CENTRAL VALLEY SALINITY ALTERNATIVES FOR LONG-TERM SUSTAINABILITY
ICM AND GIS TECHNICAL SERVICES

PROJECT KICKOFF MEETING
MONDAY, OCTOBER 8, 2012
1:00 – 4:30 PM

*BRING YOUR COPY OF THE ICM AND GIS WORKPLANS

Kennedy/Jenks Office
Sacramento River Room
10850 Gold Center Drive
Rancho Cordova, CA

(The information below is provided only if you are unable to make it in person)

Web Ex:
Go to https://lwa.webex.com/lwa/j.php?ED=212494852&UID=1422177577&PW=NNDNIMWYxMzgy&RT=MiM0
If requested, enter your name and email address
If a password is required, enter the meeting password: lwa123 - Click "Join"

Conference Call Line:
Call in number: (888) 363-4735
Code: 3626766

AGENDA

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Lead/ Time for Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome &amp; Introductions</td>
<td>Welcome &amp; Introductions</td>
<td>Karen (1:30–1:35)</td>
</tr>
<tr>
<td>Meeting Purpose</td>
<td>The purpose of the meeting is to review the ICM and GIS workplans, key deliverables, schedule and discuss pertinent technical issues and use this meeting as a forum to collaborate with the Project Committee. Review Agenda</td>
<td>Karen (1:35–1:40)</td>
</tr>
<tr>
<td>ICM Work Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach and Schedule</td>
<td>Overall Approach for CV-SNMP</td>
<td>Karen/Tom (1:40 – 2:00)</td>
</tr>
<tr>
<td></td>
<td>CV-Salts Conceptual Model</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ICM Approach and Questions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Schedule</td>
<td></td>
</tr>
<tr>
<td>Project Management Approach</td>
<td>Roles and Responsibilities</td>
<td>Karen (2:00–2:10)</td>
</tr>
<tr>
<td></td>
<td>Project Coordination and Collaboration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Early Feedback &amp; Document Review Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Schedule for PC/Team Calls</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ICM Workshop - Nov 27 or Nov 29</td>
<td></td>
</tr>
</tbody>
</table>
| Task 3 – Data Development | • Purpose  
• Approach for use of WARMF and CHVM  
• Key Deliverables | Vicki/ Barb  
(2:10 – 3:00) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 4 – Establish Initial Analysis Zones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 5 – Establish Methods for Salt and Nitrate Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Break (3:00-3:15)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Task 6 – Complete High Level Salt and Nitrate Analyses for Central Valley | • Purpose  
• Approach for Sub-areas and Use of Models  
• Key Deliverables | Vicki/ Barb  
(3:15-3:30) |
| Task 7 – Salt and Nitrate Analyses in Selected Subareas of the Central Valley | | |
| Task 8 – Initial Conceptual Model Report | | |
| GIS Work Plan | | |
| Purpose and Objectives | • Approach  
o Task 3 – Address Data Gaps in Existing BUOS System  
o Task 4 – Incorporate Additional GIS Map Layers  
• Key Deliverables & Schedule | Les/Gary  
(3:30 – 4:00) |
| Task 5 – Agricultural Zoning Map Layers | • Development of Work Plan & Schedule | Les  
(4:00–4:15) |
| Meeting Wrap Up & Next Steps | | |
| Key Message Points and Action Items | • Key Message Points  
• Action Items  
• Next Steps | Karen  
(4:15 – 4:30) |
Summary of Key Discussion Items

The kickoff meeting for the ICM and GIS technical services was held on October 8\textsuperscript{th}, 2012 and primarily included members of the related CV-SALTS Project Committee and the LWA consultant Team. During the meeting the LWA Team presented the ICM and GIS Workplans and associated tasks and received feedback from the Project Committee. The key discussion items from the kickoff meeting are summarized below.

- **Central Valley Regional Water Quality Control Board (Region 5) Jurisdictional Boundary and the Central Valley Floor**
  - The CVHM valley floor coverage of the model with data collection (as feasible as a part of ICM Task 3) in other areas of Region 5 is adequate for the purposes of the ICM work.
  - The LWA Team will coordinate with Randy Hanson and Claudia Faunt regarding modifications to the CVHM sub-region boundaries in CVHM-2 for CVSALTS purposes for the Phase 2 CV-SNMP.
  - The Central Valley floor coverage and Region 5 boundary considerations will be discussed in the Task 4 and Task 8 Reports.
  - Since the CV-SNMP must address the Region 5 jurisdictional boundary, Phases 2 and 3 should include salt and nitrate management considerations for the entire jurisdictional boundary.

