

The background image shows a river with a black pipe in the foreground. The pipe is partially submerged in the water and surrounded by green grass and vegetation. The water is dark and rippling. The sky is not visible.

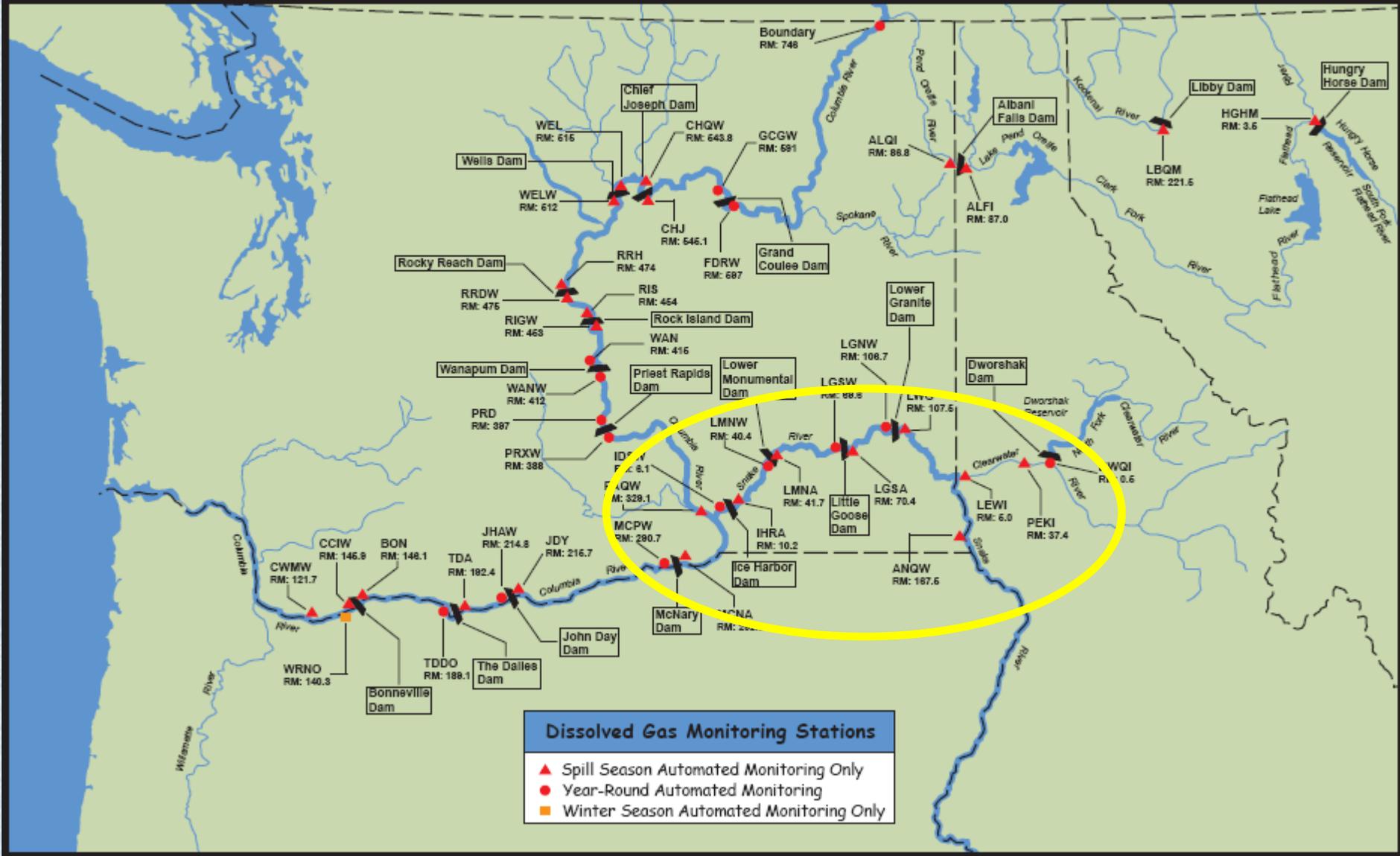
USACE Walla Walla District QA/QC Evaluation of 2013 FMS TDG Monitoring Data

