

Watershed-wide temperature assessment of Johnson Creek

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Johnson Creek

SIZE

- 26 miles long
- 54 sq mi

GOVERNMENT

- 5 cities
- 2 counties

TMDLs

- Bacteria
- Toxics (DDT, Dieldrin)
- Temperature – exceeds 17.8°C rearing criterion



The background image shows a natural stream flowing through a forest. A rustic fence made of logs and wooden posts spans the width of the stream. Numerous orange survey flags are planted in the ground along the stream banks and behind the fence. The forest in the background is dense with tall evergreen trees under a bright sky.

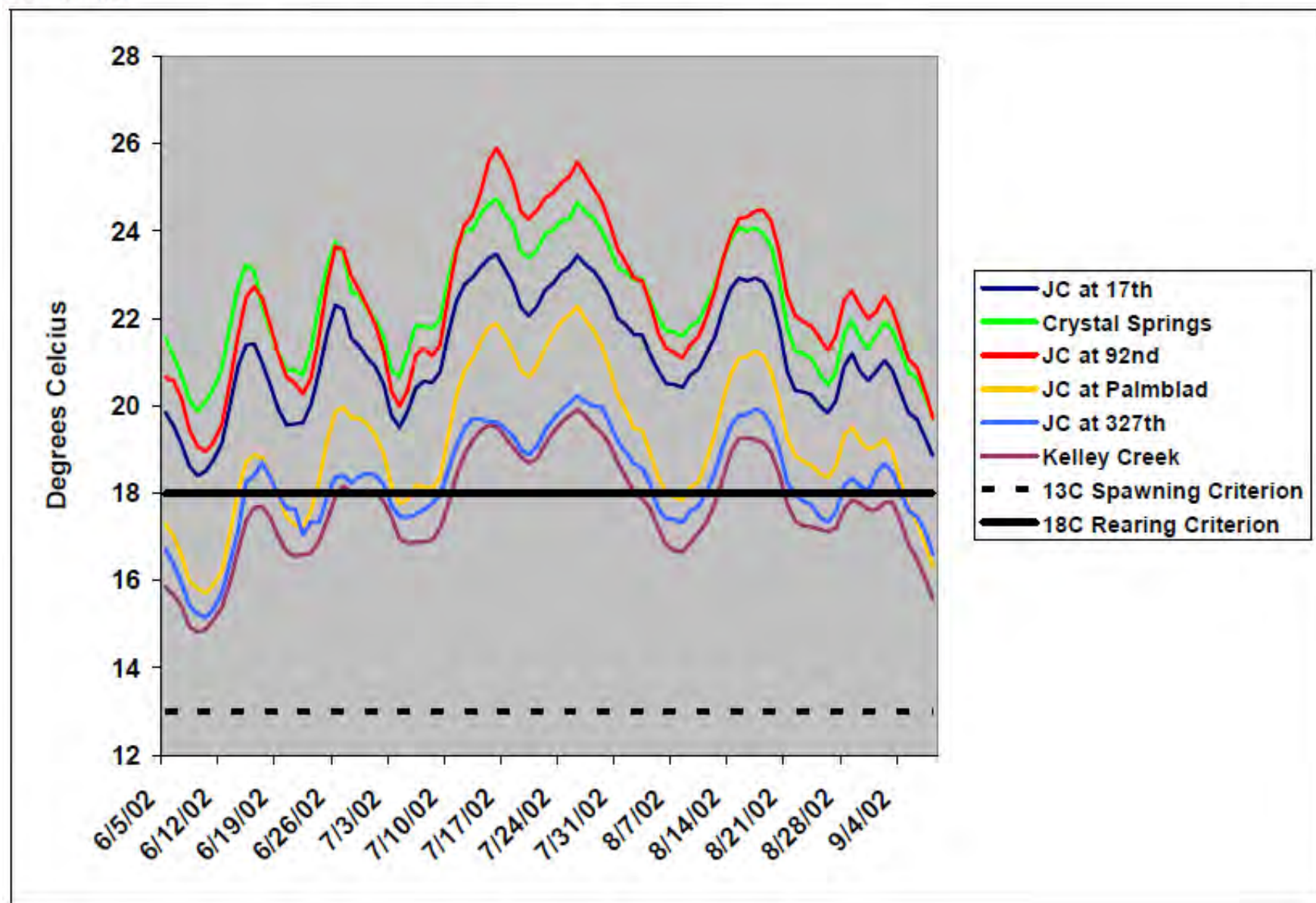
Johnson Creek Interjurisdictional Committee

- City of Damascus
- City of Gresham
- City of Milwaukie
- City of Portland
- Multnomah County
- Clackamas County -
Water Environment
Services
- DEQ
- USGS
- Metro
- Oregon Dept of Ag
- Clackamas SWCD
- Multnomah SWCD
- Johnson Creek
Watershed Council

