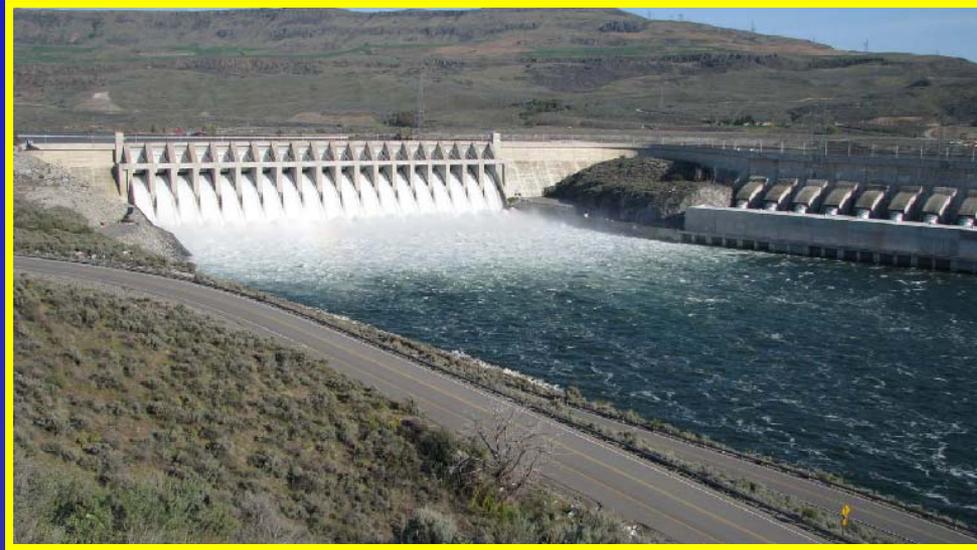


Total Dissolved Gas Monitoring 2014: Chief Joseph Dam, Albeni Falls Dam, and Libby Dam



TDG Monitoring 2014

Location

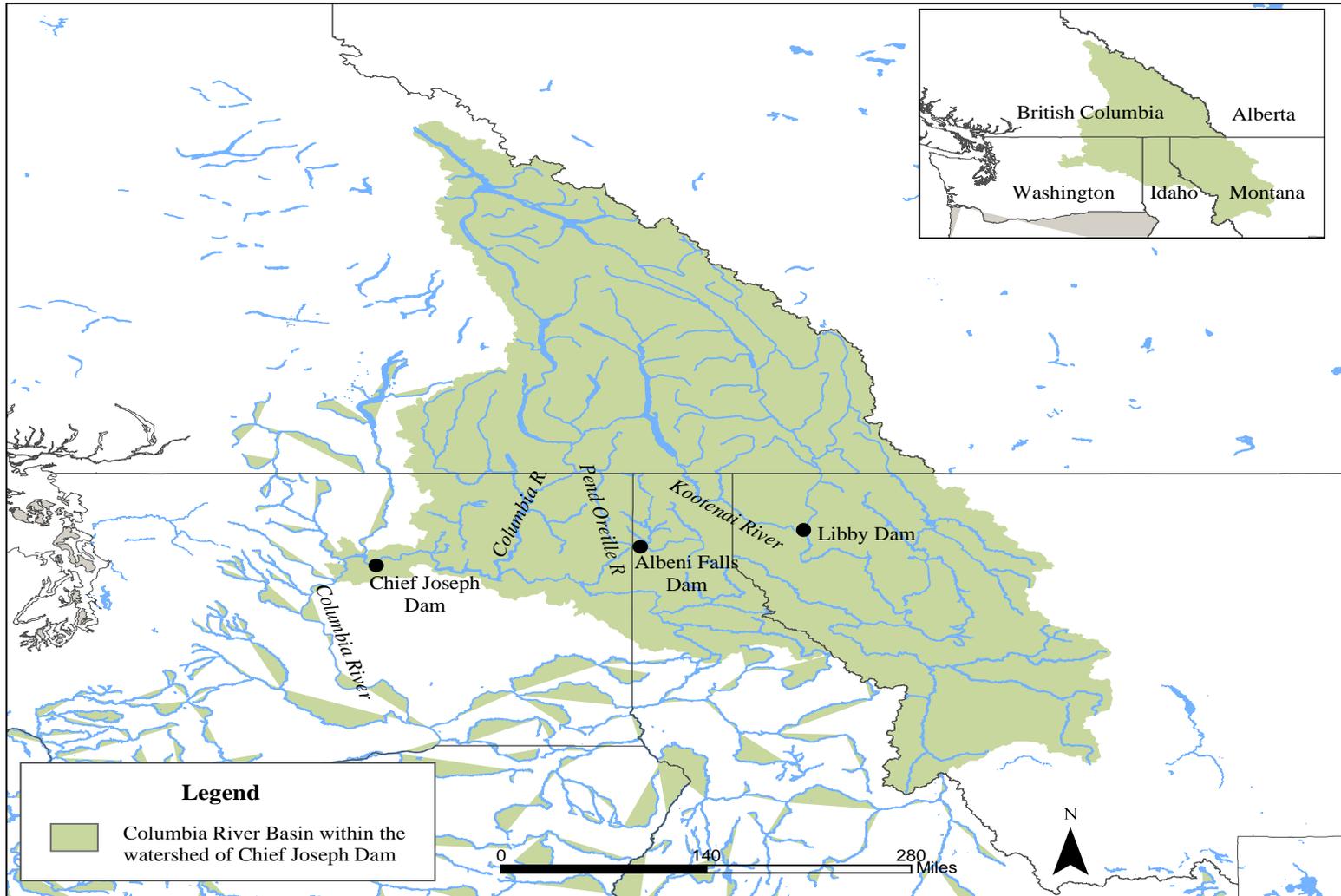
- Libby tailwater
- Chief Joseph forebay and tailwater
- Albeni Falls forebay and tailwater

Period of Operation

- Libby/Chief Joseph: April 1 – September 30
- Albeni Falls: All year

Calibration Schedule

- Sites calibrated every two weeks (April–September) and every month (October–March)



Location of the Seattle District's projects in the Upper Columbia River Basin.

