



MODEL INDICATES

Missouri River Water

The City of Omaha Combined Sewer Overflow (CSO) Program efforts minimize the water quality impacts from CSOs in the Missouri River and local streams. The Omaha CSO Long Term Control Plan (LTCP) was finalized in 2009 and updated in 2014. Implementation of CSO controls identified in the LTCP have been ongoing since 2009 and are planned to continue through 2037.

Combined sewer overflow events occur along the Missouri River when stormwater mixed with sanitary wastewater overflows from CSO outfalls to the Missouri River. Overflows contribute to an increased concentration of *E. coli* bacteria in the River until wet weather conditions subside. *E. coli* is a water quality indicator of overall bacteria. The Nebraska Department of Environment and Energy (NDEE) has determined that an average of 126 colony forming units (cfu) of *E. coli* per 100ml in the River is acceptable when the public is most likely to be exposed to the River, May 1 through Sept. 30, which is also referred to as the recreation season.

COMPUTER MODEL REQUEST

At the request of the City, a computer model that simulates *E. coli* levels in the Missouri River was developed to understand important questions such as:

- What are the main sources along the Missouri River that contribute *E. coli*?

- How high are *E. coli* levels in the Missouri River during a typical recreation season? What sections of the River have the highest and lowest *E. coli* levels, and during what times of the recreation season do these occur?
- How much are *E. coli* levels in the Missouri River estimated to be improved by CSO Program projects?

MODEL DEVELOPMENT

To answer these questions, a water quality model was built to encompass the entire Missouri River from N.P. Dodge Memorial Park, extending downstream to the confluence with the Platte River, a distance of approximately 32 river miles. The model area, represented by the map to the right, takes into account known sources of *E. coli*, including:

- Sources upstream of N.P. Dodge Memorial Park
- CSO and stormwater outfalls that discharge to Missouri River
- The City of Omaha's Water Resource Recovery Facilities
- Papillion Creek
- Council Bluffs Wastewater Treatment Plant
- Three streams in Iowa: Pigeon Creek, Mosquito Creek and Indian Creek that all flow into the Missouri River

The water quality model uses historic data, as shown in the graph to the right, collected by the City and the United States Geological Survey (USGS) and others to represent typical concentrations contributed by each of the sources mentioned above. The model was also built to include the natural process of decay that occurs to *E. coli* as it moves downstream. The model has been

Quality

tested against actual data measured in the Missouri River between 2007 and 2017 by the City and USGS. The model performs very well in predicting river depth, river flow, and *E. coli* concentrations under a variety of recreation season conditions.

MODEL RESULTS & FINDINGS

Based on the work conducted so far, the water quality model has determined that:

- The use of a more robust model provides a better understanding of water quality impacts from CSO discharges to the Missouri River, which will assist in the implementation of additional controls.
- Papillion Creek, which includes CSO discharges along with other sources, has a significant impact on river water quality, more so than the creeks on the Iowa side of the River.
- During a typical recreation season, when it rains, *E. coli* levels are highest in the vicinity of I-480, which is downstream of several of the larger CSO discharges. The levels are lowest upstream of the City near N.P. Dodge Memorial Park.
- When evaluating a typical recreation season (May through September), average levels show little variation between sections of the Missouri River.

Currently, the CSO Program is modeling alternatives developed as part of the Optimization Evaluation. The model will be an important tool in the LTCP update and will also be useful in evaluating other improvements to address water quality concerns.

LEGEND

- CSO Outfalls
- ◆ Stormwater Outfalls
- ◆ Water Quality Monitoring Locations
- Water Resource Recovery Facility/ Wastewater Treatment Plant
- Tributaries
- Upstream Model Boundary
- Downstream Model Boundary

