
OKLAHOMA'S BENEFICIAL USE MONITORING PROGRAM
Lessons Learned

Why a Beneficial Use Monitoring Program (BUMP)

- To ensure that water quality information is being collected in a scientifically defensible manner – Historically, monitoring efforts have collected and analyzed data using various protocols
- Oklahoma's waters are utilized by millions of visitors who contribute in excess of 2.2 Billion dollars annually to the Oklahoma economy.
- To support state water resource planning and protection activities. For example, to aid in the identification of priority watersheds in need of pollution control activities and develop a 303(d) list that accurately reflects reality.

BUMP is Composed of Five Major Components

- BUMP monitoring components are as follows:
  - Fixed Station Stream Monitoring,
  - Rotating Station Stream Monitoring,
  - Fixed Station Load Monitoring,
  - Fixed Station Lakes Monitoring, and
  - Intensive Investigations.

Water Quality Standards (WQS) and the BUMP work hand-in-glove

- WQS Basics: All WQS are composed of three basic parts:
    1) Beneficial Uses
    2) Criteria to Protect Beneficial Uses
    3) An Anti-degradation Policy
- A fourth critical element is a water quality monitoring and evaluation program to assure that uses and criteria are being met. This fourth component in Oklahoma is the BUMP.

Use Support Assessment Protocols (USAP)

- It is imperative that consistent, scientifically defensible USAP be developed and used to determine if Beneficial Uses are being supported or are impaired.
- Developed protocols should be used by all parties assessing beneficial use support.
    - Must support similar listing/monitoring exercises such as the Integrated Water Quality Assessment Report, 319 NPS Assessment, 314 Clean Lakes Assessment, 303(d) list, etc.

The WQS Monitoring and Evaluation Component

- Use Support Attainment Protocols
  - Provides a Consistent Framework Upon Which to Build a Monitoring and Evaluation Network
  - Specific for Lakes and Streams
- Beneficial Use Monitoring Program
  - Provides a Specifically Designed Network to Assess Beneficial Uses
  - Specific for Lakes and Streams

1st BUMP Component: Fixed Station Stream Monitoring

- **Fixed Station Stream Monitoring**:
  - approximately 100 sites (geographically related to the sixty-seven 8-digit hydrologic units) were identified through a cooperative effort with the other Oklahoma environmental agencies. Sites are sampled 10 times annually for selected physical and water quality parameters. Biological sampling also occurs on a rotational basis.

General Water Quality Sample Parameters-Sampled 10 Times Annually

Temperature	Total Alkalinity	% DO Saturation
Dissolved Oxygen	pH	Specific Conductance
Salinity	Redox	Total Hardness
Chloride	Turbidity	Sulfate
TDS	Ortho-P	Total P.
Nitrate-N	Nitrite-N	Ammonia-N
Kjeldahl-N		

Metals & Organics Sampled Once Annually with Bacteria Sampled During Growing Season

Arsenic

Cadmium

Chromium (Total)

Copper

Lead

Mercury

Nickel

Selenium

Silver

Zinc

Thallium

Pesticides

Fecal Coliform

Enterococci

Escherichia coli

Biological Community Sampling Efforts

- Sestonic Chlorophyll-a data is collected 10 times annually at all stations
- Benthic Chlorophyll-a data is collected as needed during the summer months – data is used to assist our standards setting process
- Fish Community is sampled once every 4-5 years
- Benthic Macroinvertebrates are sampled twice in the summer, twice in the winter with sampling occurring twice every 5 years.

2nd BUMP Component: Rotating Station Stream Monitoring

- **Rotating Station Stream Monitoring:**
  - Numerous sites have been monitored by the program to meet specific Oklahoma Monitoring needs. Monitoring has been conducted to support the development of TMDLs and site-specific criteria.
  - This monitoring effort has been vastly curtailed with the rapidly increasing costs of the program. This has caused some minor consternation among our state agency customers.

3rd BUMP Component: Fixed Station Load Monitoring

- **Fixed Station Load Monitoring:**
  - Flow data is collected (USGS, Mesonet, etc.) at all monitoring stations.
    - Discharge information is required for determining use support status of a waterbody. Some WQS criteria do not apply during high-flow events
    - Information is critical for the calculation of loads.

4th BUMP Component: Fixed Station Lakes Monitoring

- **Fixed Station Lakes Monitoring:**
  - quarterly sampling on approximately 40 reservoirs (total of 135 lakes). Essentially sample 90% of our reservoir surface acres.
  - Re-sampling of every lake occurs at least once every three years.
    - Bathymetric mapping also occurs on a sporadic basis.