- **Modeling Approach**
  - The LWA Team will consider how the data and information developed as a part of this work may be used for the future CV-SALTS studies/work efforts such as SSALTS, the Agriculture Zone Mapping, etc.
  - The LWA Team will compare the net recharge output for the CVHM and WARMF models (Task 6) and incorporate the results of that comparison into the final ICM report (Task 8).

- **Mixing Model**
  - As a part of Tasks 4 and 5, the LWA Team will define the delineation of the upper aquifer thickness for each IAZ as an estimated 20 year travel time and the corresponding layers of CVHM (e.g., layers 1 – 3).
  - The method for establishing the vertical dimension and saturated volume of the upper aquifer will be incorporated in the Task 4 and Task 5 reports.

- **Water Quality**
  - Account for salinity variations above and below the Corcoran Clay [Task 6 includes consideration of vertical salt mass fluxes from a deeper layer (i.e., beneath the saturated volume defined for the upper aquifer mixing zone) when that layer is above the Corcoran Clay, or where the Corcoran Clay is absent.] Task 7 includes all model layers, above and below the Corcoran Clay where present (e.g., CVHM in Kings Subbasin or MODFLOW model for the Modesto area).

- **Land Use Classes**
  - As a part of the Task 5 TM on Methodology and the Task 8 ICM Report, the LWA Team will discuss the 1) approach to compare land uses for WARMF and CVHM (Task 5), and 2) how they compared, which ones were used, etc.(Task 8).
Summary of Key Discussion Items

- **Modesto Model Boundary**
  - Double check Modesto model boundary [This has been checked; the more northerly and southerly boundaries were corrected to reflect the rectangular model boundary; see attached figure. The DWR groundwater basin (and therefore CVHM boundary) extends farther to the east than the Modesto model boundary.]

- **ICM report**
  - As a part of Task 1, the LWA Team will keep an administrative record of what’s done as a part of the ICM work (e.g. methods used, assumptions, references, etc.) and where data is located (primarily the KJ database and online access) because:
    - The info will be used for a basin plan amendment,
    - We may need to modify the modeling approach in the future,
    - To allow others to pick up where we leave off (i.e., development of local SNMPs, etc.).
  - In addition, the LWA Team needs to clarify the assumptions (which ones were explicit and which ones were implicit) and include a discussion regarding the rationale for the model selection (Task 5 and 8).
CENTRAL VALLEY SALINITY ALTERNATIVES FOR LONG-TERM SUSTAINABILITY
ICM AND GIS TECHNICAL SERVICES

MODELING MEETING
MONDAY, OCTOBER 29, 2012
1:00 – 3:00 PM

Larry Walker Associates Office - Delta Room
707 Fourth Street, Suite 200, Davis, CA

(The information below is provided only if you are unable to make it in person)

Web Ex:
1. Go to https://lwa.webex.com/lwa/j.php?ED=214408192&UID=1429002047&PW=NNjEzNDVkJODNk&RT=MiM0
2. If requested, enter your name and email address.
3. If a password is required, enter the meeting password: lwa123
4. Click "Join".

Conference Call Line:
Call in number: (888) 363-4735
Code: 3626766

AGENDA

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Lead/ Time for Item</th>
</tr>
</thead>
</table>
| Welcome                       | • Introductions  
• Review Agenda                                                                                                                                  | Karen (1:00-1:10) |
| Meeting Purpose               | *This meeting will serve as a forum for the Project Committee to collaborate with the LWA Team regarding the ICM modeling approach. The purpose of the meeting is to review the ICM modeling approach and identify and discuss technical issues/concerns and identify potential solutions.* |                    |
| ICM Modeling Approach         | • Scope of ICM 30,000 foot effort  
• Use of WARMF and CVHM model outputs (quantity and quality) in the ICM effort                                                                     | Vicki/Barb (1:10–1:20) |
| Technical Discussion and Identification of Potential Issues | • Model Selection for ICM  
• Concerns re use of WARMF model for ICM application  
• Land Use Classes  
• Mixing Model Calculations (incl. vertical IAZ dimension)  
• Boundaries (CVHM, Region 5)  
• Potential for further subregion divisions (Phase 2) | All (1:20 – 2:55) |
| Wrap Up                       | • Action Items  
• Next Steps – Meeting Summary                                                                                                                    | Karen (2:55 – 3:00) |
A meeting was held on October 29th, 2012 to discuss the modeling approach for the ICM Technical Services. The purpose of the meeting was to review the ICM modeling approach and identify and discuss any technical issues/concerns and identify potential solutions. The meeting attendees included the following:

- Vicki Kretsinger, Luhdorff & Scalmanini
- Barbara Dalgish, Luhdorff & Scalmanini
- John Dickey, PlanTierra
- Joel Herr, Systech Water Resources
- Karen Ashby, Larry Walker Associates
- Tom Grovhoug, Larry Walker Associates
- Jeannette Sager, Larry Walker Associates
- Danielle Moss, Larry Walker Associates
- Richard Meyerhoff, CDM
- Thomas Harter, UC Davis
- Giorgos Kourakos, UC Davis
- Kristin Dzurella, UC Davis
- Nigel Quinn, Berkeley National Laboratory
- Randy Hanson, USGS

During the meeting the LWA Team presented a brief summary of the approach described in the ICM Workplans and requested feedback. The key discussion items from the meeting are summarized below.

- **General Correspondence Between WARMF and CVHM**
  - There is a general concern that prior modeling efforts (e.g., Westside region modeling) have attempted to use WARMF and other groundwater models and that there have been discrepancies between the two models. Is there a way to improve the resolution of either CVHM or WARMF in order to make the correspondence between them better for the CV-SALTS efforts?
  - For the purposes of the ICM, existing model runs are being used. However, WARMF will be re-run to include updated fertilizer application rates and crop uptake rates that will be provided by John Dickey (using data from the UC Davis SBX2_1 Nitrate Study).
  - One fundamental difference between the ICM and the other modeling efforts is that the ICM work will use the mass loads calculated from WARMF combined with the hydrology (i.e., flow, recharge volumes) from CVHM to calculate the salt and nitrate concentrations.
  - Therefore, it is not necessary for the recharge volumes to match exactly in WARMF and CVHM. It is important, though, to consider how sensitive the resultant mass load is relative to the recharge volume in WARMF.
  - Conclusions from the meeting
    - The use of WARMF and CVHM is fundamentally different than how they have been used in previous modeling efforts. The differences should be captured within the narrative within the ICM Report.
    - CVHM will be used for the model hydrology. The mass from WARMF (which will be aggregated within each of the IAZs) will be combined with the hydrology of CVHM to calculate salt and nitrate concentrations.
  - Both models reflect varied land uses and calculate net recharge rates. Both models also use land-use data from the Department of Water Resources (DWR), but the land use categories and aggregations within each catchment/IAZ are handled differently.
Summary of Key Discussion Items and Decisions

- Rate of recharge is calculated by CVHM. WARMF uses recharge rates as inputs provided by various groundwater models.
- Conclusions from the meeting
  - An assessment of the land use acreage differences between the two models should be conducted either qualitatively or quantitatively to determine if this contributes to differences in the volumetric net recharge between the two models and how that relates to the mass component of recharge coming from WARMF. [This will be completed as a part of Task 8]
  - Some comparisons will be evaluated for WARMF and CVHM, and may include volumetric components of:
    - stream leakage (WARMF interaction between the water table and surface water compared to volumes of stream leakage from CVHM for gaining and losing stream conditions),
    - land use (acreages of each land use category in WARMF and CVHM will be compared on an IAZ scale),
    - and net recharge (total net IAZ recharge to groundwater will be compared from WARMF output and CVHM output).
  - If there are differences in volumes from WARMF and CVHM outputs, it was agreed to assume the CVHM is correct and findings will be noted in the ICM report. The purpose of these comparisons is to identify significant differences which may affect the results.

- How does WARMF handle the applied nitrogen mass?
- WARMF involves mass balances and historical N application rates; N uptake rates are inputs to the model
- The sum of N mass lost to recharge and to lateral outflow in WARMF will be maintained in the linkage with CVHM. The WARMF simulation within the soil is largely insensitive to whether water leaving the soil goes down to groundwater or out to surface water.
- WARMF calculates nitrification/denitrification rates
- Conclusion from the meeting
  - Denitrification is one case where the hydrology differences between the models could affect nitrogen mass. If the total net flow through the soil is markedly different between the models, the difference in retention time could affect the mass of nitrogen nitrified and denitrified.