Temperature Monitoring Goals

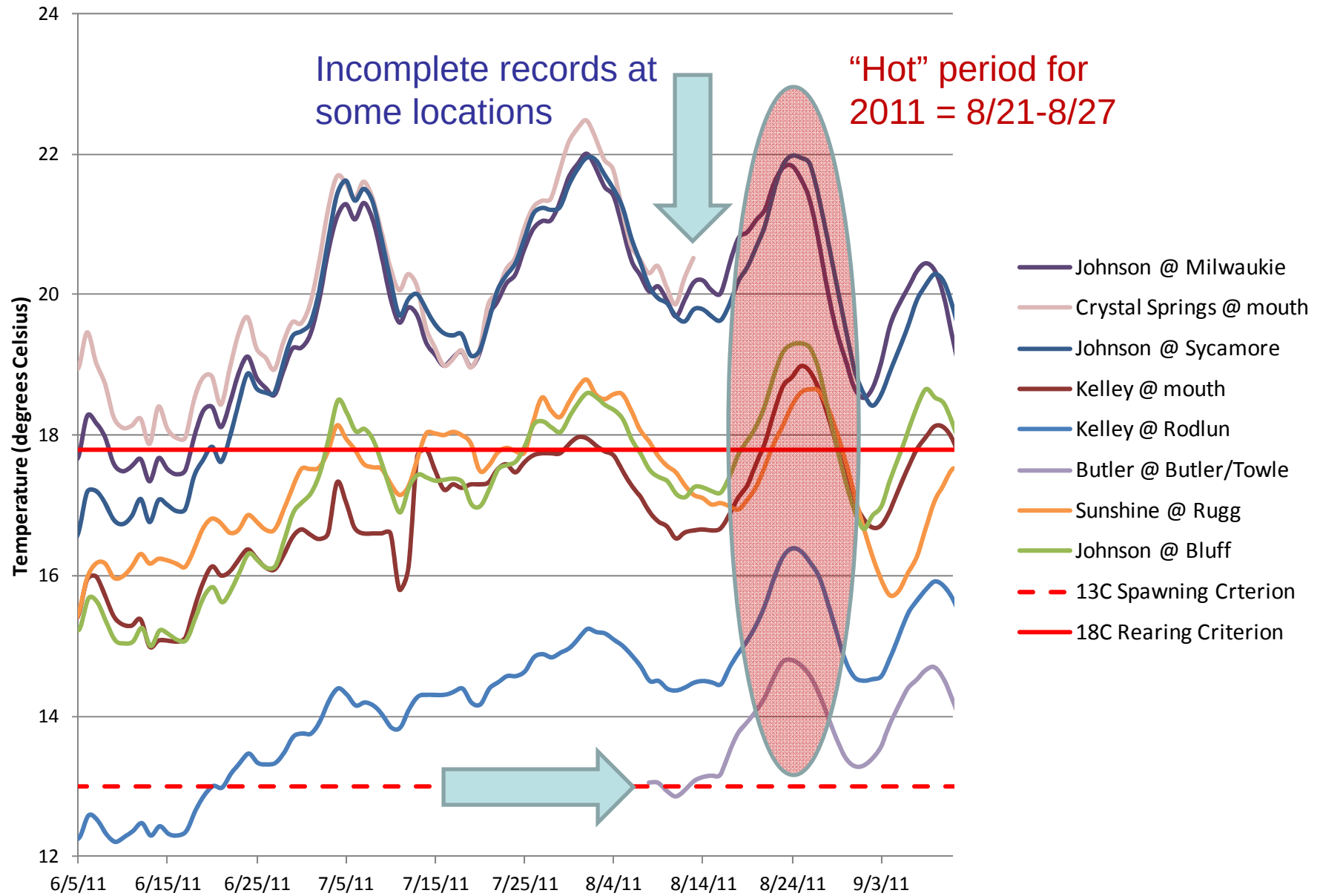
- Collect temperature data from entire watershed (30 sites in 2011)
- Identify areas of interest or concern (e.g., tributaries, in-line ponds)
- Develop metrics that can be tracked over time – e.g., magnitude and duration of temperature standard exceedance (17.8°C rearing criterion)

Figure 5.48. 7-day Average of the Daily Maximum Stream Temperature at Selected Johnson Creek Watershed Monitoring Locations



From Lower Willamette TMDL (DEQ 2006)