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Dwight Copeland
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Presentation Outline

- Station locations
- Instrumentation
- Data completeness
- QA/QC
 - Pre and post calibration comparisons to primary standards
 - Sensor comparisons to secondary standards
- Summary

2007 Dissolved Gas Monitoring Network - CDB-DSS Database



Field Monitoring Stations

- 15 sites: 6 year-round sites, 9 seasonal sites
- Total Cost for FY 2014 \$349,440
- 5 Forebay sites, 6 Tailwater sites, 4 Riverine sites
- All 15 sites visited every three weeks during spill season and 6 tailwater sites every four weeks outside spill season

Field equipment

- 41 sondes
- Hydrolab Mini 4a, and Mini 5 sondes.
- Sutron SDI-12 digital barometers
- 14 Sutron Satlink 2 HDR DCP's plus one Sutron 8210 HDR DCP with external phone modem .
- NovaLynx hand-held digital field barometers.

Field equipment for 2013

- All Sutron digital barometers at FMS's
- Two Novalynx 230-M202 Handheld Digital Barometer
- Purchased 25 new TDG Membranes from In-Situ Inc.

Lab equipment

- Heise calibrated digital pressure gage
- Ashcroft calibrated digital pressure gage
- Two Barnant digital thermometers
- ParoScientific digital barometric pressure Digiquartz Laboratory Standard.
Model 745.

Data Completeness

During the Spill Season April 1 to Sept. 30.

99.94% of the BP, 97.5% TDG
data and 99.98% of the WT data
were received in real-time

and passed provisional QA/QC review.

PEKI, LEWI, LGSW and PAQW accounted for 90.5%
of the bad TDG data.

For the whole reporting period

99.6% of the BP, 98.3% TDG and 99.8% of the WT
data



Missing/ Anomalous BP and TDG Data

1841 Hours or 2.15% of Total for 2013

Hours	Percent	Reason
1467	79.7	Too Low
145	7.87	Cable Failure
117	6.35	Bad Membrane
48	2.61	DCP Failure
33	1.79	Inspection
24	1.3	Bad Sonde
5	.27	Spike
2	.11	Missing
0	0	Other

