

CV-SALTS Technical Advisory Committee Meeting 3-8-2012

Item #5. Site-Specific EC Study Workplans and Report

Questions & Issues

In a letter dated 4 October 2011, the TAC provided comments and recommendations to Central Valley Regional Board staff on several technical issues related to a site-specific EC water quality objective study workplan for the City of Davis. There are four additional EC study workplans and an EC study report that staff are in the process of reviewing. They are:

Completed Study

- City of Roseville – Dry Creek WWTF

Workplans

- City of Roseville – Pleasant Grove
- City of Manteca WWTF
- City of Colusa WWTF (policy issue)
- City of Vacaville WWTF

While some of the issues and questions raised in the additional documents were addressed by the 4 October 2011 letter, in order to ensure a consistent and technically sound approach to our review of these and subsequent reports and workplans, we would like to obtain the TAC's input on some of the additional questions and issues raised. Both technical and policy issues were raised that influence determining objectives for the protection of agricultural use. While it is important that the policy-related issues also be addressed in order for staff to proceed with its reviews and to provide guidance to dischargers and consultants conducting studies, staff recommends that the policy-related issues be submitted to the Executive Committee for their consideration.

In order to provide some context regarding the issues and questions, a brief discussion is provided below. The discussion is divided into two sections, one for technical issues and questions and a section on policy issues and questions. In addition, a summary list of the specific questions we would like the TAC and Executive Committee to consider is provided at the end of the document

Technical Questions

1 - Is it appropriate to use results from other areas if the model inputs would be the same or more limiting? (From Roseville – Dry Creek report and Manteca workplan)

The City of Roseville – Dry Creek WWTF submitted a report recommending a site-specific EC objective based on the objectives recommended in a previously accepted

study. Roseville's approach was to compare the modeling inputs used for Hoffman's South Delta study (2010) and Dr. Stephan Grattan's City of Woodland study (2006) with the site-specific conditions in the Dry Creek study area and demonstrating that the site specific conditions used as inputs for the South Delta and Woodland modeling were similar to or more limiting than those same site specific conditions in the Roseville study area. For instance, mean annual rainfall in the Roseville study area was reported to be 5 to 6 inches more than in the South Delta study area. The report provided a table summarizing that comparison and that table is attached. Assuming dry beans as the most salt sensitive crop in the study area, the report recommended a site-specific EC objective of 900 uS/cm, which was the low end of the range recommended by Dr. Hoffman in the South Delta report.

The Manteca workplan proposed using a similar approach. Because the Manteca WWTF discharge occurs only 3 miles from the eastern edge of the Hoffman South Delta study area, the City's workplan proposed to also base its technical approach on Hoffman's South Delta report, if it could be shown that the Manteca study area conditions are the same as the South Delta conditions.

The approach used in the Roseville study and proposed in the Manteca workplan is similar to that proposed by the City of Davis, which the TAC has already commented on. Staff would like to confirm with the TAC that, in general, such an approach is valid, provided site-specific conditions in the study areas compared are similar or more limiting.

2 - What are the key model inputs that need to be similar? If the study you are basing your results on gives a range of objectives, should you always choose the lowest number?

Staff would like the TAC to review the attached table from the Roseville report comparing site-specific conditions between the Roseville, South Delta, and Woodland study areas and provide a recommendation on whether the site-specific conditions cited in the table are the appropriate ones, and whether conditions in the Dry Creek study area are similar enough to the conditions in the South Delta study area to justify basing Dry Creek's objectives on those modeled for the South Delta?

(A workplan prepared for the City of Vacaville in 2010 posed several questions for CV-SALTS to resolve before proceeding with implementing the rest of the workplan. All of the remaining technical questions were submitted with the Vacaville workplan.)

3 - Is the use of a transient model acceptable?

The TAC approved the use of the transient Grattan model for the City of Davis in its letter dated 4 October 2011. Staff recommends confirming use of a transient model as acceptable.

4 – What is the appropriate winter bare soil evaporation rate for Vacaville?

Winter bare soil evaporation rate is one of the inputs into the Hoffman model. In

conducting the South Delta study, Dr. Hoffman used a bare soil evaporation rate of 0.7 inches per month, based on a 4-year DWR study (*MacGillivray and Jones, 1989*) conducted at 10 sites in the Central Valley from Red Bluff to Bakersfield. Staff would like to confirm with the TAC that the use of *MacGillivray and Jones, 1989* to identify winter bare soil evaporation rate is acceptable and that Dr. Hoffman's use of 0.7 for the South Delta was appropriate.

5 - Is the exponential pattern for soil water root uptake the appropriate default for the Hoffman model?

Two soil water uptake patterns can be used in the Hoffman model – one, the 40-30-20-10 pattern and the other, the exponential pattern. The choice of uptake patterns can make a significant difference in the resulting salinity objective (in the South Delta report, objectives calculated using the 40-30-20-10 pattern ranged from 50 to 500 EC lower than objectives calculated using the exponential pattern). In the South Delta report, Hoffman calculated objectives using both patterns, but recommended using the exponential pattern because it fits field and plot experiment results.