TDG Monitoring 2014

- **Chief Joseph**

- Equipment

- Hydrolab MiniSonde 4a/5 TDG sensor/Sutron barometer
 - Sutron 9210 XLite DCP, AC Power
 - Radio transmission and GOES station

- **Albeni Falls**

- Equipment

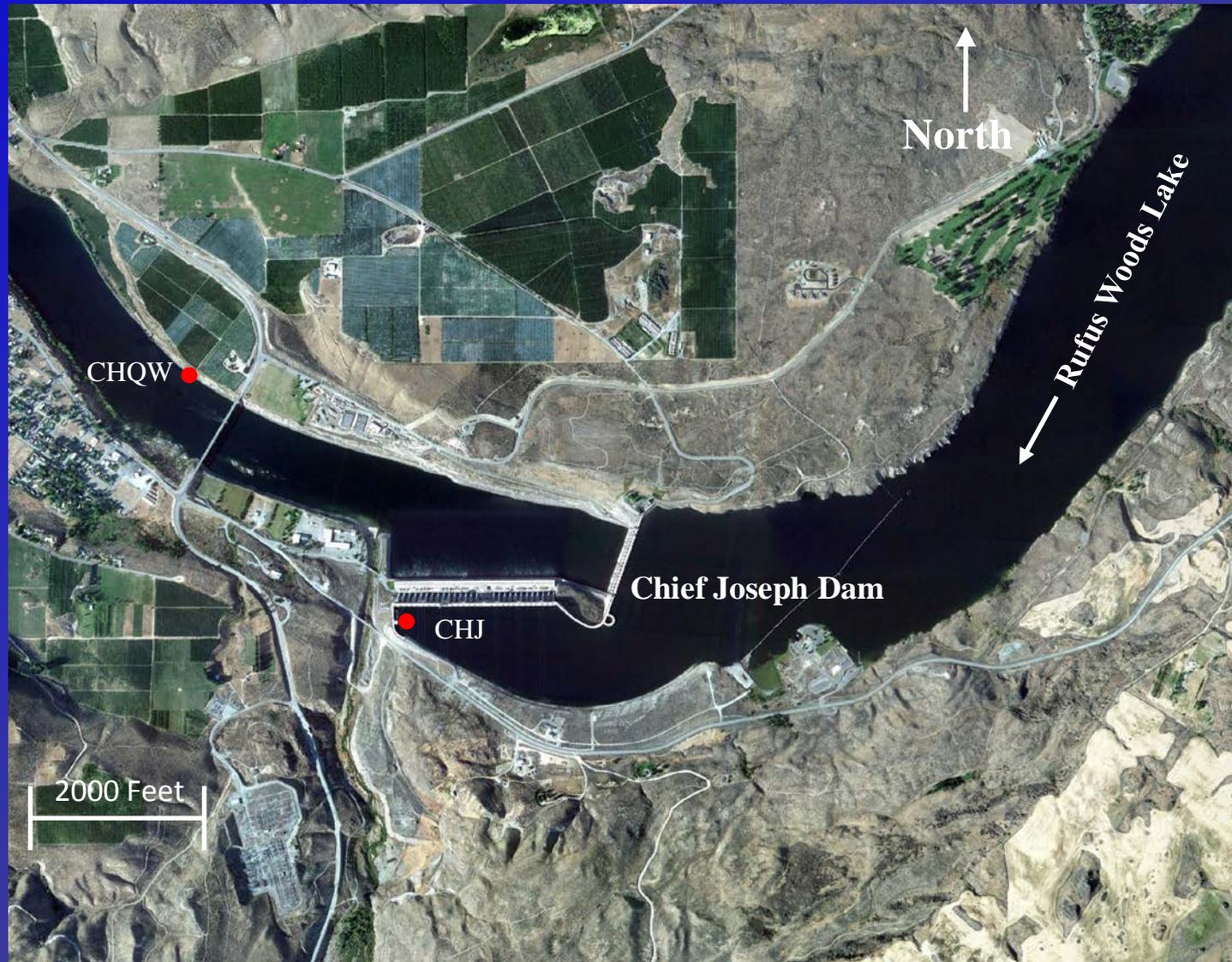
- Hydrolab MiniSonde 4a/5 TDG sensor/Sutron barometer
 - Sutron 9210 XLite DCP, AC Power
 - Radio transmission station