---

1 The ICM approach is on the 30,000 foot level, and the distribution of mass loading associated with certain land use types is therefore aggregated across an entire IAZ
Summary of Key Discussion Items and Decisions

- **Modeling the Vertical Dimensions/Transfer**
  - Concern was expressed about the approach that was proposed for the modeling of the vertical dimension/transfer
  - The LWA Team has been discussing this topic since it was raised at the Project Kickoff meeting on October 8\(^{th}\). The approach recommended and agreed upon at that meeting is being incorporated into the ICM approach.
  - As a part of Tasks 4 and 5, the LWA Team will describe the method that will be used to delineate the upper aquifer thickness for each IAZ as an estimated 20-year travel time and the corresponding layers of CVHM (e.g., layers 1 – 3).
  - The method for establishing the vertical dimension and saturated volume of the upper aquifer will be incorporated in the Task 4 and Task 5 reports.
  - Conclusion from the Meeting
    - Since the CVHM has been selected for use for the ICM, the subsurface properties can be extracted from it to determine how far water will travel vertically over a 20-year period. This information will be used to capture the effects of water traveling downward over 20 years and will represent the “mixing zone”. [This is incorporated in the ICM approach]
    - The lateral flux of solutes (salt and nitrate) is trivial compared to the vertical flux. However, these findings will be presented in the ICM report.
  - In the ICM Task 4 report regarding the IAZs that was submitted to the Project Committee on October 29, 2012, this approach is presented for the vertical dimension
  - ICM Task 5 will include the methodology for calculating the vertical dimensions or depth of each IAZ.

- Concern was expressed about the approach for the salt balance and drainage for the Westside region. This is a difficult area to characterize. The model hydrology for the shallow aquifer zone should be consistent with understood conditions for this area (recognizing that there have been updates to CVHM-1 in the revised model, CVHM-2, which is anticipated to be available in spring 2013).

- The Westside is vertically dominated, but compared to other Central Valley subregions, has the most lateral flow from the shallow aquifer zone to tile drains

- For most IAZs, the ICM will reflect the conditions represented by CVHM-1, which does not include tile drainage; another step will be added for the Westside region and corresponding IAZs in that area (see below)

- The partitioning will need to be consistent between WARMF and CVHM.

- Conclusion from the meeting:
  - WARMF addresses tile drains by adding a high-permeability layer under the soil layers. Since there is no root zone, the water that comes into this layer is transferred out laterally. WARMF simulates the drainage of precipitation and irrigation percolating down from the surface but does not simulate groundwater entering the tile drains from below.
Summary of Key Discussion Items and Decisions

- CVHM-1 does not simulate tile-drains, only runoff of applied water. CVHM-2, which is not finalized or published, and therefore not available for the ICM, is going to include the drain package.
- This should be described within the ICM report.
- The introduction of a proportioning mechanism will be described in Task 5 to help adjust the movement of mass vertically and horizontally between groundwater recharge and lateral flow to surface water components to match the conceptualization of reality where tile drains exist (the focus of this effort will be for the Westside region).

- Central Valley Floor Boundary and Region 5 Jurisdictional Boundary
  - There is a general concern that the Region 5 jurisdictional boundary will need to be considered and accounted for within the CV-SNMP Master Plan.
  - The CVHM boundary coincides with the Central Valley floor and with the boundaries of the Sacramento and San Joaquin Valley Groundwater Basins. Data collection (as feasible as a part of ICM Task 3) in other areas of Region 5 will be included to help address this concern. CVHM-1 has hydrology input from the foothills. CVHM-2 will have the same coverage.
  - The Central Valley floor coverage and Region 5 boundary considerations are discussed in the Task 4 Report and will also be included in the Task 8 Report.
  - Since the CV-SNMP must address the Region 5 jurisdictional boundary, Phases 2 and 3 should include salt and nitrate management considerations for the entire jurisdictional boundary.
CENTRAL VALLEY SALINITY ALTERNATIVES FOR LONG-TERM SUSTAINABILITY (CV-SALTS)
INITIAL CONCEPTUAL MODEL (ICM) AND GIS TECHNICAL SERVICES

PROJECT WORKSHOP
MONDAY, NOVEMBER 26, 2012
10:00 AM – 4:00 PM

Sacramento Regional County Sanitation District
Valley Oak Room
10060 Goethe Road, Sacramento

(The information below is provided only if you are unable to make it in person)

Web Ex:
1. Go to https://lwa.webex.com/lwa/j.php?ED=216730822&UID=1437122857&PW=NNzRjYTMzZTAz&RT=MiM0
2. If requested, enter your name and email address.
3. If a password is required, enter the meeting password: lwa123
4. Click "Join".

