Automated Sampling of Storm Runoff From Residential Areas


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Materials & Methods

Study Sites

- Sacramento
- F1: 2000-2002, 188, 48°
- F2: 1990-1993, 251, 48°

- Orange
  - LN8: 1988-1995, 245, 42°
  - LN9: 1986-1993, 480, 60°

Materials

- Hach Sigma 950 Flow Meter measured and recorded water level, velocity, pH, electrical conductivity, and temperature.
- Hach Sigma 900 MAX Portable Sampler collected composite samples.
- The Sigma 950 was programmed for flow-weighted sample collection and controlled the 900 MAX sampler.
- During storm events, the Hach Sigma 950 measured runoff flows, using water velocity and level, and prompted the Sigma 900 MAX to collect samples.
- A rain gauge measured rainfall.
- A solar panel recharged the batteries.

Collection Procedure

- A modified TR55 hydrologic model incorporating land cover information was used in conjunction with forecasted rainfall to estimate the potential runoff volume for each site (USDA, 1986).

- The estimated runoff volume was used to calculate the pacing interval and entered into the data logger.

Results & Discussion

- 25 storm events were sampled from 2007-2010; 12 events in Sacramento and 13 events in Orange.
- 89 storm events were sampled from eight sites; 47 in Sacramento and 42 in Orange.

Sacramento

<table>
<thead>
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<th>Site</th>
<th>ANT</th>
<th>NAT</th>
<th>F1</th>
<th>F2</th>
<th>Total %</th>
</tr>
</thead>
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<td>9</td>
<td>10</td>
<td>12</td>
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<tr>
<td>Error</td>
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<td>3</td>
<td>2</td>
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<td>14.29%</td>
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Orange

<table>
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<th>LN8</th>
<th>LN9</th>
<th>JJC2</th>
<th>Total %</th>
</tr>
</thead>
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</tr>
<tr>
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Sacramento and Orange Totals

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<tr>
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<th>ANT</th>
<th>NAT</th>
<th>F1</th>
<th>F2</th>
<th>AVR</th>
<th>LN8</th>
<th>LN9</th>
<th>JJC2</th>
<th>Total %</th>
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<td>18</td>
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<td>2</td>
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Materials & Methods

Introduction

As urbanization increases so does the focus on storm water runoff monitoring as a tool to protect surface water quality. In 2006, a project was initiated in Sacramento and Orange Counties to monitor runoff from single family homes. Four urban drainsheds each comprised of 152 - 460 homes were selected per county. Water samples were collected and precipitation and flows were measured at the storm drain outfalls to examine runoff at a neighborhood level. Water samples were analyzed for pesticides, nutrients, biological, and other parameters.

Time vs. Flow Intervals

- Time and flow are the two parameters used to determine sampling intervals.
- Time weighted collection can occur at regular intervals throughout the storm or at variable increments of time in an attempt to capture peak runoff.
- Flow weighted samples are collected at intervals of flow (King et al., 2005).
- For both strategies, it is important to minimize intervals between samples and to sample throughout the storm event.
- However, different methods work for different sites and a sampling program should develop to address the goals of the project (Stone et al., 2000).

Objective

Examine the use of a landcover model to optimize flow weighted sampling of storm runoff.

Conclusion

Overall, use of the automated samplers did prove to be reliable. The ability to take flow-weighted composite samples was worth the effort to set up and maintain the equipment for this study.

Future Work

Evaluating the model through comparison of recorded flow to estimated flow using measured rainfall data. When the ultrasonic velocity sensor encounters very clear water it records a zero velocity, resulting in a flow of zero which further leads to errors in sampling. Further inquiry of the data is needed to determine the effect of zeroes in the flow data.

Acknowledgements

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References