- **Libby**

- Equipment

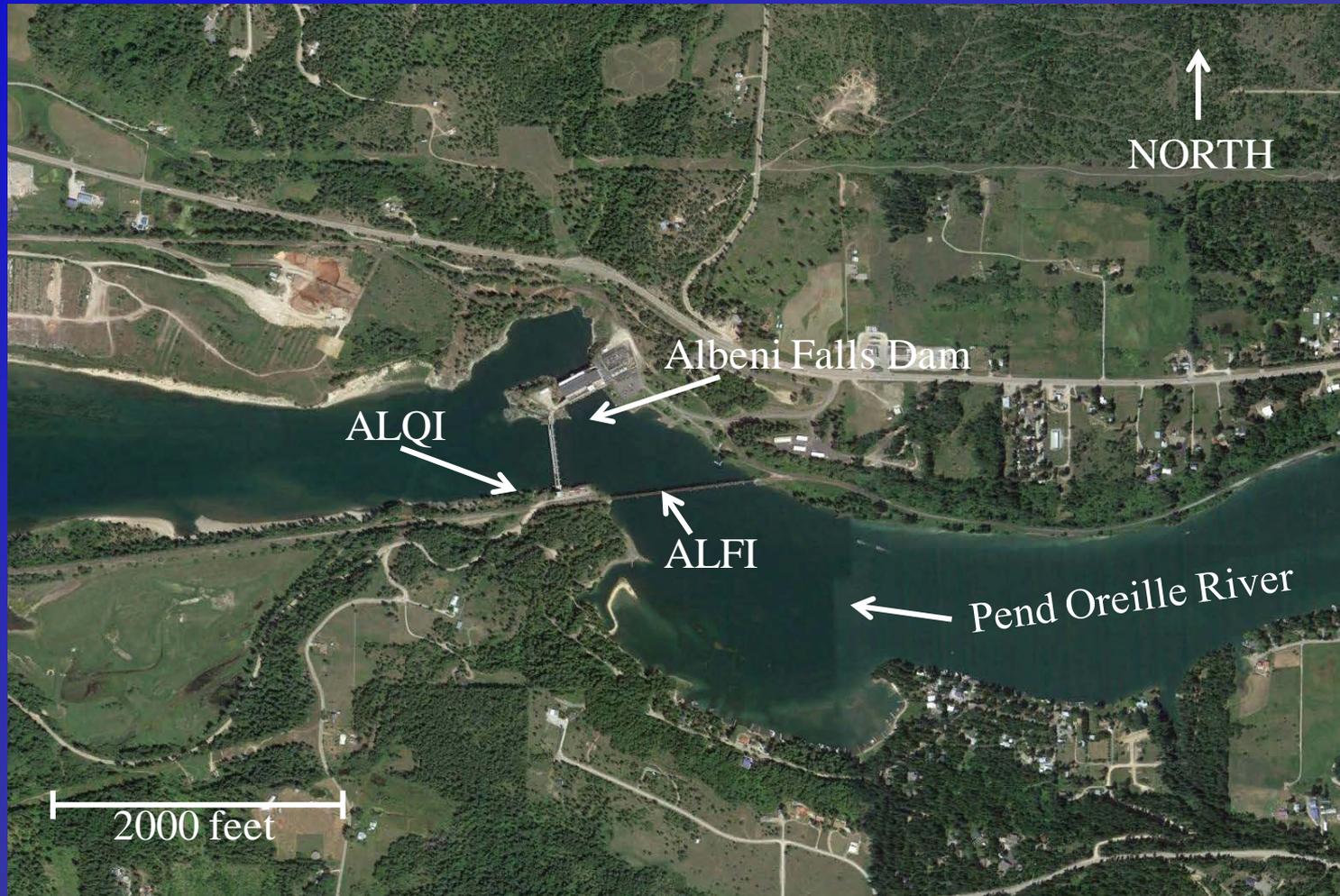
- Hydrolab MiniSonde 4a/5 TDG sensor/Sutron barometer
 - Sutron 9210 XLite DCP, Solar Power
 - Radio transmission station

TDG Monitoring 2014



Chief Joseph Total Dissolved Gas Monitoring System

TDG Monitoring 2014



Albeni Falls Total Dissolved Gas Monitoring System

TDG Monitoring 2014



Libby Dam Total Dissolved Gas Monitoring System

TDG Data Completeness 2014

Station Name	Station Abbreviation	Planned monitoring in hours	Number of missing hourly values	Number of hourly values not passing QA	Percentage of real-time TDG monitoring data received	Percentage of real-time TDG data received and passing quality assurance
Chief Joseph Forebay	CHJ	4392	5	5	99.9	99.8
Chief Joseph Tailwater	CHQW	4392	5	32	99.9	99.2
Albeni Falls Forebay	ALFI	8760	232	24	97.4	97.1
Albeni Falls Tailwater	ALQI	8760	344	40	96.1	95.6
Libby Tailwater	LBQM	4392	0	14	100.0	99.7

