



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

**Evaluation of Water Quality in Agriculturally Dominated
Water Bodies in Relation to Municipal and Domestic
Supply Beneficial Use (MUN)**

Sacramento Valley Archetypes

Draft Report

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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY



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1.0 EXECUTIVE SUMMARY

From April 2012 through September 2013, staff from the Central Valley Regional Water Quality Control Board (Central Valley Water Board) conducted an evaluation of water bodies downstream of Publicly Owned Treatment Works (POTW) discharges from the cities of Colusa, Willows, Live Oak, and Biggs in the Sacramento River Basin to determine whether conditions could reasonably be expected to support the municipal and domestic supply beneficial use (MUN). Characterization of the water bodies included an evaluation of whether the water body was a natural, modified or constructed channel (based on local water agency records) in addition to spatial and temporal water quality analyses.

To leverage resources, provide access, and insure transparency, the project was coordinated with the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) initiative, Irrigated Lands Regulatory Program (ILRP) coalitions, local POTWs, and other local, state and federal stakeholders including the water agencies that are currently managing and maintaining the water bodies in question.

Land uses within the four POTW's areas are mainly agriculture (ag). Based on records available from the water agencies currently managing the water bodies in question, all of the water bodies were either constructed or modified to convey ag drainage. There was no evidence of water being diverted nor permitted for municipal or domestic supply. Almost all of the water bodies evaluated were surrounded by rice fields.

Nineteen water bodies totaling approximately 300 miles were sampled for this study and included: Sutter Bypass, Wadsworth Canal, Colusa Basin Drain, Powell Slough, Butte Slough, Unnamed Tributary, New Ditch, Lateral Drain #2, Main Drainage Canal (C Main Drain), Cherokee Canal, Hunter Creek, Logan Creek, Lateral K, Willow Creek, Ag Drain C, and Butte Creek. These water bodies either represented background conditions or received effluent from the cities of Colusa, Willows, Live Oak, and/or Biggs. All of the water bodies except for the Colusa Basin Drain and Sutter Bypass are currently designated with the MUN beneficial use under the statewide Sources of Drinking Water Policy (88-63).

Water quality sampling in the water bodies occurred from April 2012 through September 2013, primarily Water Year 2013. Water Year 2013 was classified a dry year based on the Sacramento Valley Water Year Type Index and followed a dry year in water year 2012 and a wet year in water year 2011 (DWR, 2013 [<http://www.water.ca.gov/waterconditions/>]).

Sampling within each POTW study area was conducted twice a month from April 2012 through March 2013 period. Sampling frequency was then reduced to once a month from April 2013 through September 2013 due to limited staff resources. Key constituents consisted of elements which had been identified through either Reasonable Potential Analyses (RPA) conducted by one or more POTWs or through ILRP analyses of being constituents of potential concern. These key constituents included pH, specific conductivity (SC), turbidity, temperature, dissolved oxygen (DO), nitrate as nitrogen, sodium, aluminum, arsenic, iron, manganese, total dissolved solids (TDS), and total trihalomethanes (chloroform, bromodichloromethane, and dibromochloromethane). In June 2012, additional constituents specified in provisions of Title 22 of the California Code of Regulations to protect human health and human health-based standards in the California Toxics Rule (CTR) were analyzed. *E. coli* analyses were conducted monthly from August 2012 to September 2013. In total, 144 different constituents were evaluated during the course of the study.

All constituents were evaluated against Maximum Contaminant Levels (MCLs) specified in provisions of Title 22 of the California Code of Regulations, California Toxics Rule (CTR) criteria, California Public Health Goals (CA DPH), USEPA Drinking Water Advisory, or Odor threshold criteria to determine whether water quality may be suitable for municipal and domestic supply and protective of human health.

Based on the overall characterization of the water bodies receiving effluent from the cities of Colusa, Willows, Live Oak, and Biggs:

- Source water to the area is primarily stormwater runoff and wetland drainage during the winter and diversion of Sacramento and Feather River water, ground water, and agricultural and wetland drainage during the summer;
- All diversion and water rights within the water bodies are for irrigation use;
- All of the water bodies evaluated were specifically constructed or modified to convey agricultural drainage to facilitate agricultural operations throughout the basin;
- Flow patterns are dependent on local agricultural practices, can vary greatly throughout the year and would likely be dry during extended periods without surrounding irrigation practices;
- When analyzing the water quality results collected from the four study areas against 144 criteria to protect municipal and domestic supply and/or human health, most constituents were below the evaluation criteria and for those that were above the criteria, some elevated concentrations occurred in the effluent but the majority occurred upstream and/or downstream of where the effluent might influence water quality.
- The following constituents showed a pattern of consistently elevated levels throughout the overall study area: SC; TDS; nitrate as nitrogen; total aluminum; iron; manganese; and sodium;
 - Total aluminum, total iron, and manganese were found at elevated levels at all sites upstream and downstream of the influence of the effluent;
 - The dissolved forms of these constituents did not exceed criteria;
 - SC, TDS, and nitrate as nitrogen were elevated in the effluent, but concentrations dissipated after the first downstream site;
 - Sodium exceeded criteria in at all sites samples—effluent and water bodies;
- Total and dissolved arsenic were elevated in the Colusa and Live Oak study areas (the southern portion of the overall study area):
- Trihalomethanes were consistently reported at elevated levels in the City of Willow's effluent but not in any of the upstream or downstream sites except for two detections of chloroform upstream of the effluent in the northern portion of the basin;

- E. coli concentrations randomly exceeded criteria both upstream and downstream of the influence from the cities' effluents; and
- Constituents with elevated levels not related to the effluent appear to be linked to elevated levels in local ground water (e.g. arsenic) while others such as aluminum, iron and manganese have been correlated to high reservoir outflows from Shasta and Oroville reservoirs (Sacramento River Watershed Sanitary Survey 2010 update).

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