Santa Clara Valley Water District

Regional Calibration for Urban Watersheds

For:

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Presenters:

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(Project Engineer, Santa Clara Valley Water District)
Agenda

1. Regional Efforts
2. Purpose of Calibration
3. Principal of Calibration
4. Sensitivity of Calibration
5. Benefit of Calibration
Regional Efforts | ACPWA, SCVWD, San Jose
Agenda

1. Regional Efforts
2. **Purpose of Calibration**
3. Principal of Calibration
4. Sensitivity of Calibration
5. Benefit of Calibration
Realistic (Calibration) vs. Conservative (Standard)
Purpose of Calibration: Reduce Uncertainty

Unknown Parameters

Known Parameters
Purpose of Calibration: Reduce Uncertainty

- **Rainfall**
- **Depth**
- **Flow**

Unknown Parameters ➔ Known Parameters
Purpose of Calibration: Reduce Uncertainty

Unknown Parameters → Known Parameters

- Rainfall
- Depth
- Flow

Flow Survey Location (Obs.): LSC_05, Model Location (Pred.): D/S 4046.1, Rainfall Profile: 27313
Purpose of Calibration | Predict Storm Performance
1. Regional Efforts
2. Purpose of Calibration
3. **Principal of Calibration**
4. Sensitivity of Calibration
5. Benefit of Calibration
Correct Application of Equations
Supercritical 36" RCP Rating Curve Comparison

- Hec-Ras P36-40-0.5-SUP
- MIKE-11 P36-40-0.5-SUP
- InfoWorks-ICM SUP RCP (Cin=0.5)

Correct Application of Equations
### Principal of Calibration

<table>
<thead>
<tr>
<th>Surface</th>
<th>N value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt/Concrete</td>
<td>0.05-0.15</td>
<td>Harley (1975)</td>
</tr>
<tr>
<td>Bare Packed Soil Free of Stone</td>
<td>0.10</td>
<td>Hathaway (1945)</td>
</tr>
<tr>
<td>Fallow - No Residue</td>
<td>0.008-0.012</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>Conventional Tillage - No Residue</td>
<td>0.06-0.12</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>Conventional Tillage - With Residue</td>
<td>0.16-0.22</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>Chisel Plow - No Residue</td>
<td>0.06-0.12</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>Chisel Plow - With Residue</td>
<td>0.10-0.16</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>Fall Discing - With Residue</td>
<td>0.30-0.50</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>No Till - No Residue</td>
<td>0.04-0.10</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>No Till (20-40 percent residue cover)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Till (60-100 percent residue cover)</td>
<td>0.17-0.47</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>Sparse Rangeland with Debris: 0 Percent Cover</td>
<td>0.09-0.34</td>
<td>Engman (1986)</td>
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<tr>
<td>Sparse Rangeland with Debris - 20 Percent Cover</td>
<td>0.05-0.25</td>
<td>Engman (1986)</td>
</tr>
<tr>
<td>Sparse Vegetation</td>
<td>0.053-0.13</td>
<td>Woolhisser (1975)</td>
</tr>
<tr>
<td>Short Grass Prairie</td>
<td>0.10-0.20</td>
<td>Woolhisser (1975)</td>
</tr>
<tr>
<td>Poor Grass Cover on Moderately Rough Bare Surface</td>
<td>0.30</td>
<td>Hathaway (1945)</td>
</tr>
<tr>
<td>Light Turf</td>
<td>0.20</td>
<td>Harley</td>
</tr>
<tr>
<td>Average Grass Cover</td>
<td>0.40</td>
<td>Harley</td>
</tr>
<tr>
<td>Dense Grass</td>
<td>0.17-0.30</td>
<td>Palm</td>
</tr>
<tr>
<td>Bermuda Grass</td>
<td>0.30-0.48</td>
<td>Palm</td>
</tr>
<tr>
<td>Dense Shrubbery and Forest Litter</td>
<td>0.40</td>
<td>Harley</td>
</tr>
</tbody>
</table>

### Use Realistic Parameter Range

<table>
<thead>
<tr>
<th>Hydrologic Soil Group</th>
<th>Max. Infiltration Rate Range (in/hr)</th>
<th>Min. Infiltration Rate Range (in/hr)</th>
<th>Decay Const. Range (1/hr)</th>
<th>Drying Time Range (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5-10</td>
<td>&gt;=0.45</td>
<td>2-7</td>
<td>2-14</td>
</tr>
<tr>
<td>B</td>
<td>4-8</td>
<td>0.30-0.15</td>
<td>2-7</td>
<td>2-14</td>
</tr>
<tr>
<td>C</td>
<td>3-6</td>
<td>0.15-0.05</td>
<td>2-7</td>
<td>2-14</td>
</tr>
<tr>
<td>D</td>
<td>1-2</td>
<td>0.00-0.05</td>
<td>2-7</td>
<td>2-14</td>
</tr>
</tbody>
</table>
Principal of Calibration |

Systematic and Consistent Application
Agenda

1. Regional Efforts
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5. Benefit of Calibration
High Resolution of Hydraulic Model

Result Less Sensitive to Hydrologic Parameters
Sensitivity of Calibration Parameters

Flow Survey Location (Obs.) 5075, Model Location (Pred.) U/S ThompsonGaug

Rainfall intensity (in/hr)

1.05 x % Impervious

1.00 x % Impervious


Depth (ft)

0.00 0.50 1.00 1.50 2.00
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Benefit of Calibration | Floodplain

Reflect Realistic Performance
Reflect Realistic Performance
Benefit of Calibration | Improvements

Optimized Improvements