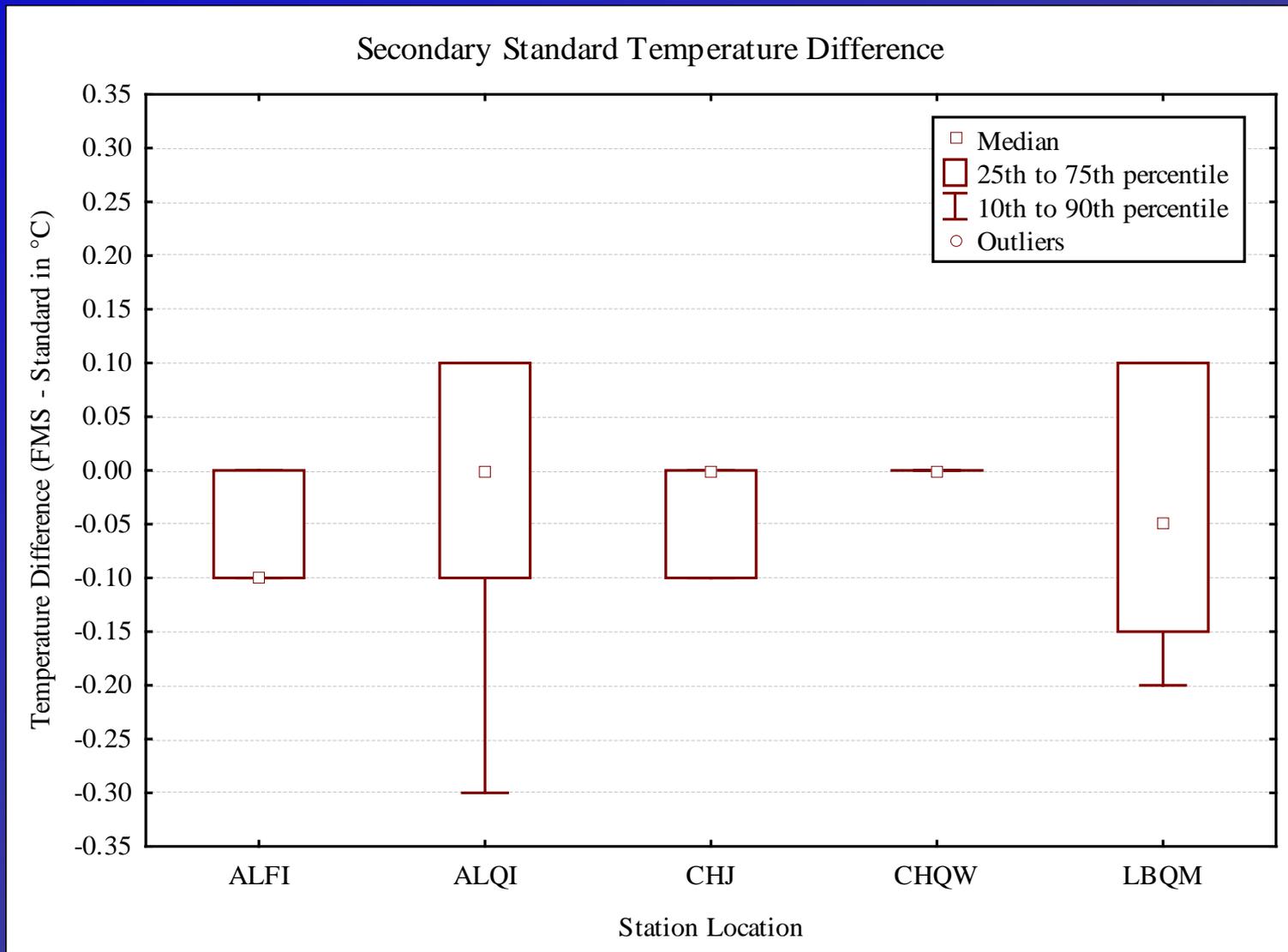
Temperature Data Completeness 2014

Station Name	Station Abbreviation	Planned monitoring in hours	Number of missing hourly values	Number of hourly values not passing QA	Percentage of real-time Temperature monitoring data received	Percentage of real-time Temperature data received and passing quality assurance
Chief Joseph Forebay	CHJ	4392	5	0	99.9	99.9
Chief Joseph Tailwater	CHQW	4392	5	0	99.9	99.9
Albeni Falls Forebay	ALFI	8760	240	0	97.3	97.3
Albeni Falls Tailwater	ALQI	8760	362	2	95.9	95.9
Libby Tailwater	LBQM	4392	0	14	100.0	100.0

TDG Monitoring 2014

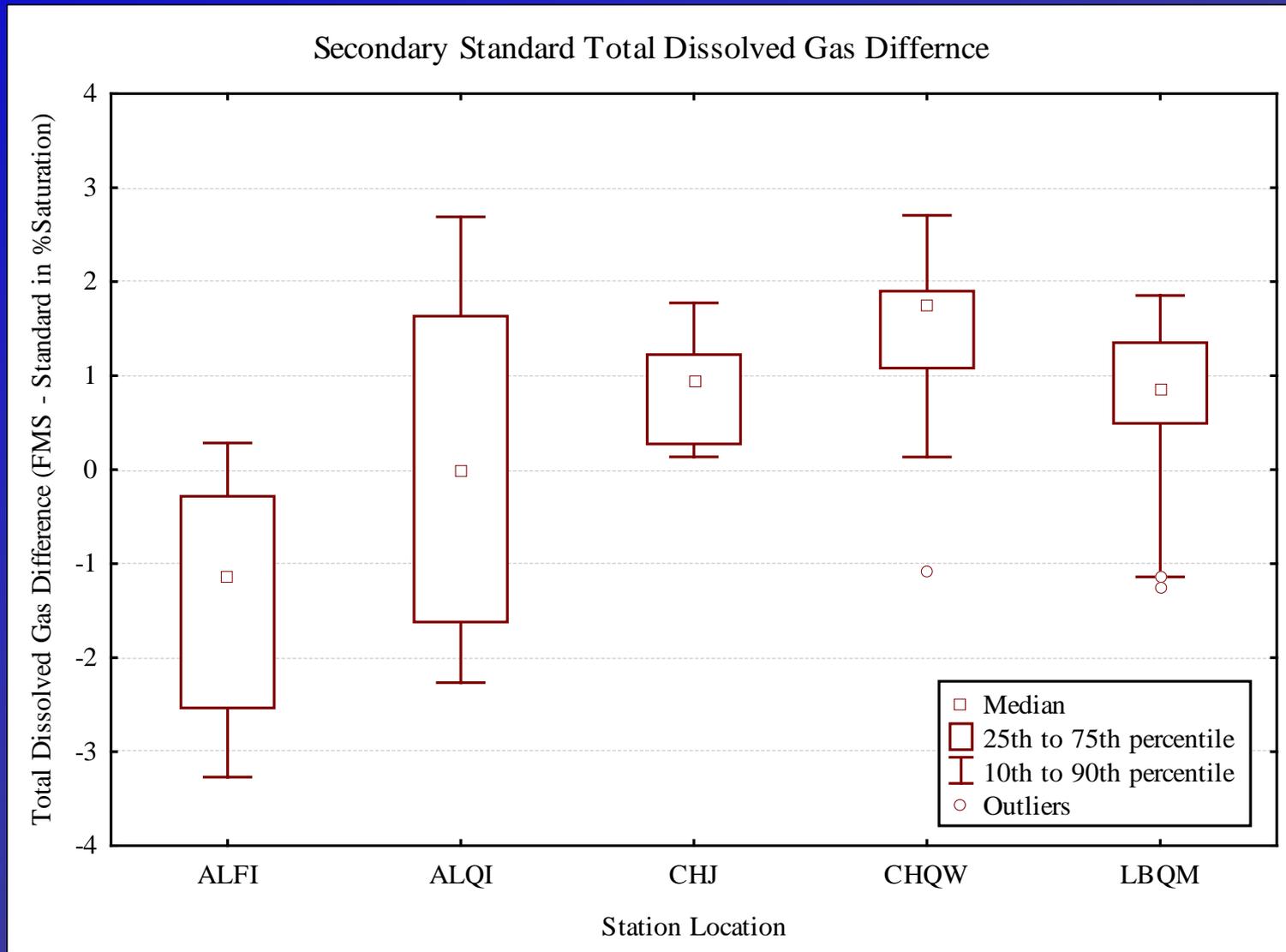
- Overview of 2014 TDG and Temperature Data
 - Data completeness
 - Chief Joseph Forebay (CHJ) and Tailwater (CHQW)
 - DCP malfunctions and programming problems
 - Calibration visits
 - Albeni Falls Forebay (ALFI) and Tailwater (ALQI)
 - DCP malfunctions and programming problems
 - Probe/Cable problems
 - TDG membrane
 - Calibration visits
 - Libby Tailwater (LBQM)
 - NO PROBLEMS!