7-day Average of the Daily Maximums - Select Johnson Creek Locations

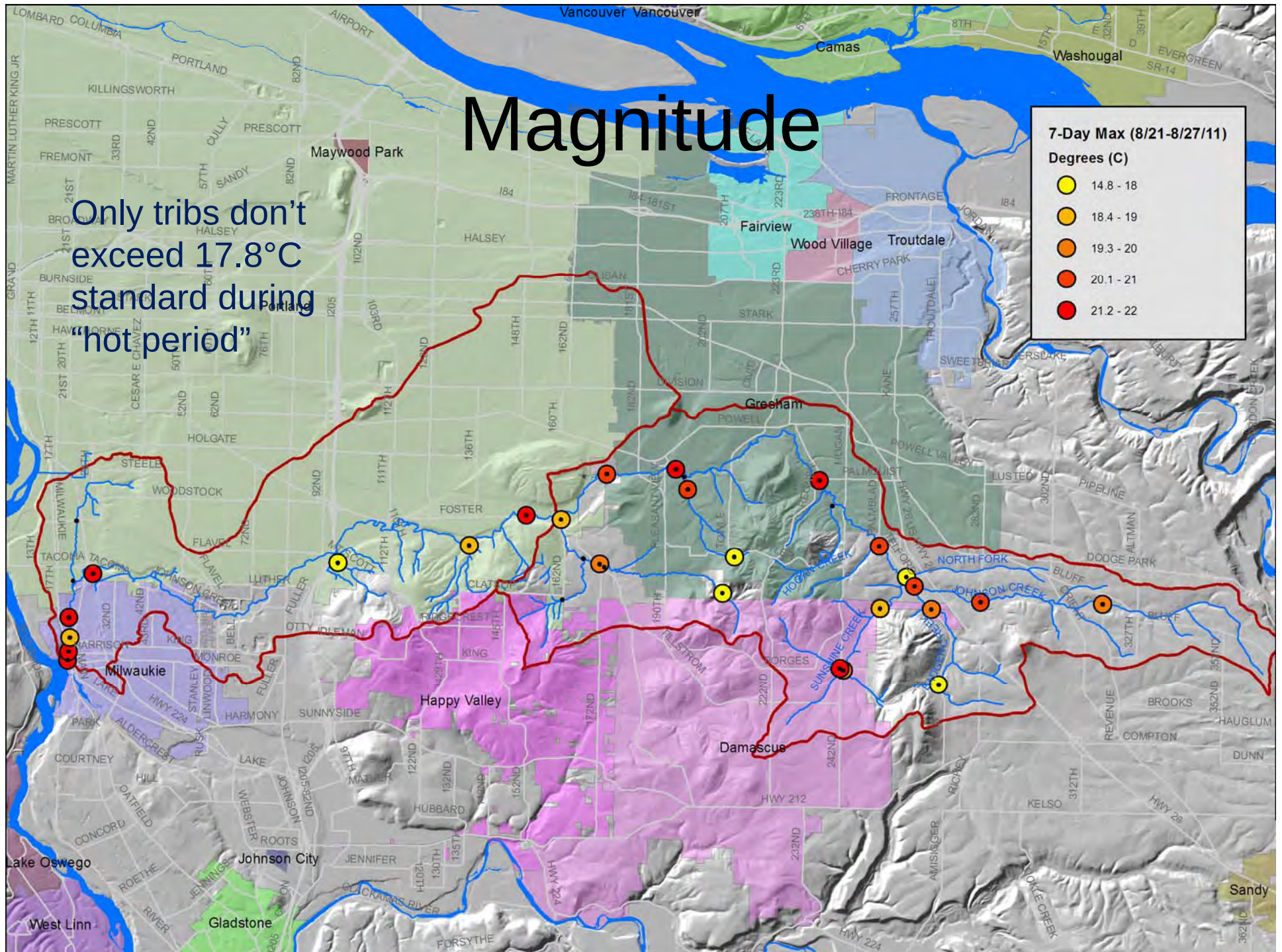


Magnitude

