INTRODUCTION TO BREWING WATER ASSESSMENT & ADJUSTMENT

Steve Carper
Oregon Brew Crew
August, 8 2019
Agenda

• Why bother with water adjustment?
• Where does my water come from?
• What’s in my water?
• Tools
• How do I use that information to make great beers?
• Resources

…and I love fizzy light lagers!
Disclaimer

• I am NOT a water chemist

• I am a water conservation tech
Why Bother with Water Adjustment?

- Primary component ~95%
- **Proper mash pH**
- Enzyme performance/extraction
- Healthy fermentation
- Clarity
- Chlorine/Chloramine removal
- Hardness/Alkalinity Adjustments
- Mineral Adjustments
  - Sulfate synergy with hop bitterness
  - Chloride sweetness and balance
  - Off Flavor mitigation
Where Does My Water Come From?

- Bull Run Reservoir
- Clackamas River
- Hagg Lake/Barney Reservoir
- Wells/Springs
Water Provider Lookup Tool

Regionalh2o.org
Water Provider Information

- Consumer Confidence Report (CCR)
- Source (s)
- Treatment
- Service area
- Contaminants

- Call Water Quality
## Clackamas River Water

### Home Brewer’s Report

### Results (mg/L)

<table>
<thead>
<tr>
<th></th>
<th>North Service Area</th>
<th>South Service Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.84</td>
<td>8.55</td>
</tr>
<tr>
<td>Total Alkalinity (CaCO₃)</td>
<td>20.6</td>
<td>24</td>
</tr>
<tr>
<td>Calcium</td>
<td>3.65</td>
<td>4.06</td>
</tr>
<tr>
<td>Sulfate</td>
<td>3.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Chloride</td>
<td>2.7</td>
<td>6.1</td>
</tr>
<tr>
<td>Magnesium</td>
<td>1.12</td>
<td>1.22</td>
</tr>
<tr>
<td>Sodium</td>
<td>5.6</td>
<td>10.6</td>
</tr>
<tr>
<td>Hardness (Total)</td>
<td>17.9</td>
<td>18.4</td>
</tr>
</tbody>
</table>

Need data in parts per million? No problem! 1 mg/L = 1 ppm.

**Beer is 90% Water. So remember, Brewer’s No Water, No Beer.**

Do your part to conserve water and take care of our watershed.

Visit [www.crwater.com/conservation](http://www.crwater.com/conservation) or [www.conservew2o.org](http://www.conservew2o.org) to see how you can help.

Did we miss something? Let us know by e-mailing sdelorenzo@crwater.com

This data was last updated on March 25, 2019. Results will be updated as new data is available.

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Lab Testing

https://www.wardlab.com/BrewersKitOrder.php

$42
## Important Ions

<table>
<thead>
<tr>
<th>Affect Hardness &amp; Alkalinity</th>
<th>Affect Flavor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>Sodium</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Chloride</td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>Sulfate</td>
</tr>
<tr>
<td></td>
<td>Magnesium</td>
</tr>
</tbody>
</table>

*Source: Martin Brungard*
# Minerals and Beer Styles

<table>
<thead>
<tr>
<th>Brewing Center</th>
<th>Calcium</th>
<th>Magnesium</th>
<th>Sodium</th>
<th>Sulfate</th>
<th>Chloride</th>
<th>Bicarbonate</th>
<th>Residual Alkalinity</th>
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<tbody>
<tr>
<td>Burton</td>
<td>275</td>
<td>40</td>
<td>25</td>
<td>610</td>
<td>35</td>
<td>270</td>
<td>5</td>
</tr>
<tr>
<td>Dortmund</td>
<td>230</td>
<td>15</td>
<td>40</td>
<td>330</td>
<td>130</td>
<td>235</td>
<td>20</td>
</tr>
<tr>
<td>Dublin</td>
<td>120</td>
<td>4</td>
<td>12</td>
<td>55</td>
<td>19</td>
<td>315</td>
<td>170</td>
</tr>
<tr>
<td>Edinburgh</td>
<td>100</td>
<td>20</td>
<td>55</td>
<td>140</td>
<td>50</td>
<td>285</td>
<td>150</td>
</tr>
<tr>
<td>London</td>
<td>70</td>
<td>6</td>
<td>15</td>
<td>40</td>
<td>38</td>
<td>166</td>
<td>85</td>
</tr>
<tr>
<td>Munich</td>
<td>77</td>
<td>17</td>
<td>4</td>
<td>18</td>
<td>8</td>
<td>295</td>
<td>180</td>
</tr>
<tr>
<td>Pilsen</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>8</td>
<td>6</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>Vienna</td>
<td>75</td>
<td>15</td>
<td>10</td>
<td>60</td>
<td>15</td>
<td>225</td>
<td>125</td>
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</tbody>
</table>

Source: Martin Brungard
Tools

- pH measuring
  - Strips
  - Meter

- Brewing Water Calculators
  - Standalone
    - *Bru’n Water*
  - Software
    - *BeerSmith*
  - Online
    - *Brewer’s Friend*
  - App
    - *Palmer’s Brewing Water Adjustment App*
## Demonstration

**Bru’n Water Website**

### Grain Bill Input

<table>
<thead>
<tr>
<th>Grains</th>
<th>Grain Type</th>
<th>Quantity (lb)</th>
<th>Quantity (oz)</th>
<th>Color (L)</th>
<th>Percentage of Grain Bill</th>
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</thead>
<tbody>
<tr>
<td>PILS</td>
<td>Base Malt</td>
<td>10.00</td>
<td>0.00</td>
<td>1.7</td>
<td>100.0</td>
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<tr>
<td>Malt Crystal</td>
<td>Crystal Malt</td>
<td>0.00</td>
<td>0.00</td>
<td>20.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Chocolate Malt</td>
<td>Roast</td>
<td>0.00</td>
<td>0.00</td>
<td>300.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Flaked Wheat</td>
<td>Wheat/Oat</td>
<td>0.00</td>
<td>0.00</td>
<td>1.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Acid Malt</td>
<td>Acid Malt</td>
<td>0.00</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Base Malt</td>
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<td>0.00</td>
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</tr>
</tbody>
</table>

**Total Grain Weight (lbs)**: 10.00

**Estimated Beer Color (EBC)**: 6.4

**Water to Grain Ratio (Quarts/Lb)**: 1.50

**Estimated Beer Color (SRM)**: 3.2

**Malt Color Setting**: Levibond

**Water used for Mash**: Adjusted Water

### Mash pH Result

- **Mash pH Guidance**
  - Suggested mash pH range for lighter colored beers is 5.3 to 5.4
  - Suggested mash pH range for darker colored beers is 5.4 to 5.6
  - Nut or crisp beer styles may benefit from a mash pH range of 5.2 to 5.3

**Estimated Room-Temperature Mash pH**: 5.73

**Lactate added to water (ppm)**: 1

**Acid Malt Strength Setting**: 5.6

**Bru’n Water v. 5.6**
Recommended Reading

**WATER**
*A Comprehensive Guide for Brewers*
John Palmer and Colin Kaminski

**Simple Water Adjustment**
Drew Beechum and Denny Conn
Zymurgy; May/June 2019

**Water Knowledge**
Martin Brungard
[https://sites.google.com/site/brunwater/water-knowledge](https://sites.google.com/site/brunwater/water-knowledge)