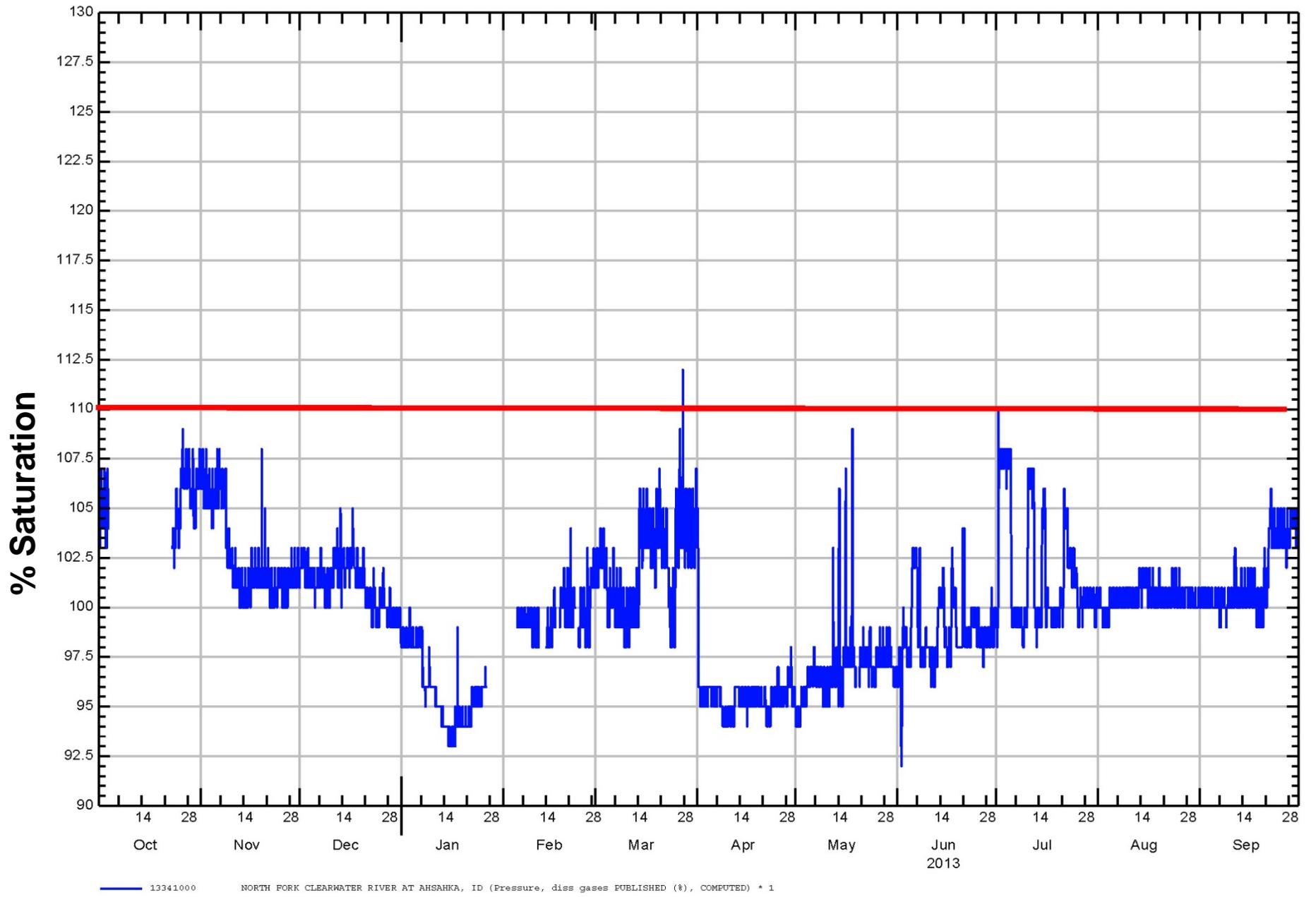
Unusable BP/TDG data

- Worst Sites: PEKI 418 hours, LEWI 198 hours, LGSW 247 hours and PAQW 364 hours where unusable
 - Mostly due to Too Low of readings, Membrane failures, DCP and cable failures.
- Best sites: LGSA, LMNA and MCNA : 0 hours unusable