Conference Call Line:
Call in number: (888) 363-4735
Code: 3626766

AGENDA

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Lead/ Time for Item</th>
</tr>
</thead>
</table>
| Welcome & Introductions                  | • Welcome & Introductions
                                             • Review Agenda
                                             • Meeting Handouts                                                        | Richard
                                             Meyerhoff
                                             Karen Ashby
                                             (10:00–10:10)                                                             |
| Meeting Purpose & Outcomes               | • Meeting Purpose
                                             Review key ICM and GIS work efforts, discuss pertinent technical issues, and use this meeting as a forum to collaborate with CV-SALTS stakeholders.
                                             • Meeting Outcomes
                                             Provide clear understanding of work efforts to date
                                             Identify stakeholder questions/concerns
                                             Identify approach for responding to concerns
                                             Obtain agreement on work tasks that can/should move forward | Karen Ashby
                                             (10:10–10:15)                                                             |

Initial Conceptual Model (ICM) Technical Services

| ICM Workplan Approach and Schedule       | • Overall Approach for CV-SNMP
                                             • CV-SALTS Initial Conceptual Model (Phase I)
                                             • ICM Approach, Questions & Schedule
                                             • Organizational Structure & Feedback
                                             • Key Meetings & Outcomes to Date | Karen Ashby
                                             Tom Grovhoug
                                             (10:15 – 10:35)                                                             |

Handouts: 1) Project Committee Kickoff Meeting Summary of Key Discussion Items, 2) Modeling Meeting Summary of Key Discussion Items and Decisions
<table>
<thead>
<tr>
<th>Task</th>
<th>Purpose &amp; Approach</th>
<th>Discussion</th>
<th>Person(s)</th>
<th>Time</th>
</tr>
</thead>
</table>
| 3 – Data Development | • Data Source List  
  • Data Summary per Initial Analysis Zone (IAZ) | | Vicki Kretsinger Barb Dalgish Jeannette Sager | (10:35 – 11:00) |
| 4 – Establish Initial Analysis Zones | • Data Source List  
  • Data Summary per Initial Analysis Zone (IAZ) | | Vicki Kretsinger | (11:00 – 12:00) |
| 5 – Establish Methods for Salt and Nitrate Analysis | • Task 6 – Complete High Level Salt and Nitrate Analyses for Central Valley  
  • Task 7 – Salt and Nitrate Analyses in Selected Subareas of Central Valley  
  • Task 8 – Initial Conceptual Model Report | | Vicki Kretsinger Joel Herr John Dickey | (2:45 – 3:00) |
| GIS Technical Services | • Purpose and Approach  
  • Review of the GIS Map Layers  
  • Discussion | | Les Chau | (3:00 – 3:30) |
| Meeting Wrap Up & Next Steps | • Action Items  
  • Next Steps  
  • Discussion | | Karen Ashby | (3:30 – 4:00) |

