

# Water Quality Monitoring

## ***BENEFICIAL USE MONITORING PROGRAM (BUMP)***



Numerous water quality monitoring programs, conducted by various state and federal agencies, exist throughout Oklahoma. Each of these programs have specific objectives and many are limited to small geographic areas. To synchronize the objectives of these programs, the Beneficial Use Monitoring Program (BUMP) was established in 1998 under the direction of the OWRB.

A primary function of BUMP is to provide a mechanism to ensure that all water quality management activities work in concert to restore, protect, and maintain designated beneficial uses. This includes the promulgation of Water Quality Standards (WQS), permitting and enforcement of permits stemming from WQS-established criteria, and non-point source controls.

BUMP's main goals include documenting where lake and stream beneficial uses meet WQS and where beneficial uses are impaired, providing information for updating WQS, and providing information for the prioritization of pollution control programs.

## ***LAKES SAMPLING***

### ***Fixed Station Lakes Monitoring***

To facilitate sampling on the 130 largest lakes in Oklahoma, the OWRB conducts quarterly sampling of approximately 40 lakes annually with repeat sampling occurring every three to four years. Data collected consists of both chemical and physical parameters



including nitrogen and phosphorus. In general, three to five sampling stations per lake (more on larger lakes), representing the lacustrine zone, transitional zone, and riverine zone, are established. Vertical profiles for dissolved oxygen (DO), % DO saturation, temperature, pH, salinity, oxidation-reduction potential (redox), specific conductance, and total dissolved solids (TDS) are taken at one-meter intervals from the lake surface to the lake bottom at each location. Readings for secchi disk depth and nephelometric turbidity are also taken at all sample stations.

## ***RIVER AND STREAM SAMPLING***

### ***Fixed Station Load Monitoring***

Through a cooperative effort with the USGS, the OWRB conducts flow monitoring at fixed station BUMP sites that do not currently have an existing USGS flow gage. Both water quality and quantity information are collected to calculate pollutant loads, which enables OWRB staff to make use support determinations. The USGS cost share program, Oklahoma's 319 program, Oklahoma's 314 program, and the 303(d)-process drive sample site locations associated with this task.

### ***Long-Term Fixed Station Monitoring***

Based largely upon the 67 USGS 8-digit hydrologic unit code (HUC) basins present in Oklahoma, 119 long-term, fixed river and stream stations have been selected throughout the state. This allows for long-term assessment of beneficial uses and water quality trends. Currently, 91 of these stations are being monitored. Data collected include a variety of chemical, biological, and physical parameters as well as some diurnal dissolved oxygen and pH monitoring during the critical summer season.

Additionally, the OWRB currently works with several partners, including the USGS, US Army Corps of Engineers, Grand River Dam Authority, and National Weather Service, to conduct flow monitoring on most fixed station sites that are not part of the Oklahoma/USGS Cooperative Gaging Network. To date, 88 stations have a working stage/discharge rating of which 82 of those stations are collecting periodic stage data through a data collection platform (DCP). This cooperative effort will allow for loadings to be calculated and trends to be assessed statewide, as well as providing much needed data for the Use Support Assessment Process (USAP). Along with the USGS cost share program, Oklahoma's 319 program, Oklahoma's 314 program, and the 303(d)-process drive sample site locations associated with this task.

### **Probabilistic Monitoring**

The OWRB also samples sites throughout the state that are selected at random by a computer program. Thus, each stream site has an equal probability or chance of being selected for monitoring.

At these sites, a physical habitat assessment is made, water chemistry is analyzed, and samples of algae, bacteria, macroinvertebrates (e.g. insects), and fish are collected.

Probabilistic Monitoring was developed to supplement the BUMP program, and has become an integral part of the assessment process. Site visitation and monitoring frequencies are dependant on study objectives. When overlaid with the BUMP network, many random-based biological collections can be used for making fixed station assessments.



### **Short-Term Rotating Station Monitoring**

Since BUMP was initiated, short-term rotating station monitoring has occurred in 220 stream segments based upon Oklahoma's 303(d) list and input from other state environmental agencies on their monitoring needs. Variables monitored are specific for each stream segment, and probabilistic monitoring may also take place on some short-term projects.

### **Intensive Investigations**

If beneficial use impairment is identified or suspected, all appropriate state agencies are alerted and an intensive investigation will be initiated to confirm that impairment is indeed occurring and to identify the source.

Some potential causes of beneficial use impairment are improper beneficial use or criteria, point source problems, non-point source problems, oil and gas contamination, agricultural activities, or mining activities.

During an investigation, all monitoring activities are cooperative in nature with the agency with statutory authority assuming the lead role for intensive monitoring. Other entities (e.g., tribal or governmental units outside of Oklahoma) will be involved as appropriate.

All intensive-monitoring activities will be consistent with the WQS and the USAP. If no protocols exist, then best professional judgment or State/Environmental Protection Agency guidance will be used as appropriate. Two intensive investigations of note include the Southeast Oklahoma pH study and the Southwest Oklahoma Chloride Control study.

### **GROUNDWATER SAMPLING**

Groundwater is critical to our economy and quality of life. Half of the state's water withdrawals are derived from its aquifers. Whereas the OWRB has a mature and successful surface water quality monitoring program, no comprehensive approach or plan to monitor the quality of the state's groundwater resources has been developed.

Presently, groundwater monitoring is performed on a limited basis by several state agencies within their jurisdictional boundaries. These monitoring programs are generally specific to pollution control activities or required reporting by public water supply systems to the Oklahoma Department of Environmental Quality (ODEQ).

While existing monitoring programs are very important, they tend to focus more narrowly around a specific permitted activity or the source water of a public water supply system (wellhead protection area). To ensure the protection of water quality of our groundwater supplies in the future, it is essential that groundwater monitoring be broadened to encompass all of the fresh groundwater in the state.