TDG and Temperature QA/QC 2014



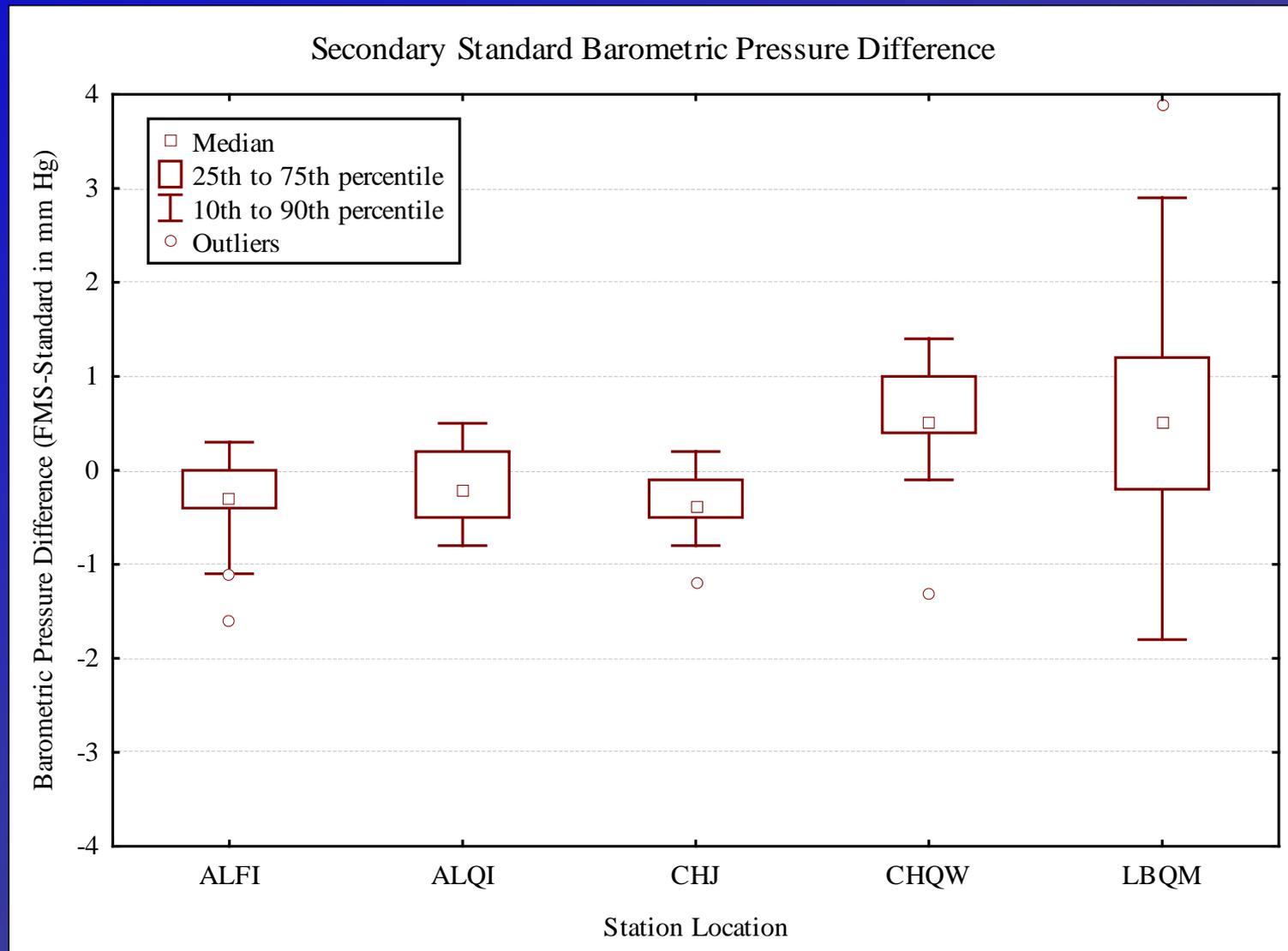
Difference between the secondary standard and the field thermometer