*Handout: Initial Conceptual Model Data Source List*
ICM & GIS Workshop Sign On

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tom Watkins</td>
<td>LWA</td>
<td><a href="mailto:tomw@lwa.com">tomw@lwa.com</a></td>
<td>530-753-6400</td>
</tr>
<tr>
<td>Dylan Boyle</td>
<td>LSCE</td>
<td><a href="mailto:dboyle@lsce.com">dboyle@lsce.com</a></td>
<td></td>
</tr>
<tr>
<td>Danielle Moss</td>
<td>LWA</td>
<td><a href="mailto:DanielleM@lwa.com">DanielleM@lwa.com</a></td>
<td></td>
</tr>
<tr>
<td>Vicki Kustin</td>
<td>LSCE</td>
<td><a href="mailto:VUKretzinger@lsce.com">VUKretzinger@lsce.com</a></td>
<td></td>
</tr>
<tr>
<td>Sevim Onsoy</td>
<td>Kennedy Jenks</td>
<td><a href="mailto:sevimonsoy@kennedyjenks.com">sevimonsoy@kennedyjenks.com</a></td>
<td></td>
</tr>
<tr>
<td>Karen Ashley</td>
<td>LWA</td>
<td><a href="mailto:Karianna@lwa.com">Karianna@lwa.com</a></td>
<td>530-661-0490</td>
</tr>
<tr>
<td>Richard Meyers</td>
<td>Contra Costa</td>
<td><a href="mailto:meyers@contra-costaco.com">meyers@contra-costaco.com</a></td>
<td></td>
</tr>
<tr>
<td>Rob Bushy</td>
<td>RNWCB-5</td>
<td><a href="mailto:rb@nwb.ca.gov">rb@nwb.ca.gov</a></td>
<td></td>
</tr>
<tr>
<td>Roger Reynolds</td>
<td>SEI</td>
<td><a href="mailto:rreynolds@ucmerced.edu">rreynolds@ucmerced.edu</a></td>
<td></td>
</tr>
<tr>
<td>Barb Dalgish</td>
<td>LSCE</td>
<td><a href="mailto:bbdalgish@lsce.com">bbdalgish@lsce.com</a></td>
<td></td>
</tr>
<tr>
<td>Les Chan</td>
<td>Kennedy Jenks</td>
<td><a href="mailto:leschan@kennedyjenks.com">leschan@kennedyjenks.com</a></td>
<td>415-243-2480</td>
</tr>
<tr>
<td>Gary Carlton</td>
<td>KF Consulting</td>
<td><a href="mailto:garycarlton@kennedyjenks.com">garycarlton@kennedyjenks.com</a></td>
<td></td>
</tr>
<tr>
<td>John Dickey</td>
<td>Landierra</td>
<td><a href="mailto:jdickey@agc.com">jdickey@agc.com</a></td>
<td></td>
</tr>
<tr>
<td>Joe DiGiorgio</td>
<td>Stanford</td>
<td><a href="mailto:jodi@stanford.edu">jodi@stanford.edu</a></td>
<td></td>
</tr>
<tr>
<td>George Kourakos</td>
<td>UCDavis</td>
<td><a href="mailto:giorak@gmail.com">giorak@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td>David Cory</td>
<td>SJU DA</td>
<td><a href="mailto:farmer@lawcomcast.net">farmer@lawcomcast.net</a></td>
<td>650-854-2905</td>
</tr>
<tr>
<td>Debbie Webster</td>
<td>AVAIA</td>
<td><a href="mailto:eoffice@avaia.org">eoffice@avaia.org</a></td>
<td></td>
</tr>
<tr>
<td>Daniel Cozad</td>
<td>CSUC</td>
<td><a href="mailto:dcozad@csucalg.org">dcozad@csucalg.org</a></td>
<td></td>
</tr>
<tr>
<td>Thomas Hanke</td>
<td>UCD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kristen O.</td>
<td>UCD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Name</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigel Quinn, Berkeley Natl Lab</td>
<td>5) Randy Hansen, USBS</td>
</tr>
<tr>
<td>Peter Thomas, Caltech Energy</td>
<td>6) Fern Wilson, City of Vacaville</td>
</tr>
<tr>
<td>Michael Steiger, EKI</td>
<td>7) Rachael McNeal, CA DGA</td>
</tr>
<tr>
<td>Karina Harrington, Heron Crabtree</td>
<td>8) Bruce Houdeholds, NCWA</td>
</tr>
<tr>
<td>(Fresno Stockton East Water District)</td>
<td></td>
</tr>
</tbody>
</table>
An ICM and GIS technical services workshop was held on November 26th, 2012. The purpose of the workshop was to:

- Review the key ICM and GIS work efforts completed to date as well as the upcoming tasks;
- Discuss the pertinent technical issues; and
- Use the workshop as a forum to collaborate with the CV-SALTS stakeholders.

The sign in sheet, agenda, and presentations are included as attachments to this workshop summary. The key discussion and action items are summarized below.

- **ICM – Task 3 Data Development**
  - Why was Panoche Silver Creek not included in the Southern San Joaquin Valley maps for the surface water quality data?
    - The water bodies that are currently included in the maps are those that are included within CVHM-1. This water body is not currently included within CVHM-1. However, if this water body is included in CVHM-2 then it could be included in future maps and analyses.
  - Since TDS-EC ratios tend to vary over time, it was noted that the Team should consider developing annual site specific (TDS-EC) ratios that take into account typical seasonal variability or hydrologic cycle variability (e.g., wet vs. dry periods).
  - It was noted that the Team should review the nitrogen data to make sure that similar data are being used (e.g., NO$_3$-N, NO$_3$-NO$_2$, vs TN)
    - The Team acknowledged that this review is occurring as a part of the data QA/QC process and that the Team is using NO$_3$-N. However, due to the massive quantity of data, the QA/QC review is not exhaustive for the purposes of the ICM work.
  - Will WARMF be updated as a part of this work?
    - For the purposes of the ICM, existing model runs are being used. However, WARMF will be re-run to include updated fertilizer application rates and crop uptake rates that will be provided by John Dickey (using data from the UC Davis SBX2_1 Nitrate Study).
  - The LWA Team should consider obtaining data from the tile drain sumps.