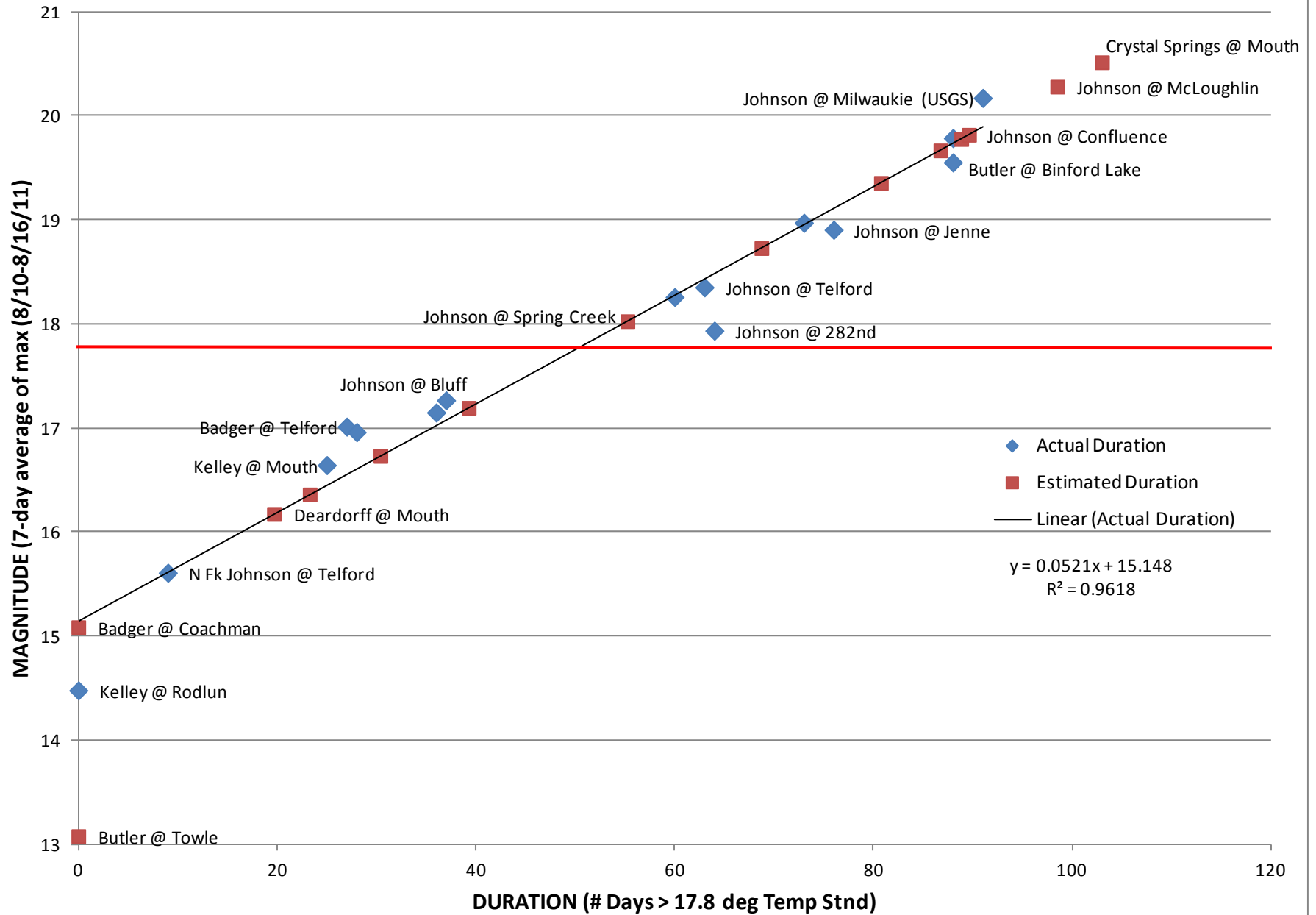
Only tribes don't
exceed 17.8°C
standard during
"hot period"

7-Day Max (8/21-8/27/11)

Degrees (C)