TDG and Temperature QA/QC 2014



Difference between the secondary standard and the TDG instrument

TDG and Temperature QA/QC 2014



Difference between the secondary standard and the Barometer

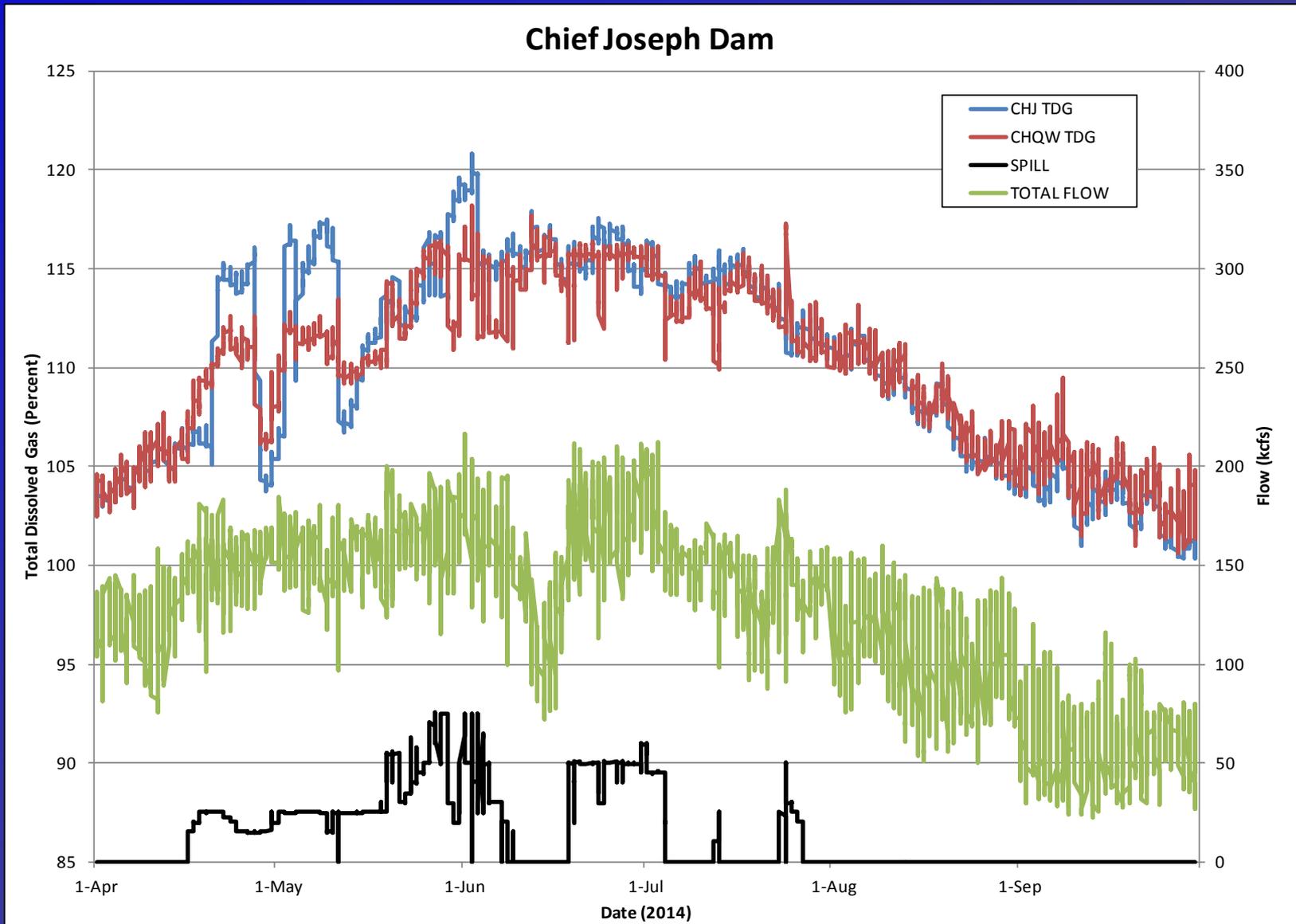
TDG Monitoring 2014

- Overview of 2014 Data QA/QC
 - Laboratory calibration data were good and within 0.1 ° C for temperature and 1% saturation for TDG
 - Field calibration data were good and generally within 0.2 ° C for temperature , 2mm Hg for barometric pressure, and 2% saturation for TDG at all stations

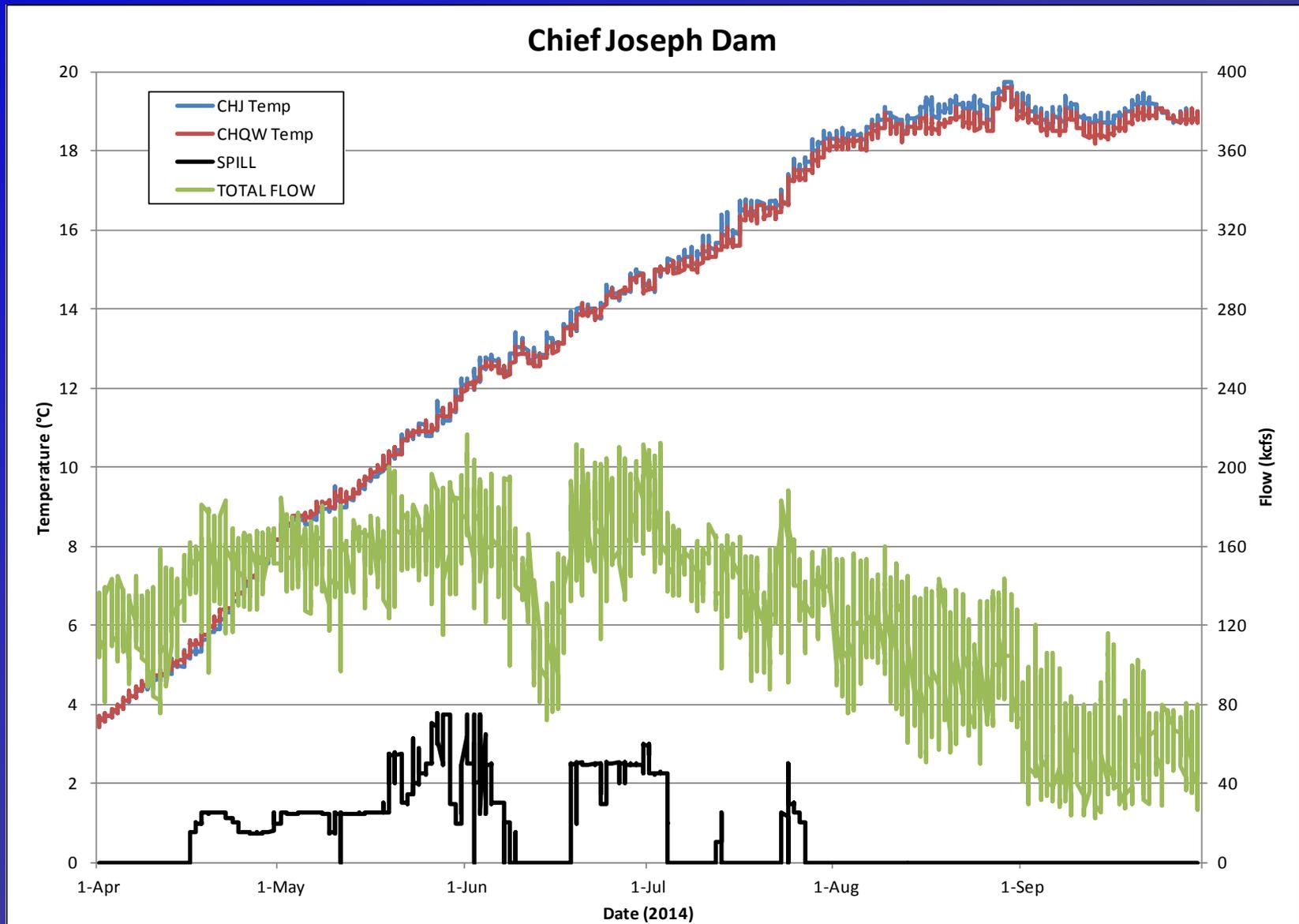
TDG Monitoring 2014

- 2014 Spill Season Results for Chief Joseph Dam
 - TDG-Forebay (CHJ)
 - Forebay TDG levels a function of Grand Coulee tailwater TDG
 - Maximum forebay TDG about 120%
 - TDG-Tailwater (CHQW)
 - Low spill volumes
 - Station located in undiluted spillway flow, not mixed river
 - TDG equal to or less than forebay TDG
 - Temperature-Forebay/Tailwater
 - Little difference between forebay and tailwater temperatures

