukiah
	Russian River at Mill Creek Park	Ukiah
Warm Springs	Foss Creek at Matheson Street	Healdsburg

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Figure 10.1: TMDL Attainment Monitoring Locations

10.3.1 IDENTIFICATION OF BACTERIA SOURCES

Since both *E. coli* and enterococci bacteria can originate from natural sources, the human and domestic animal sources causing exceedance of the concentration-based TMDLs should also be investigated in the BLRPs and Russian River Watershed Regional Monitoring Program. There are numerous laboratory analyses that can confirm the presence of waste from human or domestic animals (Griffith et al. 2013).

Bacteroides bacteria

Because of the short life span, *Bacteroides* bacteria concentrations are often used to indicate recent fecal contamination of surface waters. *Bacteroides* bacteria are a suitable indicator of a waterbody's bacteriological quality since the bacteria come from the gastrointestinal systems of animals, they degrade rapidly outside of the body, and technology is available to trace the bacteria back to specific types of animals, including humans and domestic animals. Host-specific *Bacteroides* bacteria can be used to help assess the natural background of pathogenic indicator bacteria in minimally disturbed waterbodies. Current recommended genetic markers and protocols for *Bacteroides* bacteria analysis are described by Griffith et al. (2013). Additional markers may also be appropriate in the future as technology advances to improve assay sensitivity and performance.

Bacteriophages

Measurement of *Bacteroides* bacteriophages may provide additional information on animal hosts. *Bacteroides* bacteria are rapidly inactivated by environmental oxygen levels, but *Bacteroides* bacteriophages are resistant to degradation. One group of phages that specifically uses *B. fragilis* strain HSP40 as host is found only in human feces and not in feces of other animals.

Viruses

Several methods detect viruses excreted in feces and/or urine with high specificity to human waste and almost no cross-reactivity with other sources. Among the virus methods, markers for DNA viruses, such as human adenovirus and human polyomavirus, are among the more sensitive and robust. These viruses are fairly widespread among humans, and a sizable portion of the population sheds polyomaviruses passively. In addition, the DNA genomes of these viruses are less labile than those of common human enteric viruses with RNA genomes, which may make them more resistant to environmental degradation and therefore easier to detect.

Chemical Source Tracking

Chemicals found in wastewater might be useful for independently confirming human waste in ambient surface waters. Measurement of chemicals that could include optical brighteners used in laundry detergents, caffeine, fecal sterols (metabolic byproducts of human digestion processes), and metabolite of nicotine (cotinine) excreted by tobacco users.

10.3.2 REPORTING AND ASSESSMENT

The assessment of *E. coli* and enterococci concentrations and TMDL target attainment in tributary streams and creeks shall be assessed by Regional Water Board staff by compiling available instream data. Available data may include effectiveness monitoring data submitted by the monitoring coalition or by individual implementing parties under their BLRPs, data collected by other watershed stakeholders, and data collected by the Surface Water Ambient Monitoring Program and other Regional Water Board efforts. These data could be shared and coordinated via a cooperative Russian River Watershed monitoring coalition.

Regional Water Board staff will assess progress toward attainment of the TMDLs/loading capacities on a watershed or sub-watershed scale, and provide a report on a regular basis, likely every five years. The report may be accomplished through an informational presentation to the Regional Water Board or as part of a larger stewardship report.

10.4 POST TMDL-ATTAINMENT OR NON-ATTAINMENT PROCEDURES

When reaches of the Russian River and/or its tributaries attain the TMDLs/loading capacities, it is assumed that wasteload and load allocations are attained in the watersheds, and the following procedures shall take place in those reaches. Should instream data again identify impairment after TMDL attainment, these procedures shall not apply.

1. Effluent limitations and other pertinent discharge requirements established in WDRs and conditional waivers of WDRs will remain in place.
2. Implementation actions already in place shall be maintained by the implementing party or parties.
3. Implementation actions that are described in a BLRP but have not yet been put into place shall not be required.
4. Status reports for TMDL implementation actions shall no longer be required.
5. Effectiveness monitoring shall continue to ensure water quality does not degrade, although the monitoring and reporting frequency can be reduced if approved by the Executive Officer.