6 - Is the methodology Dr. Hoffman used to determine leaching fractions in the South Delta report appropriate for other areas? In the absence of site-specific data, is 15% appropriate to utilize as a conservative assumed leaching fraction for other Central Valley areas?

In their letter regarding the City of Davis workplan, the TAC recommended using a range of 15% to 20% for the leaching fraction input to represent conditions in the Yolo Bypass. Hoffman used 15% and 20% leaching fractions for his South Delta study, and based that on calculations using tile drainage and applied water data from the South Delta.

Policy Questions (*Staff Recommends Requesting Executive Committee Review*)

1 – How much influence should the input of local irrigation water users have on determining site-specific salinity objectives? (From City of Colusa workplan)

The consultant for the City of Colusa posed a question to staff regarding the possibility of deferring the EC study if the City were to submit documentation stating that the landowners surrounding the discharge are willing to accept the water quality as it currently exists. This raises a broader question, which is how much weight should be given to local irrigation water users' input in determining site-specific salinity objectives?

2 - What level of crop protection is reasonable?

This is a very significant policy issue that has a huge impact on the EC objective chosen. But the issue has not been resolved in a definitive way. Suggested levels that staff has seen range from 85% to 100% protection. Without a clear policy, staff has to default to the most conservative number, which is 100% protection.

3 - What crop type is appropriate for determining level of protection?

This is another significant policy issue that can have a huge bearing on the salinity objective recommended. But there is no clearly defined methodology for determining what crops to include when identifying the most salt sensitive crop to be protected in an area.

The following is a summary of the questions discussed above

Technical Questions

1. *Is it appropriate to use results from other areas if the model inputs would be the same or more limiting?*
2. *What are the key model inputs that need to be similar? If the study you are basing your results on gives a range of objectives, should you always choose the lowest number?*
3. *Is the use of a transient model acceptable?*
4. *What is the appropriate winter bare soil evaporation rate for Vacaville?*
5. *Is the exponential pattern for soil water root uptake the appropriate default for the Hoffman model?*
6. *Is the methodology Dr. Hoffman used to determine leaching fractions in the South Delta report appropriate for other areas? In the absence of site-specific data, is 15% appropriate to utilize as a conservative assumed leaching fraction for other Central Valley areas?*

Policy Questions

1. *How much influence should the input of local irrigation water users have on determining site-specific salinity objectives?*
2. *What level of crop protection is reasonable?*
3. *What crop type is appropriate for determining level of protection?*

Table 8. Comparison of site-specific parameters use in previous modelling studies by Hoffman and Grattan to the DCWWTP Area of Influence within the Dry Creek watershed

Parameter	Hoffman (2010)	Grattan (2006)	DCWWTP area of influence (this study)	Comparison
Sensitive crops	Bean (threshold EC _e of 1,000 µmhos/cm)	Corn (threshold EC _e of 1,700 µmhos/cm) and Rice (threshold EC _e of 1,900 µmhos/cm)	Sensitive crops in <5% of land use classification. Alfalfa (threshold EC _e of 2,000 µmhos/cm) and Bean (threshold EC _e of 1,000 µmhos/cm)	The most salt sensitive crops in the DCWWTP Area of Influence have similar tolerances to the crops considered in the Woodland study and are more tolerant than the sensitive crops considered in the South Delta.
Soil Type	Predominately clay, clay loam, and silty clay loam. Soil class was not provided.	Class 4 – moderately to poorly drained soils used in analysis	Class 3 and 4 in most of watershed – low permeability with shallow root depth potential; Class 1 or 2 in the Dry Creek floodplain	The soils in the DCWWTP Area of Influence have similar or higher permeability than soils used in previous modeling efforts.
SAR	2.4 – very slight soil infiltration reduction potential	4.3 – water infiltration problems unlikely	0.50-1.9 – none to very slight soil infiltration reduction potential	The SAR in DCWWTP Area of Influence is lower or similar to the South Delta SAR, and lower than the Woodland SAR, therefore modeling using either estimate would produce a more stringent EC limit than Roseville conditions.
Climate	Mean annual precipitation of 13.8 inches Temperature is lower than Riverside	Mean annual precipitation of 18.4 inches Mean temperature of 16 C (60 F)	Mean annual precipitation of 19-20 inches Temperature is lower than Riverside	Similar rainfall to Woodland, and higher rainfall than South Delta. Using South Delta estimates would produce a more stringent EC limit than conditions in the DCWWTP Area of Influence. Temperature is cooler and more humid than Riverside (used for literature crop tolerance values), therefore literature crop tolerance values would produce a more stringent EC limit than conditions using the DCWWTP Area of Influence.
Leaching Fraction	Average leaching fractions between 0.21 and 0.27	Assumed a reasonable leaching fraction of 0.15 to 0.20	Has not been determined for the DCWWTP Area of influence, but is likely similar to the South Delta and Woodland	Leaching fraction is likely similar between the DCWWTP Area of Influence and the South Delta and Woodland areas.