

Aquatic Life Study - Scope of Work

Project Objectives

CVSC plans to hire a Consultant to complete a technical analysis that fulfills the following three project objectives:

1. Identify salinity-related water quality criteria that could be used as the basis for establishing water quality objectives (WQO) in Central Valley surface waters for protection of aquatic life beneficial uses;
2. Identify salinity-related WQOs, standards, goals, procedures and/or policies that have been established elsewhere (state, federal or international) and can be used to inform efforts to establish WQOs to protect aquatic life beneficial uses, consistent with the Central Valley Regional Water Quality Control Board's (CVRWQCB) biological-related beneficial uses (i.e., Warm Freshwater Habitat [WARM], Cold Freshwater Habitat [COLD], and Preservation of Biological Habitats of Special Significance [BIOL] – collectively referred to as “aquatic life beneficial uses”); and
3. Prepare technical recommendations for adoption of salinity-related WQOs to protect aquatic life beneficial uses for consideration by the CVRWQCB.

For the purposes of this project, salinity-related water quality criteria or objectives refers to the following constituents: Total dissolved solids (TDS), specific conductance or electrical conductivity (EC), sodium (Na), chloride (Cl), calcium (Ca), magnesium (Mg), potassium (K), sulfate (SO_4), carbonate (CO_3), bicarbonate (HCO_3), hardness, and boron (B).

The Consultant will accomplish the objectives of this study through completion of Tasks 1 through 6 (see below). Task 1 is the primary task; the findings from this task will provide the baseline for the level of effort required in subsequent tasks, i.e., Tasks 2 through 5 are intended to be secondary tasks that provide opportunity to supplement the primary technical information developed under Task 1.

In addition to completion of Tasks 1 through 6, the Consultant will coordinate work activities on a regular basis with the CV-SALTS Technical Project Manager (TPM). Coordination activities include periodic telephone calls or email exchanges to address project-related questions initiated either by the TPM or Consultant.

Task 1 – Review Selected Literature Regarding Salinity and Protection of Aquatic Life Beneficial Uses

The Consultant will review the following documents to establish a baseline of current understanding of salinity and protection of aquatic life beneficial uses (hyperlinks are provided for documents publicly available; Evans and Frick 2001 will be provided by CV-SALTS; other documents shall be acquired by the Consultant):

- Central Valley Regional Water Quality Control Board. 1999. *Boron: A Literature Summary for Developing Water Quality Objectives (Draft)*. Central Valley Regional Water Quality Control Board, January 1999.

http://www.swrcb.ca.gov/rwqcb5//water_issues/swamp/historic_reports_and_faq_sheets/info_supt_rec_guidelines/boron_literature_sum_draft.pdf

- Central Valley Regional Water Quality Control Board. 2000. *Salinity: A Literature Summary for Developing Water Quality Objectives (Draft)*. Central Valley Regional Water Quality Control Board, January 2000.
http://www.swrcb.ca.gov/rwqcb5//water_issues/swamp/historic_reports_and_faq_sheets/info_supt_rec_guidelines/davis2000_salinity_litsum_aro7019.pdf
- Department of Interior. 1998. *Guidelines for the Interpretation of Biological effects of Selected Constituents in Biota, Water and Sediment*. Department of Interior, National Irrigation Water Quality Program, Information Report No. 3. November 1998. In particular, review the sections titled introduction; boron, and salinity. <http://www.usbr.gov/niwqp/guidelines/index.html>.
- Evans, M. and C. Frick. 2001. *The Effects of Road Salts on Aquatic Ecosystems*. NWRI Contribution Series No. 02-308, National Water Research Institute and University of Saskatchewan, Saskatoon, SK, Canada.
- Iowa Department of Natural Resources. 2009. *Water Quality Standards Review: Chloride, Sulfate and Total Dissolved Solids*. Iowa Department of Natural Resources, February 9, 2009.
http://www.iowadnr.gov/portals/idnr/uploads/water/standards/ws_review.pdf
- Nagpal, N.K., D.A. Levy, and D.D. MacDonald. 2003. *Water Quality: Ambient Water Quality Guidelines for Chloride - Overview Report*. Ministry of Environment, British Columbia, Canada.
<http://www.env.gov.bc.ca/wat/wq/BCguidelines/chloride/chloride.html>
- Stroud Water Research Center. 2010. *Expert Report on the Proposed Rulemaking by the Pennsylvania Environmental Quality Board for Ambient Water Quality Criterion Chloride (Cl)*. Stroud Water Research Center, Avondale, Pennsylvania. Stroud Report #2010004. June 14, 2010.
<http://www.sierraclub.org/naturalgas/rulemaking/documents/PA.Chapter93/2010.6.14.StroudReport.pdf>
- Weber-Scannell, P.K. and L.K. Duffy. 2007. *Effects of Total Dissolved Solids on Aquatic Organisms: A Review of Literature and Recommendation for Salmonid Species*. American Journal of Environmental Sciences 3: 1-6.