General Water Quality Parameters - Sampled Quarterly

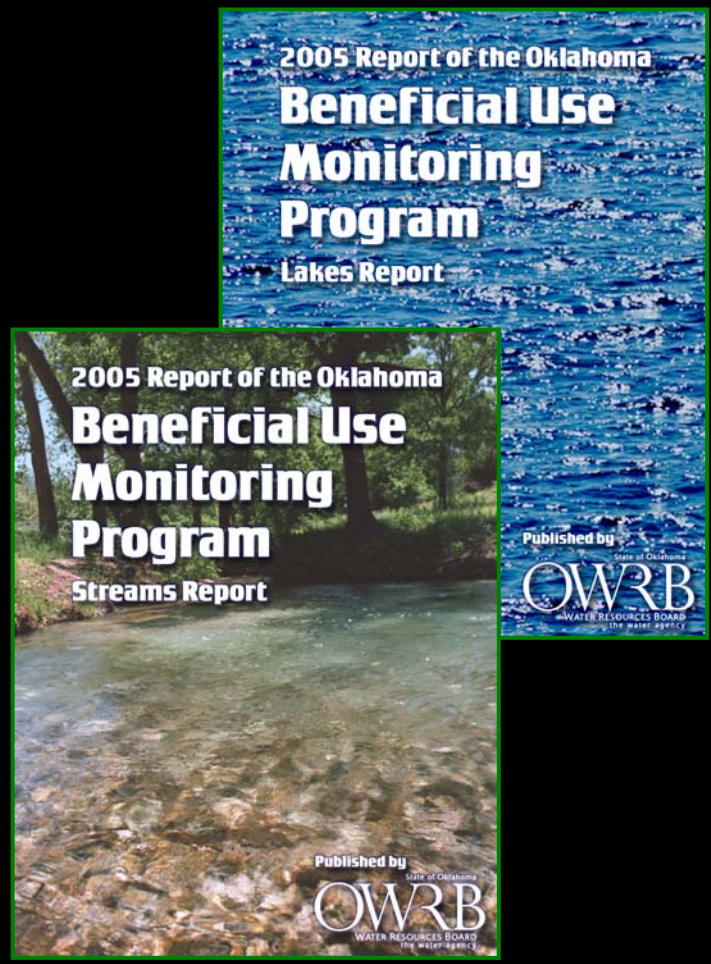
Dissolved Oxygen	pH	Specific Conductance
Temperature	Chlorophyll-a	% DO Saturation
Salinity	Redox	Total Hardness
Chloride	Turbidity	Sulfate
TDS	Othro-P	Total P
Secchi Disk Depth	Pheophytin	Nitrate-N
Nitrite-N	Ammonia-N	Kjeldahl-N

5th Monitoring Component: Intensive Investigations

- **Intensive Investigations: Original intent was to conduct more comprehensive studies on our lake and stream resources**
  - Intensive investigations have not been performed as part of the BUMP program and it is not anticipated that any work will be conducted in the future. A 20% funding cut greatly contributed to the demise of this aspect of the program.
  - Also, we probably set some unrealistic and unattainable goals related to this component

Annual Reporting Activity

- **Reporting:**
  - a report on the results of BUMP monitoring is published every year and distributed to the Oklahoma Legislature, State and Federal Agencies, and other interested parties.
  - The BUMP Report is available either as a hard-copy (highly discouraged), on a CD, or it can be accessed via the web (highly preferred!!)
    - http://www.owrb.state.ok.us/quality/monitoring/bump.php



BUMP: Where do we go from here? Lessons Learned

Need to continue to refine and enhance USAP

- Nutrient
- Sediment

- Work to develop USAPs for all assigned Beneficial Uses in the OWQS.
- Continue work on interpretive protocols for narrative criteria
- Data collected through monitoring has served a vital role in setting appropriate WQS and site specific criteria. I.e pH
- Bacteria = Bad in so many ways
  - Criteria – between 70% to 85% of the waters sampled exceed the numerical criteria
  - Holding time issues – to meet 8 hour holding time or not meet 8 hour holding time

BUMP - Where do we go from here cont.?

- Continue to evolve the program
  - With increasing program costs and flat funding comes hard decisions. Be willing to adapt as new priorities are identified. The dreaded "data-gap" can be survived. Work with your partners to maximize efficiency (i.e. negotiate "price-breaks" if possible).
- Partner, Partner, Partner = It is essential that you partner or work very closely with all concerned parties in your monitoring arena. Your "worst-enemy" today may be your "best-friend" tomorrow. Build healthy working relationships

BUMP - Where do we go from here cont.?

- Clear Program Goals & Realistic Expectations
  - It is critical that realist expectations are outlined
- Educate your decision makers
  - It can be a real eye-opener for decision makers when they realize monitoring monies are required in perpetuity.
- Report results on a consistent basis and present results in simplified language!!! Identify your target audience and talk in language they can understand