Magnitude and Duration of Temperature Exceedance

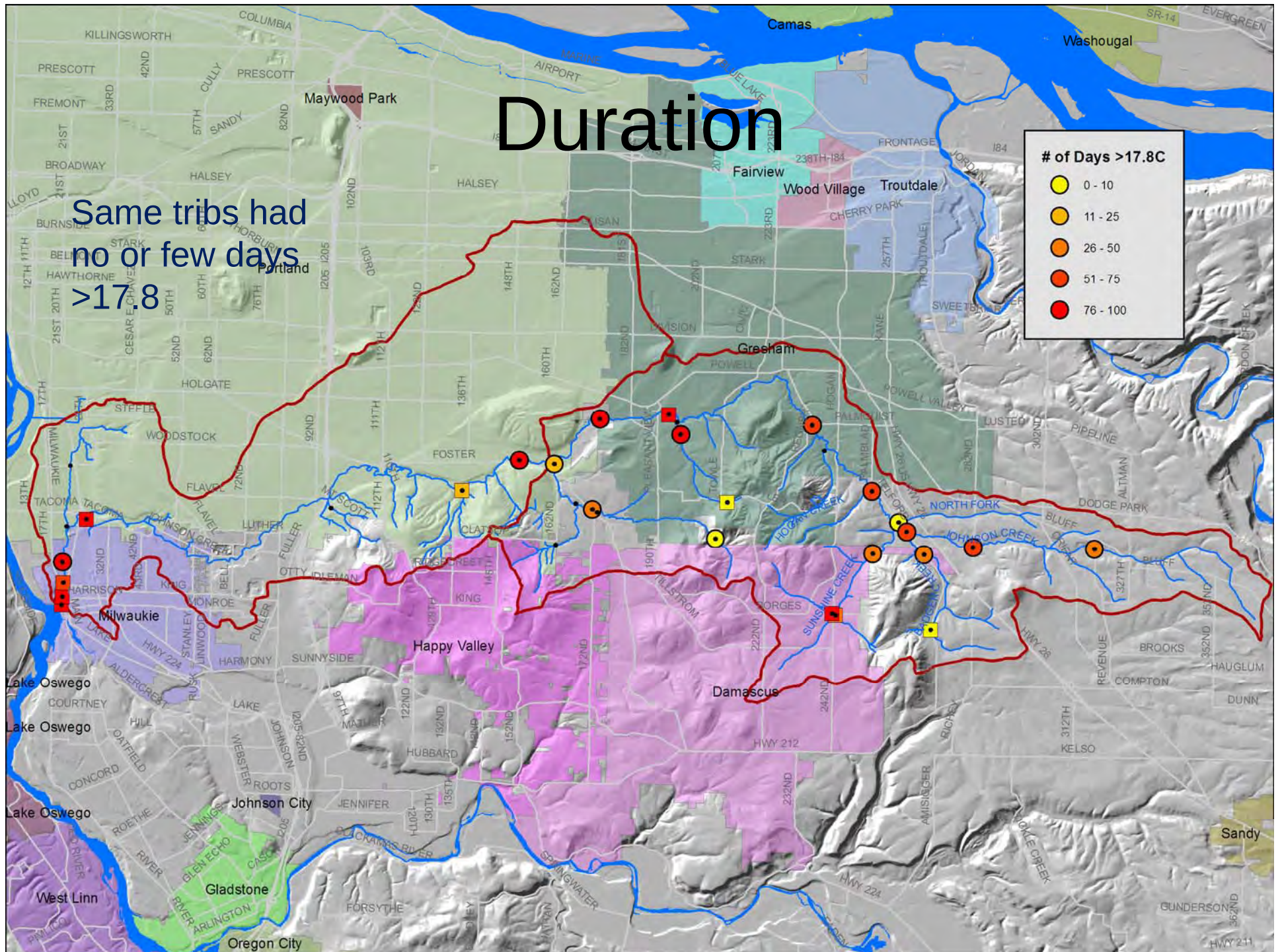


Duration

Same tribes had
no or few days
>17.8

of Days >17.8C

- 0 - 10
- 11 - 25
- 26 - 50
- 51 - 75
- 76 - 100



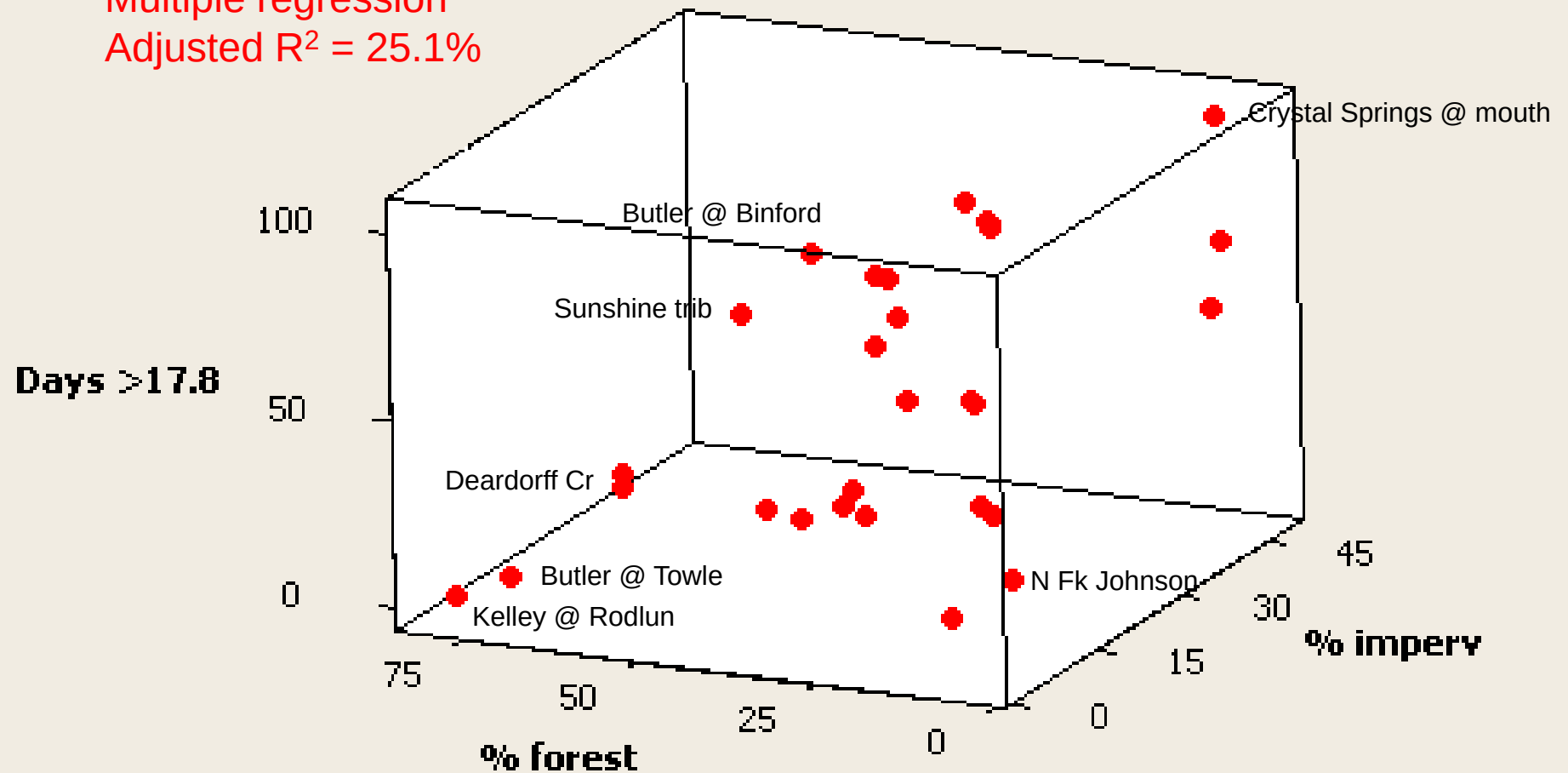
Temperature Factors

Used USGS StreamStat tool to estimate drainage characteristics upstream of each sampling location

