Colorado River Watch Network

Water quality indicators

Key measures provide a snapshot of conditions

Colorado River Watch Network (CRWN) volunteers test for several key water quality indicators. The resulting water quality data provides baseline information, helps identify trends or changes in water quality over time, and aids scientists investigating problems such as nonpoint-source pollution and nutrient enrichment.

LCRA professional monitors conduct similar tests when they evaluate water quality. The testing supplies a stream of data to LCRA, providing an early warning system for potential sources of water pollution.

For detailed information on water quality tests conducted by CRWN Volunteers, see the CRWN Water Quality Monitoring Manual.

Volunteer monitor Jennifer Jeffery holds a transparency tube at her site on the Colorado River in Wharton.

These are the key measurements and why they are important water-quality indicators:

- **Dissolved oxygen (DO)**
  The DO test measures the amount of oxygen dissolved in the water. Oxygen is essential for both plants and animals, but high levels in water can be harmful to fish and other aquatic organisms. Nonpoint-source pollution can decrease the amount of dissolved oxygen in water. The decomposition of leaf litter, grass clippings, sewage, and runoff from feedlots decreases DO readings. Decreased DO can be harmful to fish and other aquatic organisms. Dissolved oxygen is measured in milligrams per liter (mg/L). Expected levels: 4.0 to 12.0 mg/L

- **Water temperature**
  Aquatic organisms are dependent on certain temperature ranges for optimal health. Temperature affects many other parameters in water, including the amount of dissolved oxygen available, the types of plants and animals present, and the susceptibility of organisms to parasites, pollution and disease. Causes of temperature changes in the water include weather conditions, shade and discharges into the water from urban sources or groundwater inflows. Temperature is measured in degrees Celsius (°C). Seasonal trends: May to October: 22 to 35°C, November to April: 2 to 27°C

- **pH**
  A pH test measures the alkalinity or acidity concentration in water. A pH of 7 is neutral, below 7 is acidic, and above 7 is basic or alkaline. Acid rain, from auto exhaust or coal-fired power plants, causes a drop in the pH of water. Pollution from accidental spills, agricultural runoff and sewer overflows can also change the pH. Buffering capacity is water's ability to resist changes in pH, and is critical to the survival of aquatic life. The limestone soils of Central Texas act to neutralize these acids and often result in a more basic pH. While young fish and insect larvae are sensitive to a low pH (acid), extreme values on either end of the scale can be lethal to most organisms. Expected levels: 6.5 to 9.0

- **Escherichia coli (E. coli)**
  E. coli is a type of fecal coliform bacteria that comes from human and animal waste. The Enivronmental Protection Agency uses E. coli measurements to determine whether fresh water is safe for recreation. Disease-causing bacteria, viruses and protozoans may be present in water that has elevated levels of E. coli. Levels of E. coli can increase during flooding. E. coli is measured in number of colony forming units. The EPA water quality

standard for E. coli bacteria is 394 colony forming units per 100 mL.

- **Specific conductance**
  The specific conductance test measures the ability of water to pass an electrical current. Conductivity in water is affected by the presence of inorganic dissolved solids such as chloride, sulfate, sodium, calcium and others.

  Conductivity in streams and rivers is affected by the geology of the area through which the water flows. Streams that run through granite bedrock will have lower conductivity, and those that flow through limestone and clay soils will have higher conductivity values. High conductance readings can also come from industrial pollution or urban runoff -- water running off of streets buildings, and parking lots. Extended dry periods and low flow conditions also contribute to higher specific conductance readings.

  Because an organic compound such as oil does not conduct electrical current very well, an oil spill tends to lower the conductivity of the water. Temperature also affects conductivity; warm water has a higher conductivity. Specific conductance is measured in microsiemens per centimeter (µs / cm). Expected levels: 300 to 700 µs /cm in most of the Colorado River watershed; higher near San Saba and the coast.

- **Nitrates**
  Nitrogen is a nutrient necessary for growth of all living organisms. The Colorado River Watch Network monitors test for nitrogen in the form of nitrate (NO3-N). In excess amounts, nitrates in water cause an increase in algae growth. Algae can rob the water of dissolved oxygen and eventually can kill fish and other aquatic life. Sources of nitrates may include human and animal wastes, industrial pollutants and nonpoint-source runoff from heavily fertilized croplands and lawns. Under certain conditions high levels of nitrates (10 mg/L or more) in drinking water can be toxic to humans. High levels of nitrates in drinking water have been linked to serious illness and even death in infants. Nitrates are measured in milligrams per liter (mg/L). Expected levels: less than 1.0mg/L.

- **Transparency**
  Transparency measures how far light can penetrate a body of water. Sunlight provides the energy for photosynthesis and determines the depth to which algae and other plants can grow, defining the ecological make-up of a water body. A change in water clarity may be noticed after heavy rains, as silt and debris can run off into water bodies causing the visibility to decrease. Transparency usually decreases in the summer when plankton, silt and organic matter are more likely to be prevalent. CRWN monitors use both secchi disks and transparency tubes to measure transparency.

- **Visual tests**
  Monitors are also asked to record physical observations of the water. Volunteers record the clarity of the water, and the presence of plants and other aquatic life. They may also report the amount of rainfall received in the area.

To view data collected by our program, see CRWN Monitoring Sites and Data

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— Updated on October 4, 2012 at 09:05 AM —