Based on the review of the above documents, the Consultant shall develop the following information with regards to salinity and protection of aquatic life beneficial uses:

1. Detailed summary of the purpose, methods, findings and/or recommendations developed by various authors with regards to the establishment of salinity-related water quality criteria to protect aquatic life beneficial uses. This summary should include any supporting tables and figures that demonstrate or illustrate the basis of findings or recommendations.
2. Evaluation of the applicability of the purpose, methods, findings and/or recommendations to the area under the jurisdiction of the CVRWQCB, including (a) evaluating the applicability of aquatic species used as the basis for water quality criteria recommendations in other geographic areas to freshwaters within the jurisdiction of the CVRWQCB; and (b) consistency of the methods used to develop water quality criteria recommendations to accepted federal methods for establishing aquatic life criteria (see Stephan, C. E., D. I. Mount, D. J. Hansen, J. H. Gentile, G. A. Chapman, and

W. A. Brungs. 1985. *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses*. Environmental Protection Agency Office of Research and Development, Duluth, MN.
http://water.epa.gov/scitech/swguidance/standards/criteria/current/upload/2009_01_13_criteria_85guidelines.pdf

3. The Consultant shall identify/recommend key technical references cited in documents reviewed for this task that should also be reviewed to provide additional insight into findings and recommendations.

The Consultant shall prepare a Draft Technical Memorandum (TM) for CV-SALTS Technical Advisory Committee (TAC) review that incorporates the findings from this task. The Consultant shall also present the findings at one TAC meeting (via teleconference) and participate in the TAC discussion of the TM.

A Final Draft TM will be prepared based on TAC comments. The Consultant shall also prepare a comment/response table as an attachment that describes how each comment was addressed. Any comments received on the Final Draft TM will be addressed during preparation of the Project Report under Task 6.

As part of its review of the draft and final draft TMs, the TAC will evaluate the recommendations for review of key technical references and provide direction to the Consultant regarding the level of effort (if any) that should be applied to Task 2.

Deliverables: (1) Draft TM; (b) Final Draft TM with comment/response table; and (c) Presentation and participation in one TAC meeting.

Task 2 – Supplemental Review of Key Technical References

Task 2 shall be implemented only as approved by the TAC. The Consultant shall review the technical references approved under Task 1 (for budgeting purposes assume that up to 20 references will be approved for review). For each reference, the Consultant shall be responsible for obtaining a copy to review. The Consultant shall review the approved references and prepare a brief summary (along with relevant tables and figures) of the key findings. The findings shall be prepared within the context of the information developed under Task 1.

Deliverable: Prepare materials (text with citations, figures and/or tables) that summarize any relevant findings and incorporate them into the Project Report (Task 6).

Task 3 – Supplemental Review of Federal Procedures, Policies and Guidelines

The Consultant shall conduct a review of federal procedures, policies and guidelines to evaluate or identify relevant salinity-related information that supplements the findings from Tasks 1 and 2. At a minimum, this review will include:

- Environmental Protection Agency (EPA) – The Consultant shall conduct a general review of EPA procedures, policies and guidance to identify any relevant documents related to salinity and protection of aquatic life beneficial uses that are supplemental to information identified in Task 1. In addition, the Consultant shall also complete the following specific EPA-related reviews:

- Evaluate EPA's development of a field-based method for establishing an aquatic life benchmark for conductivity by reviewing the following documents:
 - EPA 2011 final publication: *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*.
<http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=233809>
 - Scientific Advisory Board (SAB) 2011 review of EPA 2010 draft report: *Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*
[http://yosemite.epa.gov/sab/sabproduct.nsf/02ad90b136fc21ef85256eba00436459/EEDF20B88AD4C6388525785E007331F3/\\$File/EPA-SAB-11-006-unsigned.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/02ad90b136fc21ef85256eba00436459/EEDF20B88AD4C6388525785E007331F3/$File/EPA-SAB-11-006-unsigned.pdf)

The review of the above documents should focus on the methods used to establish the benchmark and any implications for protection of freshwater aquatic life if such an approach were applied to the region under the jurisdiction of the CVRWQCB.

