Swan Falls Agreement AADF Travel Time Analysis

Presented to the Swan Falls Technical Working Group

By Dan Stanaway

Date: October 20, 2015
Methods

• Date ranges were selected based on
  – Flow variation
  – Milner flow range 200 – 2800 cfs

• 4 reaches upstream of CJ Strike were analyzed
  – Milner to Buhl
  – Buhl to Bliss
  – Bliss to King Hill
  – King Hill to Loveridge

• Best fit travel time was determined statistically and visually
Snake River at Loveridge

- Milner to Buhl ≈ 40 miles
- Buhl to Bliss ≈ 36 miles
- Bliss to King Hill ≈ 12 miles
- King Hill to Loveridge Bridge ≈ 33 miles
Milner Flow approx 1500 cfs
Travel Time approx 22 hrs

Milner Flow approx 2800 cfs
Travel Time approx 15 hrs
Milner to Buhl

**Milner Flow approx 600 cfs**
**Travel Time approx 28 hrs**

**Milner Flow approx 200 cfs**
**Travel Time approx 34 hrs**
Buhl to Bliss

- Milner Flow approx 1500 cfs
- Travel Time approx 10 hrs

- Milner Flow approx 2800 cfs
- Travel Time approx 8 hrs
Buhl to Bliss

**Milner Flow approx 600 cfs**
**Travel Time approx 14 hrs**

**Milner Flow approx 600 cfs**
**Travel Time approx 17 hrs**
Bliss to King Hill

Milner Flow approx 1500 cfs
Travel Time approx 3 hrs

Milner Flow approx 2800 cfs
Travel Time approx 2 hrs
Bliss to King Hill

Milner Flow approx 600 cfs
Travel Time approx 4 hrs

Milner Flow approx 200 cfs
Travel Time approx 5 hrs
King Hill to Loveridge

Milner Flow approx 1500 cfs
Travel Time approx 10 hrs

Milner Flow approx 2800 cfs
Travel Time approx 7 hrs
King Hill to Loveridge

Milner Flow approx 600 cfs
Travel Time approx 15 hrs
<table>
<thead>
<tr>
<th>Reach</th>
<th>Date</th>
<th>Milner Flow</th>
<th>Distance (miles, est)</th>
<th>Estimated Lag</th>
<th>$R^2$</th>
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<td>Milner-Buhl</td>
<td>1/11 - 1/21</td>
<td>1500</td>
<td>40</td>
<td>22</td>
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<td>Milner-Buhl</td>
<td>2/15 - 2/25</td>
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<td>40</td>
<td>15</td>
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<td>Milner-Buhl</td>
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Travel Time Plots

1. **Milner to Buhl Travel Time**
   - Equation: $y = 34.913e^{-3E-04x}$
   - $R^2 = 0.9927$

2. **Buhl to Bliss Travel Time**
   - Equation: $y = 16.901e^{-3E-04x}$
   - $R^2 = 0.9524$

3. **Bliss to King Hill Travel Time**
   - Equation: $y = 5.1154e^{-3E-04x}$
   - $R^2 = 0.9904$

4. **King Hill to Loveridge Travel Time**
   - Equation: $y = 17.749e^{-3E-04x}$
   - $R^2 = 0.9801$
Travel Time Comparison

<table>
<thead>
<tr>
<th>Milner Flow (cfs)</th>
<th>Current Method (hrs)*</th>
<th>Updated Calculation (hrs)*</th>
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<tbody>
<tr>
<td>600</td>
<td>72</td>
<td>73</td>
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<tr>
<td>1500</td>
<td>48</td>
<td>57</td>
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</table>

*assumes 10 hrs from CJ Strike

y = 74.936e^{-3E-04x}

R² = 0.99