- **Action Items:**

---

1 For the purposes of the ICM work the QA/QC consists of the following: outlier values are screened where information is sufficient to deem them as not legitimate, aka remnant typos from original data entry from the agency providing the data (mistaken units such as ug/L instead of mg/L, etc). This is done by plotting time series data to identify such mistakes. For the purpose of identifying the form of nitrate (i.e. nitrate as N or nitrate as NO3), the LWA Team relies on the reported analyte and units provided by the source agency.
The LWA Team has identified a data gap for surface water quality for Los Gatos Creek. If you have data for this area or suggestions for data, please forward the information to Karen Ashby (karena@lwa.com).

As part of the Task 5, 6, and 7 work, the LWA Team will use temporal and site specific TDS-EC ratios where readily available for water quality sites and ratio’s obtained from literature when a site specific ratio is unattainable.

The LWA Team will look into the tile drain sumps as a source of data for use in analyzing shallow groundwater quality.

**Irrigation Water Data Request**

- The following suggestions were made to assist with the irrigation water data request
  - Request the data in the format that the data are currently collected by the Districts (specific suggestions per Nigel Quinn’s 11/24 email).
  - Sources of this information include the Water Conservation Plans/Bureau of Reclamation and/or other files to obtain available data.
  - Follow up the data request with phone calls to the key agriculture coalition members.

**Action Items:**

- The LWA Team will modify the data request and spreadsheet based on the feedback that was provided, and re-submit to Richard Meyerhoff for distribution as a letter signed by the Technical Advisory Committee Co-Chairs.
- The LWA Team will follow up the request with phone calls to key agricultural coalition participants within CV-SALTS.
- Any data gaps noted as a part of this effort will be documented in the ICM Task 8 Report.

**ICM – Task 4 – Establish Initial Analysis Zones**

- It was noted that there are two groundwater flow model updates that are occurring.
  - There is the San Joaquin update for the west-side (SJWHM); and
  - The update of CVHM (i.e., called CVHM-2)
  - This distinction should be made within the ICM reports.
- Nigel Quinn provided a summary of the update on the SJWHM model (11/27 email):
  - The SJWHM model will replace the current WESTSIM model.
  - The model will likely be available to the general public in summer 2013.
  - The new model has a more refined ¼ mile mesh and incorporates all of the major west-side ephemeral streams.
  - The model also simulates tile drainage on the west-side and incorporates additional layers sub-Corcoran (5) and above-Corcoran (5) to address subsidence issues.
  - The model doesn’t explicitly simulate seasonal wetlands; rather it treats wetlands as a unique agricultural use.
Summary of Key Discussion Items and Decisions

- The model has the capability of changing land use over time as well as irrigation efficiency. It also has a routine for limiting crop ET under deficit irrigation.
  - It was unclear if the CVHM-2 update will include the SJWHM update and/or if all of the sub-regions will be included. This may be determined in the next week or so.
  - Clarification was requested regarding the differences between the ICM work and Phase 2.
    - For the ICM work (Task 6) the calculations are at the IAZ scale
    - For Phase 2 the calculations can be made at the cell scale (Phase 2 scope to be determined)
    - It was noted that the models can be used as tools for these calculations.
  - The ICM work will provide the overarching framework for the development of the local SNMPs. Flexibility will be maintained so that local entities will be able to define their grid size, use local models, studies and/or refine the inputs based on local data and information. The actual refinements possible will be based on data availability, resources and local needs.
    - The use of nested models will be discussed further with Randy Hanson and the LWA Team. There are several options that are available.
    - It was requested that the Team note the calibration, sensitivity, and uncertainty related to the approach and use of the models.

- Action Items:
  - The LWA Team will note the distinction between the two model updates (SJWHM and CVHM-2) as needed within the Task 4, Task 5, and Task 8 ICM reports.
  - Randy Hanson will follow up with Vicki Kretsinger regarding the CVHM-2 update
  - Barbara Dalgish and Randy Hanson will discuss the use of nested models for the local refinements. This information will be described within the Task 8 ICM Report.
  - The LWA Team will identify the uncertainty (either numerically or qualitatively) as well as the sensitivity of the models and approach within the Task 8 ICM Report.