- Consult the EPA ECOTOX Database (<http://cfpub.epa.gov/ecotox/index.html>) to determine if any new relevant information regarding acute or chronic effects of salinity-related constituents on aquatic life has been incorporated into the database that supplements information already reported on or summarized in Tasks 1 or 2.
- Department of Interior (e.g., U.S. Fish & Wildlife Service, Bureau of Reclamation, U.S. Geological Survey) and Department of Commerce (e.g., National Marine Fisheries Service) – The Consultant shall conduct a general review of procedures, policies and guidance developed by these agencies to identify any relevant documents related to salinity and protection of aquatic life beneficial uses that supplements information reviewed under Tasks 1 or 2.

Deliverable: Prepare materials (text with citations, figures and/or tables) that summarize any relevant findings and incorporate them into the Project Report (Task 6).

Task 4 – Supplemental Review of California Plans, Procedures, Policies and Guidelines

The Consultant shall complete a general review of plans, procedures, policies and guidelines as described below:

- California Water Boards - The Consultant shall review the Basin Plan programs for each of the nine California Regional Water Boards to identify any salinity-related numeric or narrative WQOs established to protect aquatic life beneficial uses. This review shall include the following:
 - Review of each approved Water Quality Control Plans (Basin Plan), including approved amendments to the Basin Plan not yet incorporated into the main body of the Basin Plan document.
 - Review any proposed amendments currently under development and under active consideration for inclusion into a region's Basin Plan.

- For any identified numeric salinity-related WQOs, ascertain the technical basis for the adoption of the WQO by any appropriate means, including conducting interviews with relevant Water Board staff.
- For any identified narrative WQOs applicable to salinity-related constituents, determine if any implementation procedures have been established to translate the narrative WQO into a numerical effluent limit or objectives to protect aquatic life beneficial uses.
- California Department of Fish and Game (CDFG) – Identify if CDFG has any established procedures, policies or guidelines with regards to salinity and protection of aquatic life beneficial uses. Summarize any findings.

Deliverable: Prepare a summary of the findings from this general review and incorporate them into the Project Report (Task 6).

Task 5 – Supplemental Review of Selected International Procedures, Policies and Guidelines

The Consultant shall conduct a review of selected international procedures, policies and guidelines to evaluate or identify relevant salinity-related information that supplements the findings from Tasks 1 and 2. At a minimum, this review will include:

- Canada – Summarize any applicable water quality guidelines for protection of aquatic life published by the Canadian Council of Ministers of the Environment (CCME).
http://www.ccme.ca/publications/ceqg_rcqe.html
- Australia/New Zealand - Summarize any applicable water quality guidelines for protection of aquatic life included in *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.
<http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html>
- South Africa - Summarize any applicable water quality guidelines for protection of aquatic life included in *South African Water Quality Guidelines, Volume 7: Aquatic Ecosystems*
http://www.capetown.gov.za/en/CSRM/Documents/Aquatic_Ecosystems_Guidelines.pdf
- Other - The Consultant should do a cursory Internet search to identify any other readily available international documents that could provide additional supplemental information relevant to this project. These documents should be identified, but not reviewed under this task.

Deliverable: Prepare materials (text with citations, figures and/or tables) that summarize any relevant findings and incorporate them into the Project Report (Task 6).

Task 6 – Prepare Project Report

Under this task, the Consultant shall prepare a Project Report that (a) combines the findings from Tasks 1 through 5 into a single report; and (b) provides recommendations regarding adoption of salinity-related WQOs to protect aquatic life beneficial uses. The technical basis for any recommendations for adoption of WQOs shall be provided.

The Consultant shall first prepare a Draft Project Report for TAC review. The draft report shall address any comments previously received on the Task 1 Final Draft TM and include a comment/response table to summarize how these comments were addressed. The Consultant shall also make a presentation of the

Draft Project Report (via teleconference) to the TAC and participate in the TAC discussion of the draft report.

The Consultant shall prepare a Final Project Report based on TAC comments on the draft report. The Consultant shall include a comment/response table in the final submittal to summarize how TAC comments on the Draft Project Report were addressed in the final report.

Deliverables: (1) Draft Project Report with comment/response table regarding how comments on the Final Draft TM were addressed; (2) TAC presentation and discussion; and (3) Final Project Report with comment/response table.

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