

The following screening analysis was performed by the LWA Team to complete Task 8b of the Scope of Work for Development of a Basin Plan Amendment for Salt and Boron in the Lower San Joaquin River, *Finalize Water Quality Criteria Review*.

### **Step 1: Development of Table 1 – Salinity Criteria, Guidelines, or Proposed Protective Benchmarks Advanced in LSJRC Beneficial Use Source Documents.**

The salinity criteria, guidelines, or proposed protective benchmarks that appear in **Table 1** represent a subset of those provided in the various reports (LSJRC Beneficial Use Source Documents; see list below) prepared by other Consultants or Central Valley Regional Water Quality Control Board staff. All criteria and guidelines used to regulate salinity in surface waters in California, other states, and various countries around the world that were included in the LSJRC Beneficial Use Source Documents were included in **Table 1**. Proposed protective benchmarks (those numeric values found in peer reviewed journal articles that have not ever been used to regulate surface water quality) were not included in **Table 1**, with the following exceptions:

1. AGR (irrigation) beneficial use-related proposed protective benchmarks associated with or informing the work of Dr. Glenn J. Hoffman;
2. AGR (stock watering) beneficial use-related proposed protective benchmarks suggested by Kennedy/Jenks Consultants in *Salt and Nutrients: Literature Review for Stock Drinking Water Final Report, 20 May 2013*; and
3. MUN beneficial use-related proposed protective benchmark suggested by Dennis W. Westcot in *Drinking Water Quality Criteria for Evaluation of Water Quality Objectives for the Lower San Joaquin River, 20 June 2012*.

### **Step 2: Development of Table 2 – Preliminary Range of Potential Salinity Criteria for Reach 83 of the Lower San Joaquin River by Beneficial Use Type.**

A second screening analysis was performed when determining the individual or range of potential salinity criteria to advance from **Table 1** to **Table 2**. Certain criteria, guidelines, or proposed protective benchmarks were excluded from **Table 2** for the following reasons (listed by beneficial use and parameter):

#### **MUN**

**TDS** State of Utah water quality criteria for TDS not considered because they are based on the naturally elevated levels of salts found in that state.

**Boron** Canadian and Australian/New Zealand water quality guideline for boron not considered because they exceed the existing boron objectives included in the Central Valley Basin Plan.

U.S. EPA IRIS (0.63 mg/L) and SNARL (0.60 mg/L) guidelines not considered because the Central Valley Basin Plan's existing boron objectives are considered to be sufficiently protective of the MUN beneficial use.

### **AGR (irrigation)**

EC Numeric values below the existing seasonal Central Valley Basin Plan objective of 0.7 dS/m are not considered because the existing EC objective is considered sufficiently protective of the AGR beneficial use.

Numeric values above 1.4 dS/m not considered because 1.4 dS/cm considered an approximate upper threshold if State Board's proposed southern Delta water quality objective Alternative 3 was implemented in the next update to the Bay-Delta Plan.

TDS Based on the upper threshold of 1.4 dS/m described above, an upper threshold for TDS is 850 mg/L based on the assumed relationship between EC and TDS ( $EC = 0.65 \times TDS$ ) that was used by Central Valley Regional Board staff in developing the Salt and Boron TMDL for the LSJR. To this end, the State of Utah water quality standard for TDS of 1,200 mg/L is not considered.

Boron U.S. EPA IRIS (0.63 mg/L) and SNARL (0.60 mg/L) guidelines not considered because the Central Valley Basin Plan's existing boron objectives are considered to be sufficiently protective of the AGR beneficial use.

### **AGR (stock watering)**

EC State of South Dakota daily maximum EC concentration of 7.0 dS/m not considered as the potential salinity objectives to be further evaluated and modeled in Task 3 are considered to be average values (averaging periods to be determined).

Mg Canadian water quality guideline for magnesium of 125 mg/L not considered because Ayers and Westcot (1985) guideline of 250 mg/L already considered sufficiently protective, if not overprotective of the beneficial use.

### **WARM**

Cl British Columbia and Canadian water quality guidelines for chloride not considered because they are based on single species chronic toxicity bioassays that may not have relevance to the project area. State of Iowa water quality criteria for chloride based on hardness and sulfate concentrations, which when using typical concentrations measured in the LSJR, would produce criteria that exceed the 1988 U.S. EPA chronic ambient water quality criterion of 230 mg/L.

SO4 Proposed State of Illinois hardness-based criteria for sulfate considered to be suspect based on the review of Dr. David Buchwalter's and is not considered further. The U.S. EPA chronic criterion for sulfate of 124 mg/L calculated by Dr. Buchwalter was advanced with caveats as noted in the Aquatic Life Study.

### **COLD**

Cl British Columbia and Canadian water quality guidelines for chloride not considered because they are based on single species chronic toxicity bioassays that may not have relevance to the project area. State of Iowa water quality criteria for chloride based on hardness and sulfate concentrations, which when using typical concentrations measured in the LSJR, would produce criteria that exceed the 1988 U.S. EPA chronic ambient water quality criterion of 230 mg/L.

SO4 Proposed State of Illinois hardness-based criteria for sulfate considered to be suspect based on the review of Dr. David Buchwalter's and is not considered further. The U.S. EPA chronic criterion for sulfate of 124 mg/L calculated by Dr. Buchwalter was advanced with caveats as noted in the Aquatic Life Study.

Lower San Joaquin River Committee Beneficial Use Source documents considered by the LWA Team under its Task 8b work effort:

- Drinking Water: CDM Salinity Effects on MUN-Related Uses of Water, July 2012  
Drinking Water Quality Criteria for Evaluation of Water Quality Objectives for the Lower San Joaquin River, 20 June 2012, prepared by Dennis Westcot (included as Attachment A to CDM MUN Report)
- Agriculture: Central Valley Regional Water Quality Control Board Salt Tolerance of Crops in the Lower San Joaquin River (Merced to Stanislaus River Reaches), Draft Report, March 2010  
CDM Salinity Effects on AGR Irrigation-Related Uses of Water, August 2012
- Stock Watering: Kennedy/Jenks Consultants Salt and Nutrients: Literature Review for Stock Watering Water, Final Report, 20 May 2013
- Aquatic Life: Aquatic Life Study, Final Report, October 9, 2013, prepared by Dr. David Buchwalter

**The following documents were also reviewed and considered by the LWA Team under its Task 8b work effort:**

Two Central Valley Water Board staff reports reviewing boron and salinity criteria:

Davis, H. January 1999 Draft. Boron: A Literature Summary for Developing Water Quality Objectives. Central Valley Water Board.

Davis, H. January 2000 Draft. Salinity: A Literature Summary for Developing Water Quality Objectives. Central Valley Water Board.

Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board, Central Valley Region: The Sacramento River Basin and the San Joaquin River Basin. Fourth Edition, Revised October 2011 (with Approved Amendments).