TDG Monitoring 2014



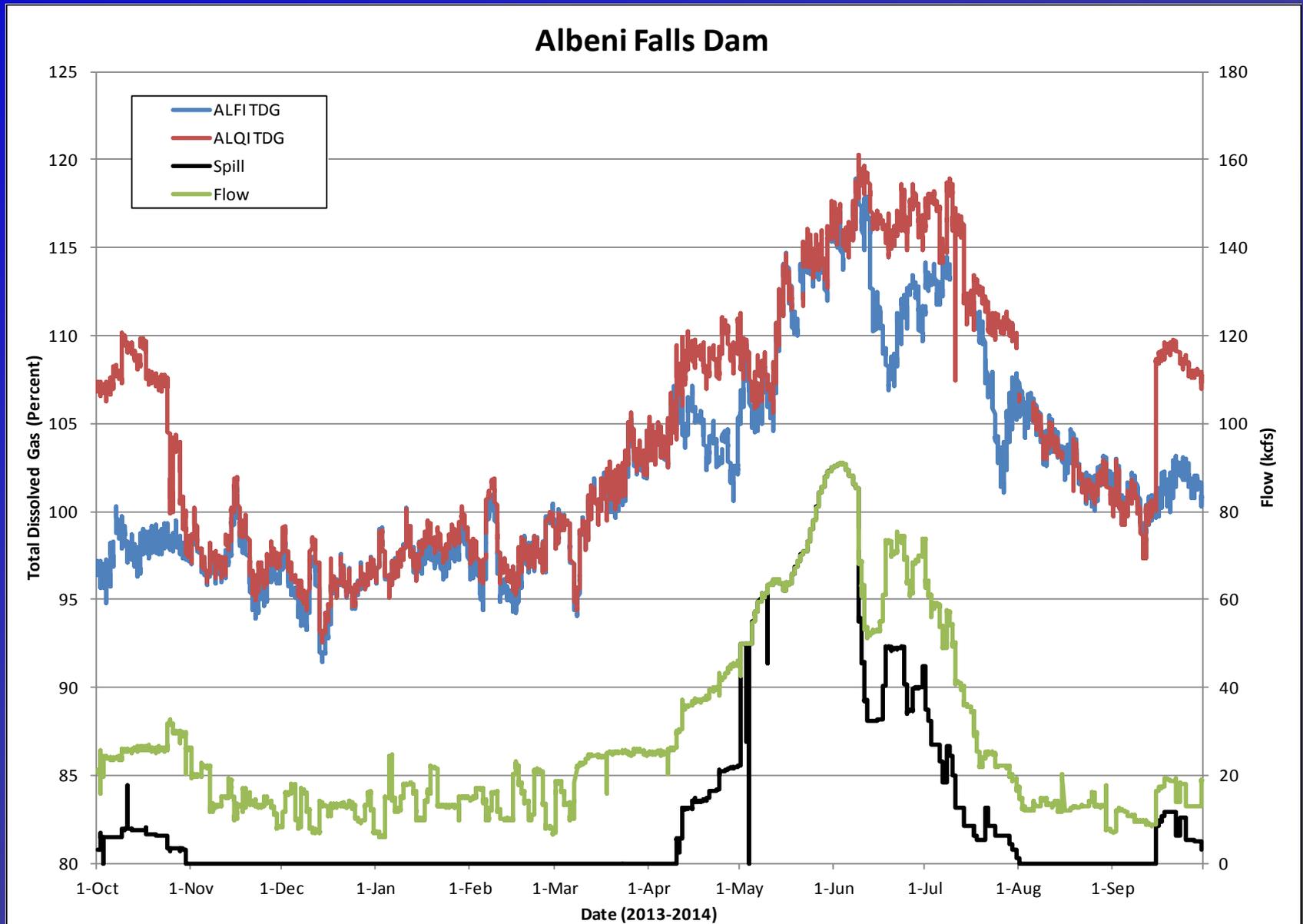
TDG Monitoring 2014



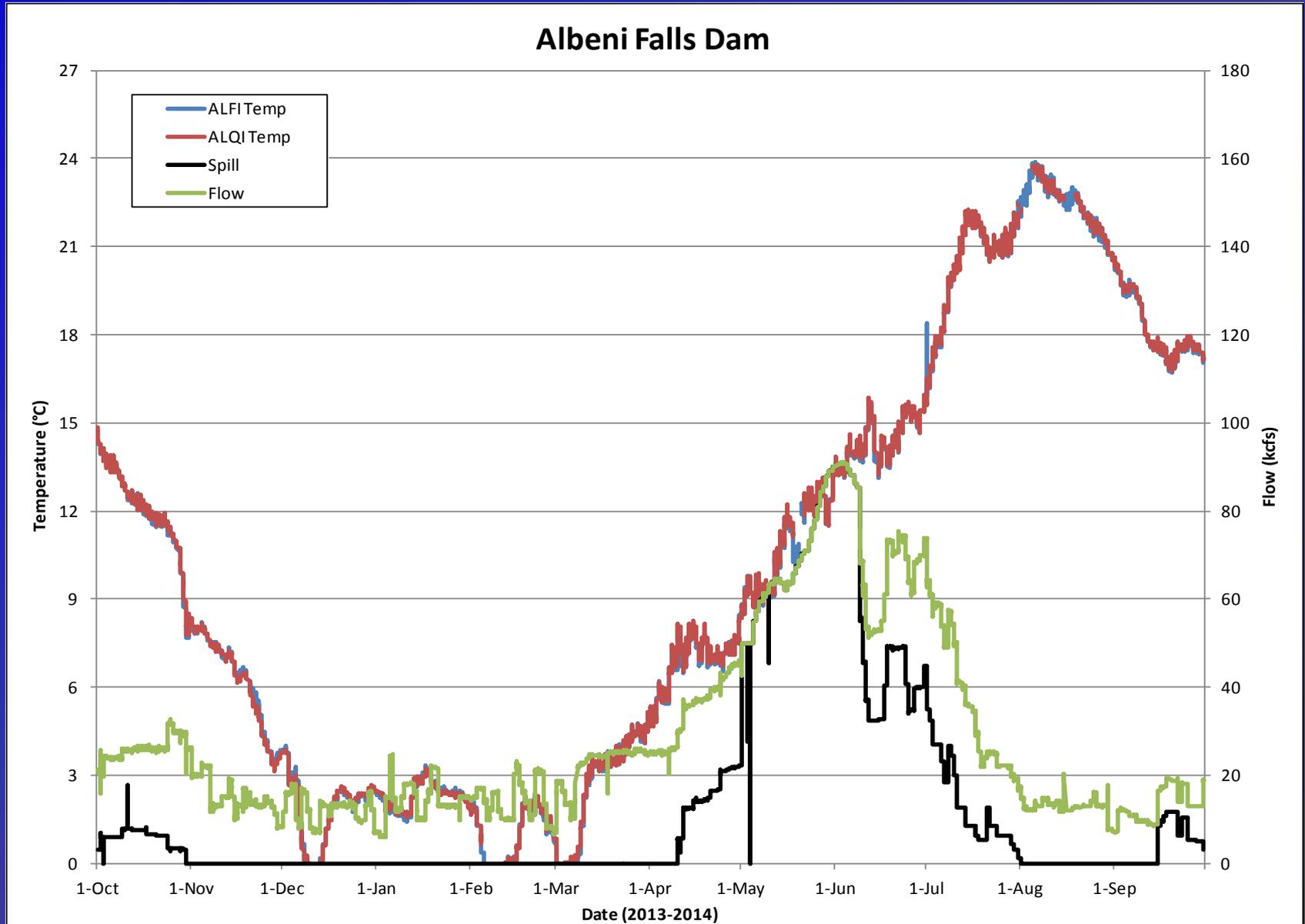
TDG Monitoring 2014

- 2014 Spill Season Results for Albeni Falls Dam
 - TDG-Forebay (ALFI)
 - Function of upstream TDG saturations
 - Highest TDG value was about 119% during 56kcfs spill
 - TDG-Tailwater (ALQI)
 - Highest TDG value was about 121% during 56kcfs spill
 - Higher spill volumes did not produce higher TDG saturations