- ICM – Task 5 – Establish Methods for Water, Salt, and Nitrate Balances
  - Two options were presented for calculating the ambient groundwater quality - gridded approach or kriging.
    - The LWA Team suggested that they will make the determination regarding which approach to use based on the available data and that their approach will be similar to what was used for GAMA.
    - It was recommended that the LWA Team consider using the grid approach for the upper aquifer and the kriging approach for the lower aquifer. The variability of groundwater quality in the upper aquifer is likely to be much higher in the upper aquifer. Use of the grid approach in this area will more likely capture this variability than the kriging approach.
Clarification was requested regarding how managed wetlands will be accounted for within the approach.

- CVHM does not account for wetlands
- WARMF somewhat accounts for wetlands – treats them like a slow moving river

The LWA Team will describe the method that will be used to delineate the upper aquifer thickness for each IAZ as an estimated 20-year travel time and the corresponding layers of CVHM (e.g., layers 1 – 3).

The method for establishing the vertical dimension and saturated volume of the upper aquifer will be incorporated in the Task 4 and Task 5 reports.

Since the CVHM has been selected for use for the ICM, the subsurface properties can be extracted from it to determine how far water will travel vertically over a 20-year period. This information will be used to capture the effects of water traveling downward over 20 years and will represent the “mixing zone”.

The lateral flux of solutes (salt and nitrate) is trivial compared to the vertical flux. However, these findings will be presented in the ICM report.

Clarification was requested regarding how the dissolution of minerals in soil will be handled.

- Due to the timestep used for the ICM, right now this is not an independent component of the model. The approach does not account for residual salt loads within the soils.
- This is considered within the root zone in WARMF, however, below the root zone, the calculations are all conservative (the concentrations are passed straight through to the upper aquifer).

Action Items:

- The LWA Team will identify the analysis approach and assumptions used for the determination of ambient groundwater and surface water quality for each IAZ within the ICM Task 8 Report.

**GIS – Task 3 and Task 4 – Addressing Identified Data Gaps & Development of Map Layers**

- The LWA Team presented the work completed to date for Task 3 and Task 4. The LWA Team also presented an online interface for the GIS map layers that have been created under Task 3.

  - It was noted that Nigel Quinn may have a shape file for the “wetland water supply channels” data gap that was identified.
  - It was noted that, due to the SWRCB Sources of Drinking Water Policy (Resolution 88-63), that MUN should be shown as a beneficial use on the “natural streams” unless otherwise stated within the Basin Plan.
  - It was stated that the tributary rule applies to “natural steams”.
  - It was unclear if the NHD dataset distinguishes between “natural streams” and other types of water conveyance features.
The LWA Team identified that CV-SALTS may want to consider additional work to hydrologically link the main trunk streams and rivers (currently mapped as a part of the GIS Task 3 work) to the tributaries.

- The methodology can be applied to identify the tributaries and to develop attribute tables that will contain designations of the beneficial uses to individual segments of selected tributaries.
- Once the designations are applied to the segments of tributaries, they can be revised or removed manually in the attribute tables. Several workshop participants expressed interest in having this pilot tested to see how it could work.

**Action Items:**

- Les Chau will e-mail Nigel Quinn to request the shape file(s) of wetland water supply channels and related surface water features. Nigel Quinn will send the shape file(s) (currently in draft status) to Les for incorporation into the mapping (ideally in about 3 weeks so that it may be incorporated into the work products).
- LWA Team will review BU designations as they relate to MUN
- LWA Team will verify if NHD database identifies “natural streams”
- Information on the linkages of beneficial uses to tributaries will be included within the Task 3 Report to identify the additional work that could be conducted.
- LWA Team may pilot test the additional linkage of the tributaries to a test area within the valley floor (possibly the Live Oak area).

**Workshop Conclusions and Action Items**

At the end of the Workshop the following action items were agreed upon:

1. The LWA Team will develop a workshop summary and list of specific action items based on the feedback received at the Workshop [completed]
2. Richard Meyerhoff will communicate with the Project Committee and verify that the LWA Team has “conditional approval”, based on the workshop summary and list of action items, to proceed with the Task 6 work. [approval by Nov 30 or shortly thereafter]
3. The workshop participants will submit additional comments to Richard Meyerhoff by COB November 30.
4. The LWA Team will finalize the Task 3, 4, and 5 reports in December based on the comments received at the Workshop and received from the PC and/or EC.