DWQI - NF Clearwater River NR Ahsahka, ID



13341000



13341000 NORTH FORK CLEARWATER RIVER AT AHSAHKA, ID (Pressure, diss gases PUBLISHED (\$), COMPUTED) * 1

Dworshak

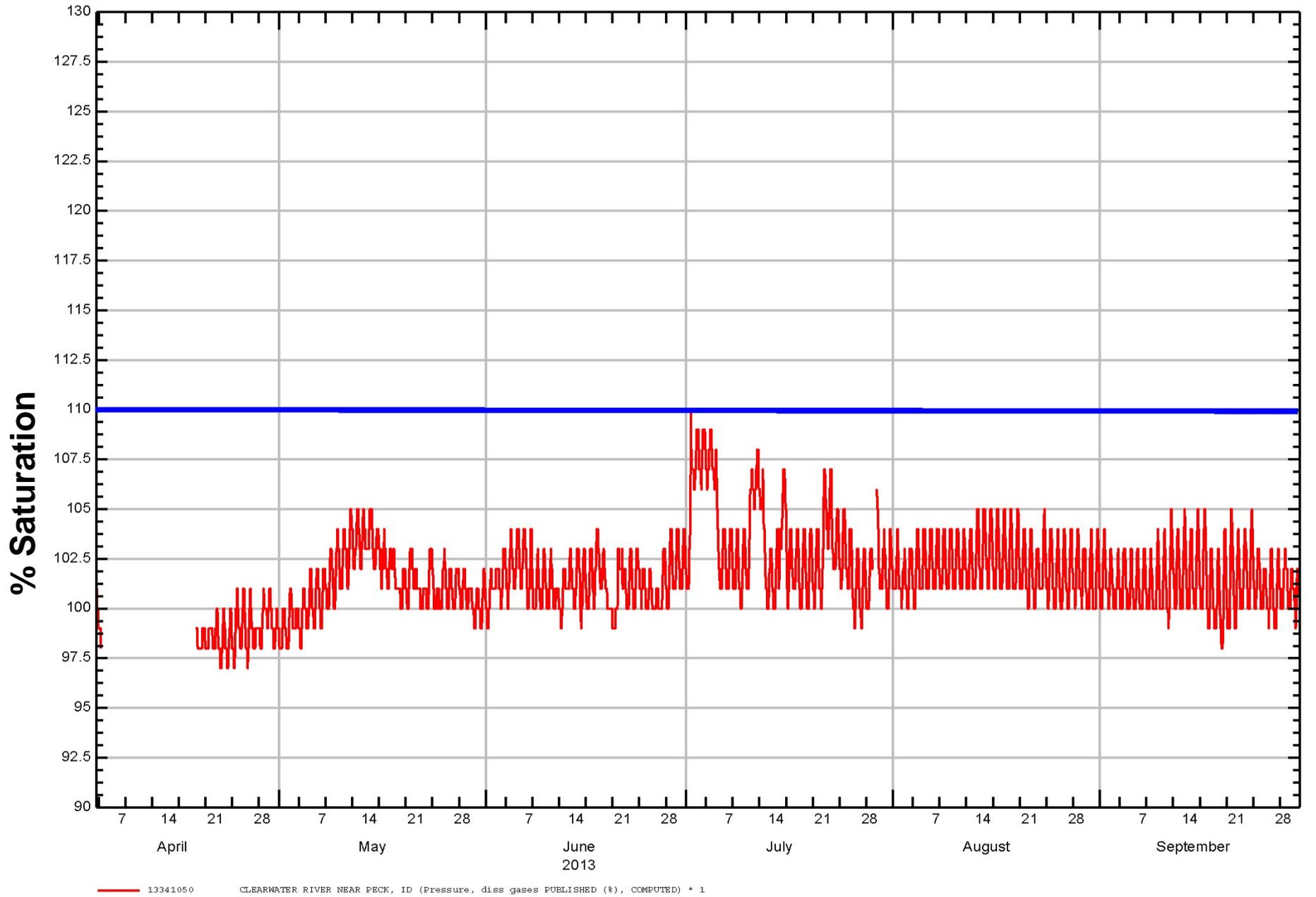


PEKI - Clearwater River NR Peck, ID



13341050

13341000



13341050 CLEARWATER RIVER NEAR PECK, ID (Pressure, diss gases PUBLISHED (\$), COMPUTED) * 1