 - Max tailwater TDG increase (10%) during spill of 8 kcfs via 5 of 10 bays
 - Temperature-Forebay/Tailwater
 - Forebay and tailwater temperatures are similar, no stratification

TDG Monitoring 2014



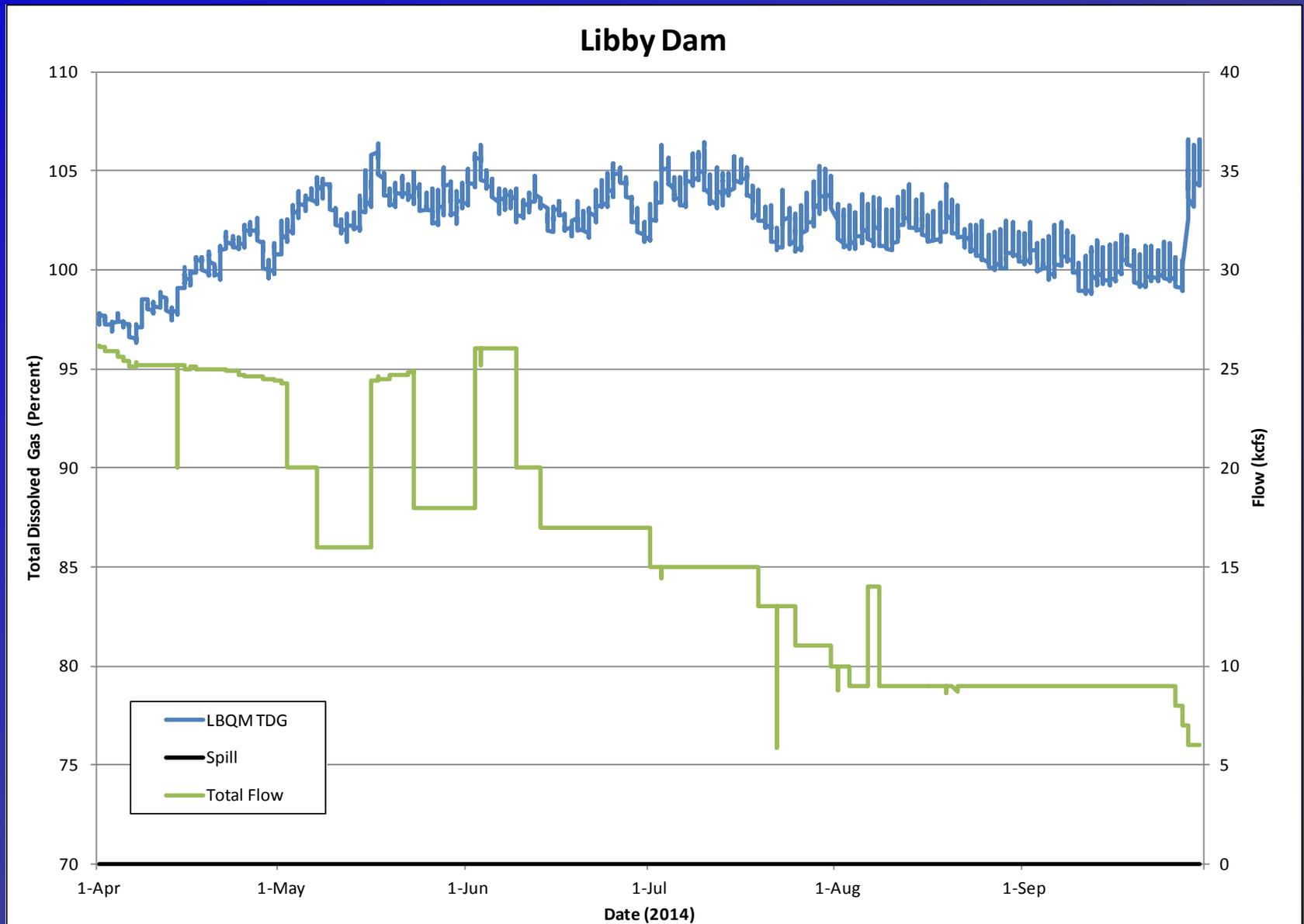
TDG Monitoring 2014



TDG Monitoring 2014

- 2014 Spill Season Results for Libby Dam
 - No Spill
 - TDG did not exceed 110%
 - Temperature did not exceed 16°C

TDG Monitoring 2014



TDG Monitoring 2014

Libby Dam

