Assessment of Nitrate Concentrations in a Tributary to the Russian River

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Our Research Project

- We were interested in researching how Nitrate concentrations are dispersed throughout the Laguna de Santa Rosa watershed.
- We hoped to narrow down an area which could be contributing nitrates into the waterway so that others may look into it further.

Background

- Nitrates can be introduced as a result of different kinds of farming.
- They can become a problem when pesticides and animal feces seep or wash into waterways.
- The area of Sonoma County we were testing in is highly agricultural and cattle based.

Why We Should Care

- High levels of nitrates in freshwater streams can lead to eutrophication within the system.
- Eutrophication is an overabundance of nutrients.
- This then leads to a hypoxic zone.

Methods and Timing

- We used a nitrate sensor to gather data from six different locations in the Russian River Watershed.
- We took two sets of data one week apart from each other. The first set was taken before a light rainstorm, the second was after.
- Each sample taken was gathered from a shaded location, one foot below the surface of the water.

Conditions During Sampling

<table>
<thead>
<tr>
<th></th>
<th>1st Sample Round</th>
<th>2nd Sample Round</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start time of Sampling*</td>
<td>1:30 PM</td>
<td>1:15 PM</td>
</tr>
<tr>
<td>Average Air Temperature**</td>
<td>19°C</td>
<td>24°C</td>
</tr>
<tr>
<td>Days Since Previous Rain</td>
<td>16</td>
<td>5</td>
</tr>
</tbody>
</table>

*Sampling took around 1 hour from sites 1-6.
**Both days were sunny with clear skies.
Site 1: Laguna De Santa Rosa before Confluence with Mark West Creek
1st Sample Round= 2.2 mg/L
2nd Sample Round= 3.3 mg/L
GPS Coordinates: N 38.452230, W -122.834842

Site 2: Mark West Creek before Confluence with Laguna de Santa Rosa
1st Sample Round: 1.5 mg/L
2nd Sample Round: 1.7 mg/L
GPS Coordinates: N 38.485593, W -122.825496

Site 3: Laguna De Santa Rosa after Confluence with Mark West Creek
1st Sample Round: 2.1 mg/L
2nd Sample Round: 3.5 mg/L
GPS Coordinates: N 38.484986, W -122.841714

Site 4: Laguna de Santa Rosa before Confluence with Russian River
1st Sample Round: 2.3 mg/L
2nd Sample Round: 3.6 mg/L
GPS Coordinates: N 38.493956, W -122.892553

Site 5: Russian River before Confluence with Laguna de Santa Rosa
1st Sample Round: 2.5 mg/L
2nd Sample Round: 3.1 mg/L
GPS Coordinates: N 38.494298, W -122.890648

Site 6: Russian River after Confluence with Laguna de Santa Rosa
1st Sample Round: 2.6 mg/L
2nd Sample Round: 3.3 mg/L
GPS Coordinates: N 38.494153, W -122.893777
## Data Totals

<table>
<thead>
<tr>
<th>Site</th>
<th>1st Sample Round Nitrate Concentrations (in mg/L)</th>
<th>2nd Sample Round Nitrate Concentrations (in mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1 (Laguna before MW*)</td>
<td>2.2</td>
<td>3.3</td>
</tr>
<tr>
<td>Site 2 (MW* before Laguna)</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Site 3 (Laguna after MW*)</td>
<td>2.1</td>
<td>3.5</td>
</tr>
<tr>
<td>Site 4 (Laguna before RR**)</td>
<td>2.3</td>
<td>3.6</td>
</tr>
<tr>
<td>Site 5 (RR** before Laguna)</td>
<td>2.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Site 6 (RR** after Laguna)</td>
<td>2.6</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*Mark West Creek
**Russian River

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## Nitrate Concentrations

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### This Data in Context with Previous Research

- In completely natural conditions, nitrate levels in streams tend to stay under 1 mg/L.
- 10 mg/L is where most scientists agree that the environment starts to become harmed by excessive nitrates.
- The US Public Health Administration also has 10 mg/L as its maximum amount allowed in our drinking water.

### Possible Causes of Nitrate Levels

- Runoff from fertilizers and piles of cow feces can be washed into the creeks and rivers that flow through Sonoma County, causing nitrates to be unnaturally introduced.
- Human urban pollution may also aid in raising the levels as the waterways pass through many cities along its path to the ocean.

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### Examples of Possible Contributors

- Private Septic System at Site 3
- Vineyards along Mark West Creek at Site 2
- Vineyards along Creeks in the Tested Area
- Red Star® Vineyard
Conclusions

- Based off of the data we collected, we noticed that the Laguna de Santa Rosa has a higher concentration of nitrate than Mark West Creek.

- The concentration of nitrates that we found were slightly higher than natural conditions, but are far away from being detrimental, even considering a light rainstorm.

Acknowledgements

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Bibliography