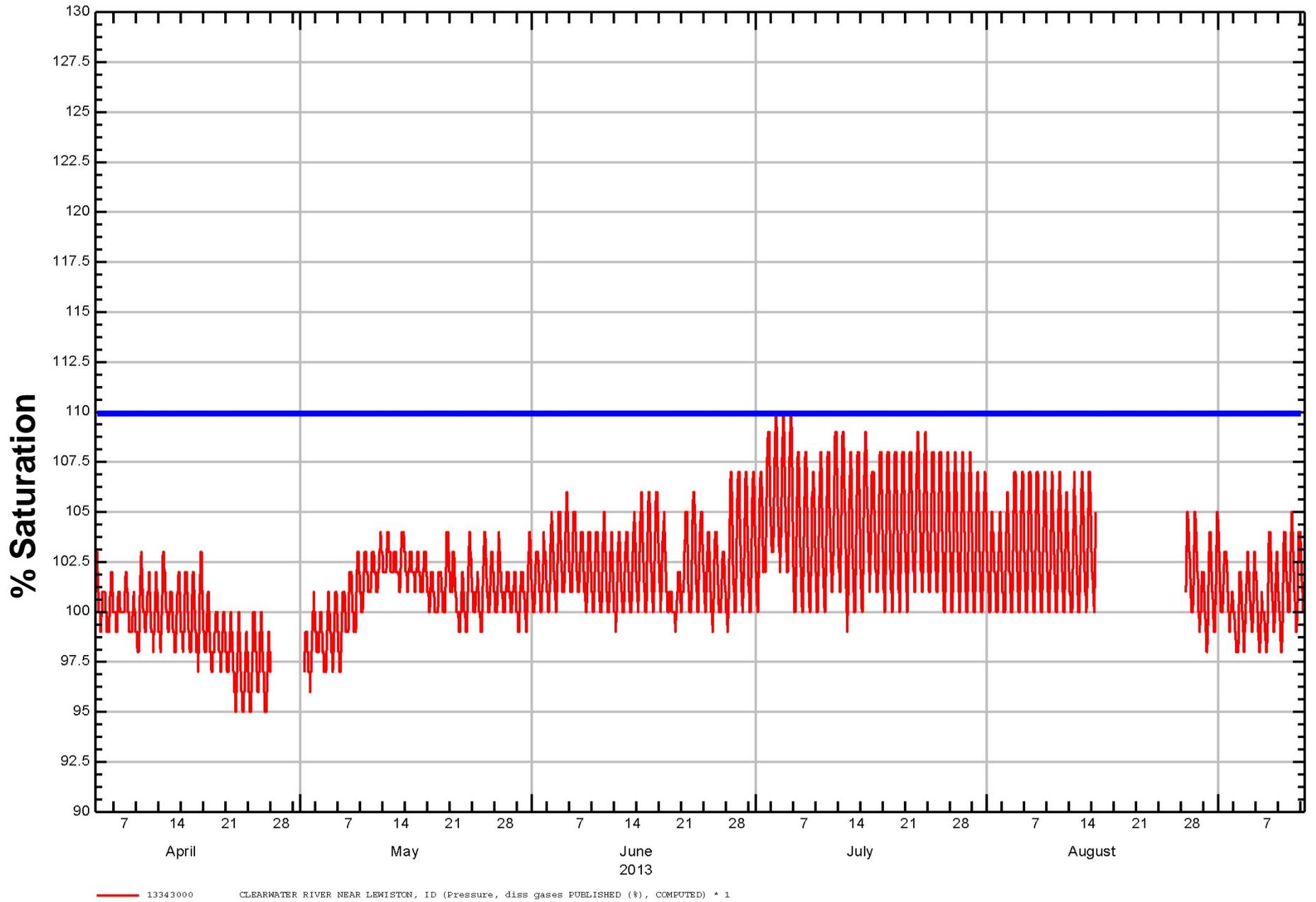
Peck



LEWI – Clearwater River NR Lewiston, ID



13343000



13343000 CLEARWATER RIVER NEAR LEWISTON, ID (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1

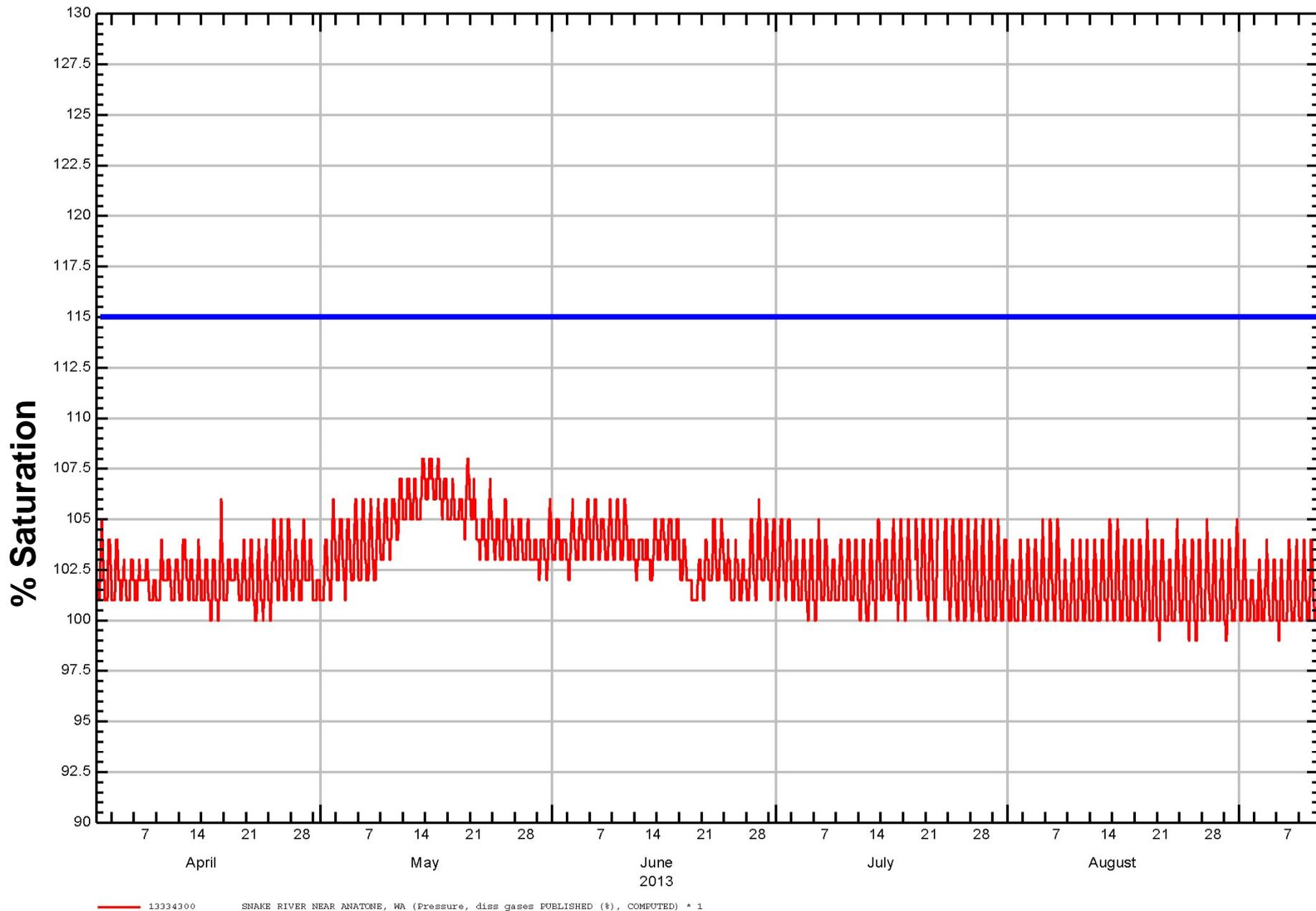
Lewiston



ANQW – Snake River NR Anatone, WA



13334300