Location	Exceedances (# Days)	% Forest	% Impervious (NOAA)
Crystal Springs @ mouth	103	6.8	47.3
Johnson @ McLoughlin	98	23.8	24.7
Johnson @ Milwaukie	91	22.2	26.8
Johnson @ SE 17th	90	22.0	27.0
Johnson @ Confluence	89	22.0	27.1
Butler @ Below Binford	88	39.4	17.2
Johnson @ Sycamore	88	27.4	13.7
...			

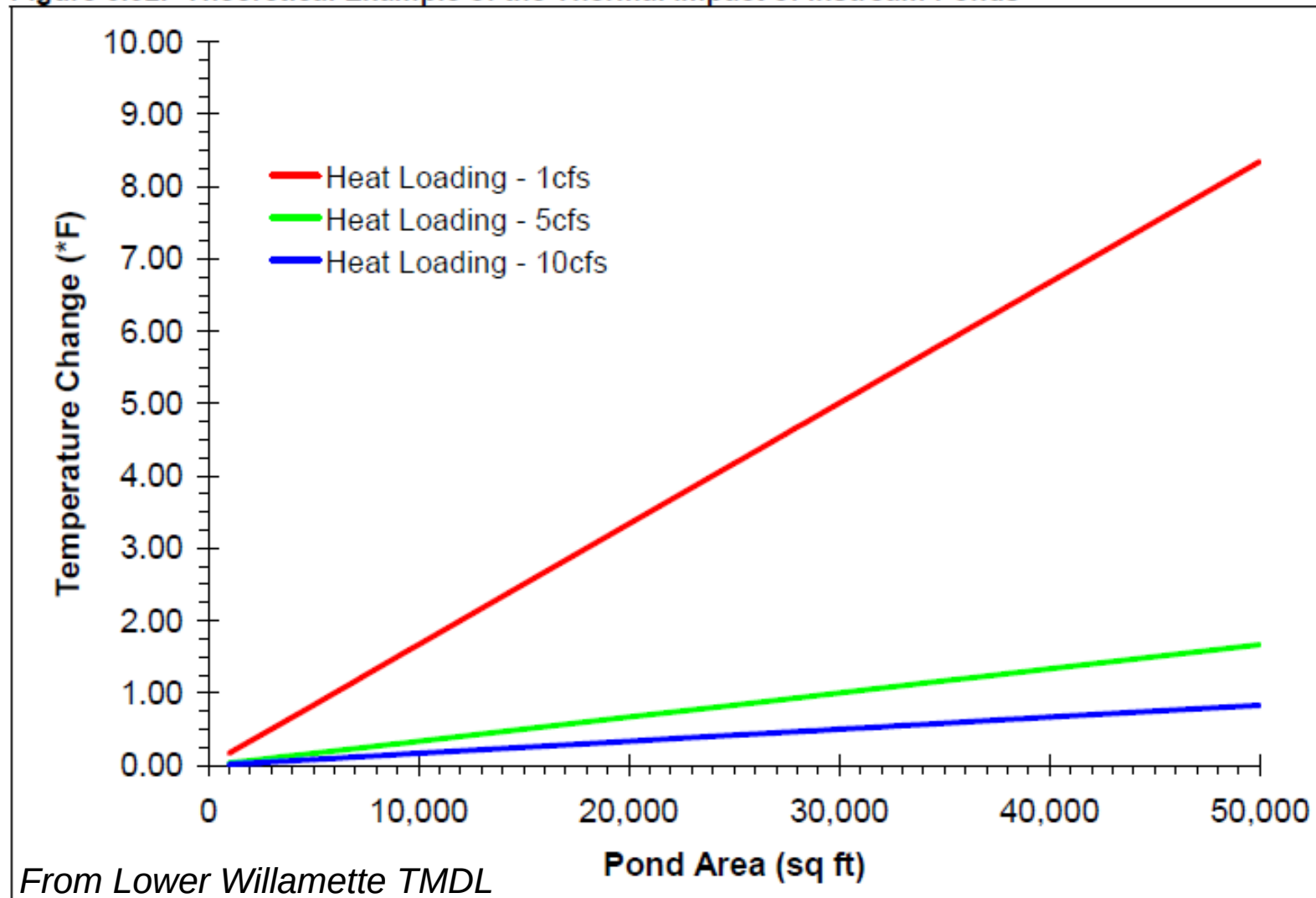
Temperature exceedances vs % forest and impervious

Multiple regression
Adjusted $R^2 = 25.1\%$



Other Temperature Factors

Figure 5.52. Theoretical Example of the Thermal Impact of Instream Ponds

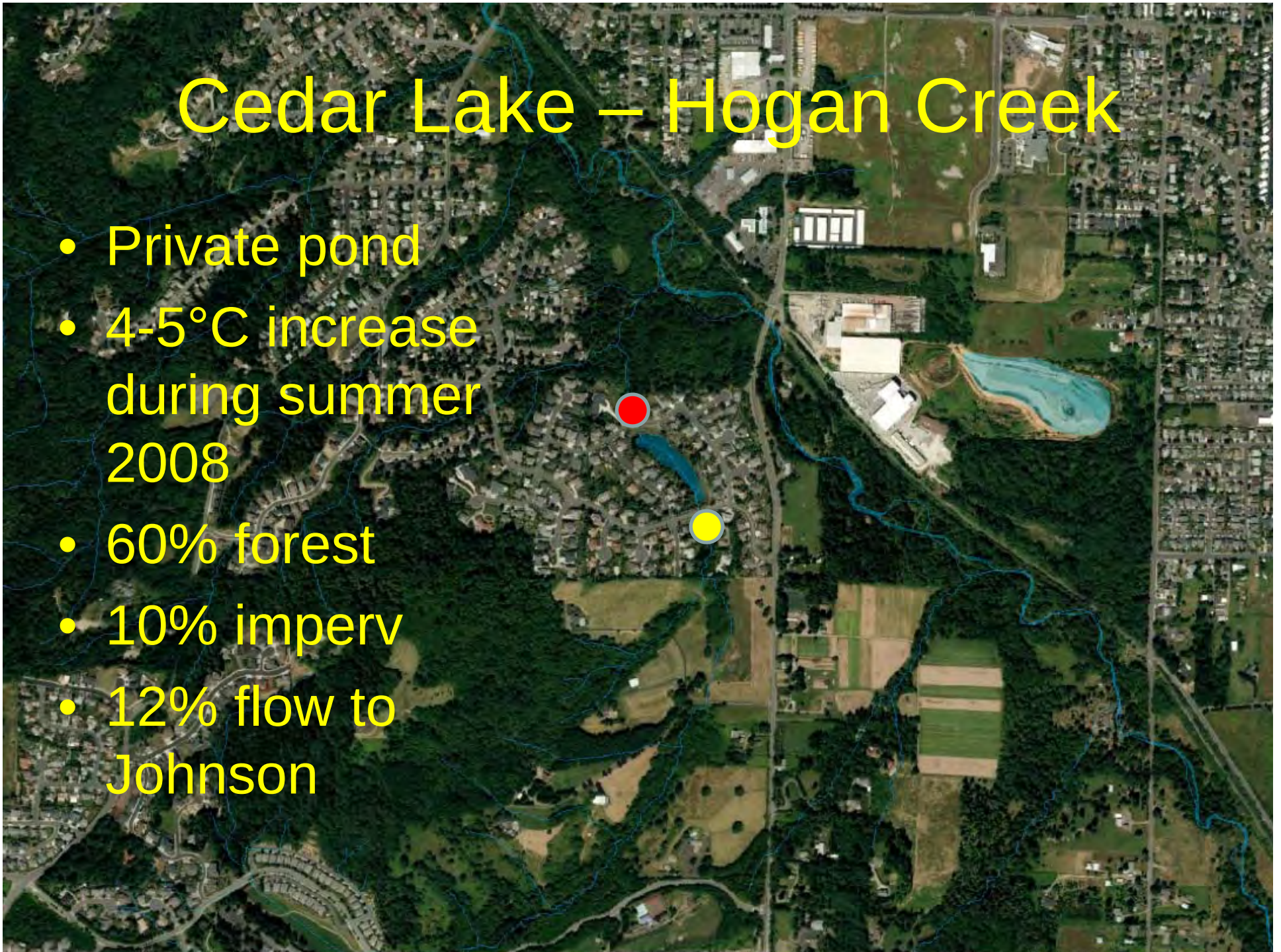


Butler Creek Ponds

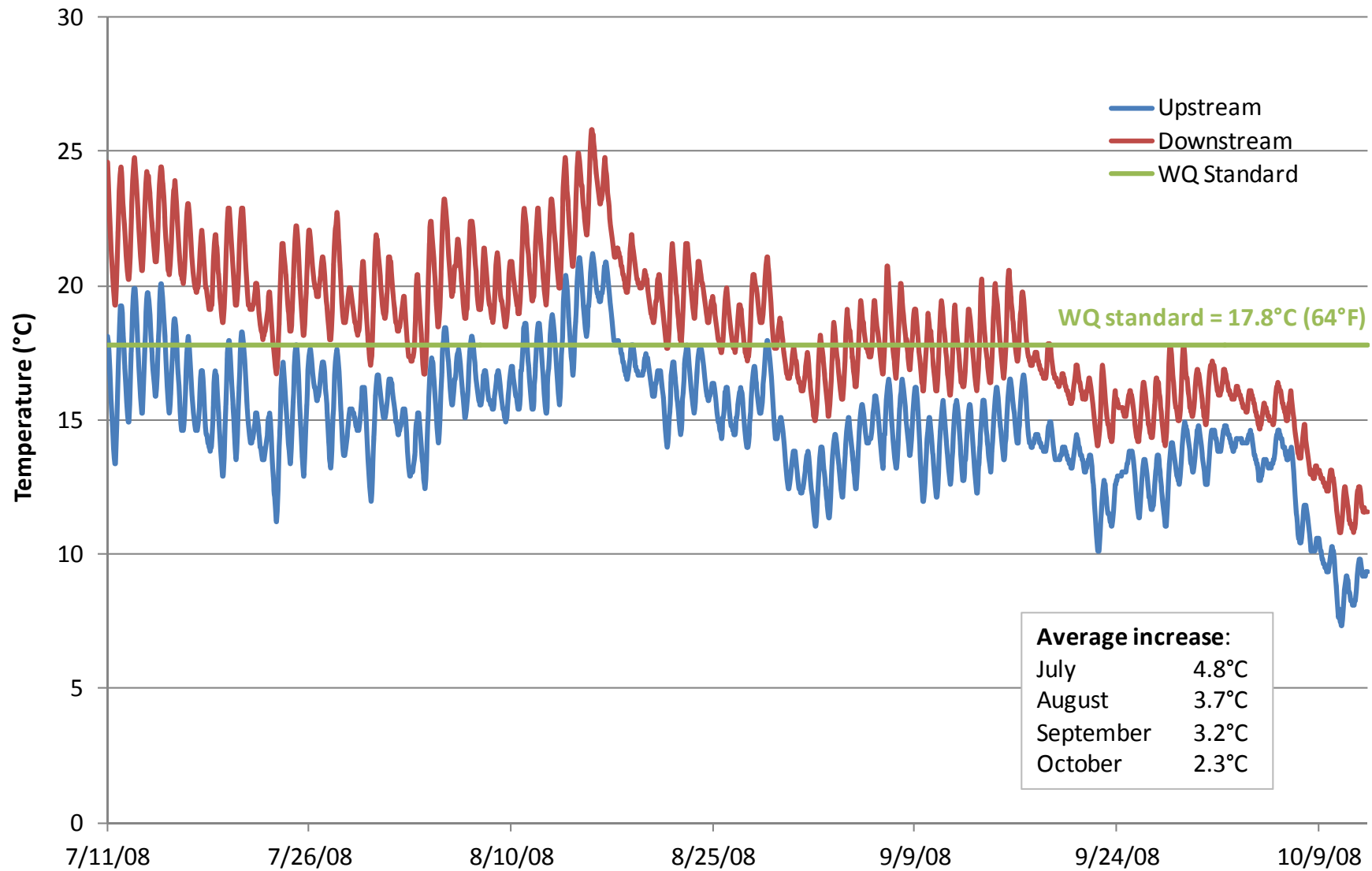
- 3 in-line ponds
- 2011 data suggests avg of 5.6°C increase
- 38% forest (77% above U/S site)
- 10% flow

Cedar Lake – Hogan Creek

- Private pond
- 4-5°C increase during summer 2008
- 60% forest
- 10% imperv
- 12% flow to Johnson



Hogan Creek - Temperature Up & Downstream of Cedar Lake



Summary

- Mainstem Johnson warm from upper reaches
- Temperature shows some relationship to forest and impervious surface
- Stormwater infrastructure alters watershed assumptions (detention, drywells, CSO)
- In-line ponds causing heat loading
- Continued monitoring needed to determine long-term success of restoration