13334300 SNAKE RIVER NEAR ANATONE, WA (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1



Anatone

LGW & LGNW

Snake River at Lower Granite Dam



13343595

Log Cabin Island

13343590

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Almota Ferry Rd

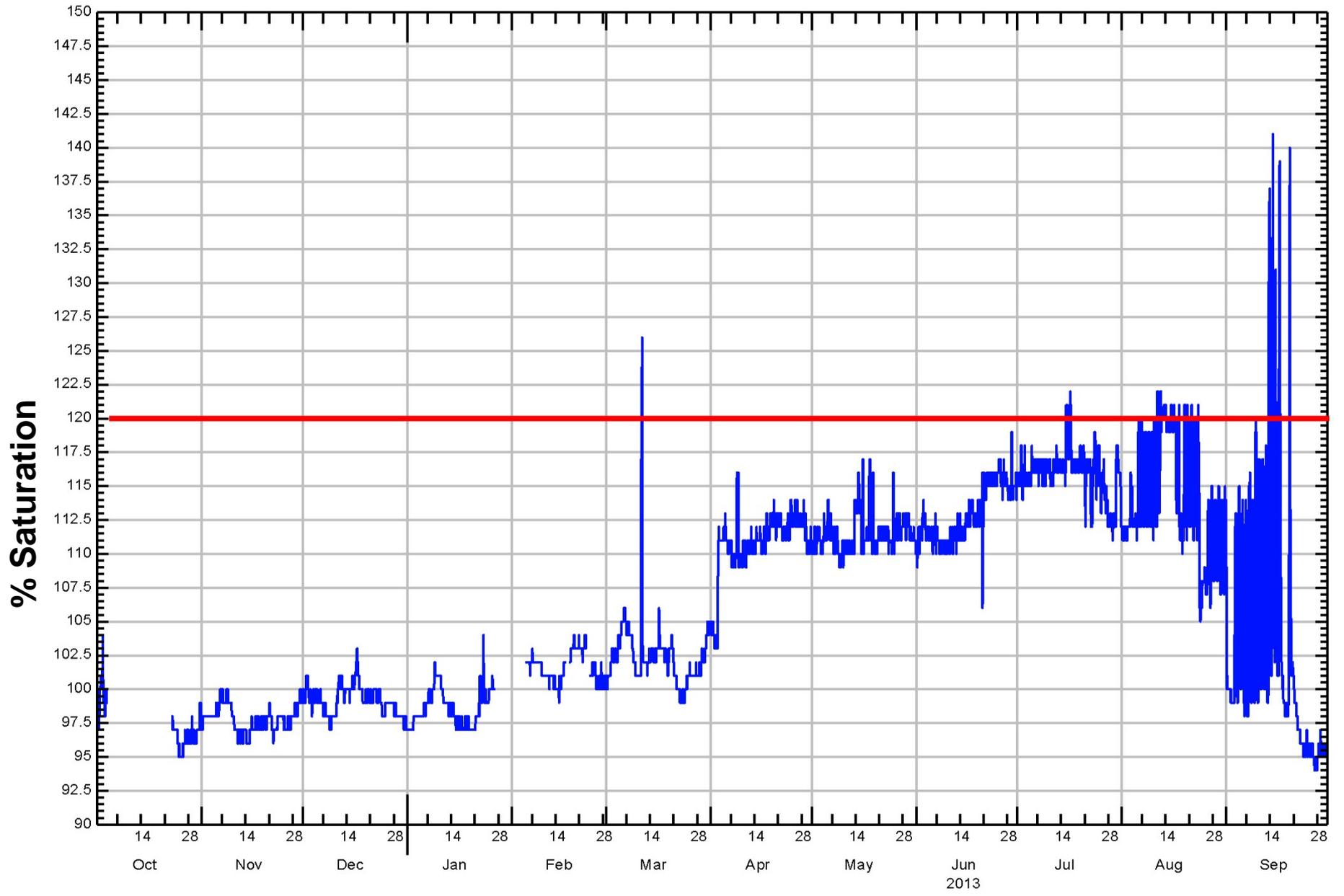
Lower Granite Dam Rd



13343590 LOWER GRANITE LK FOREBAY AT LOWER GRANITE DAM, WA (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1



Lower Granite Forebay



13343595 SNAKE RIVER (RIGHT BANK) BL LOWER GRANITE DAM, WA (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1

Lower Granite Tailwater



LGSA & LGSW

Snake River at Little Goose Dam



13343860

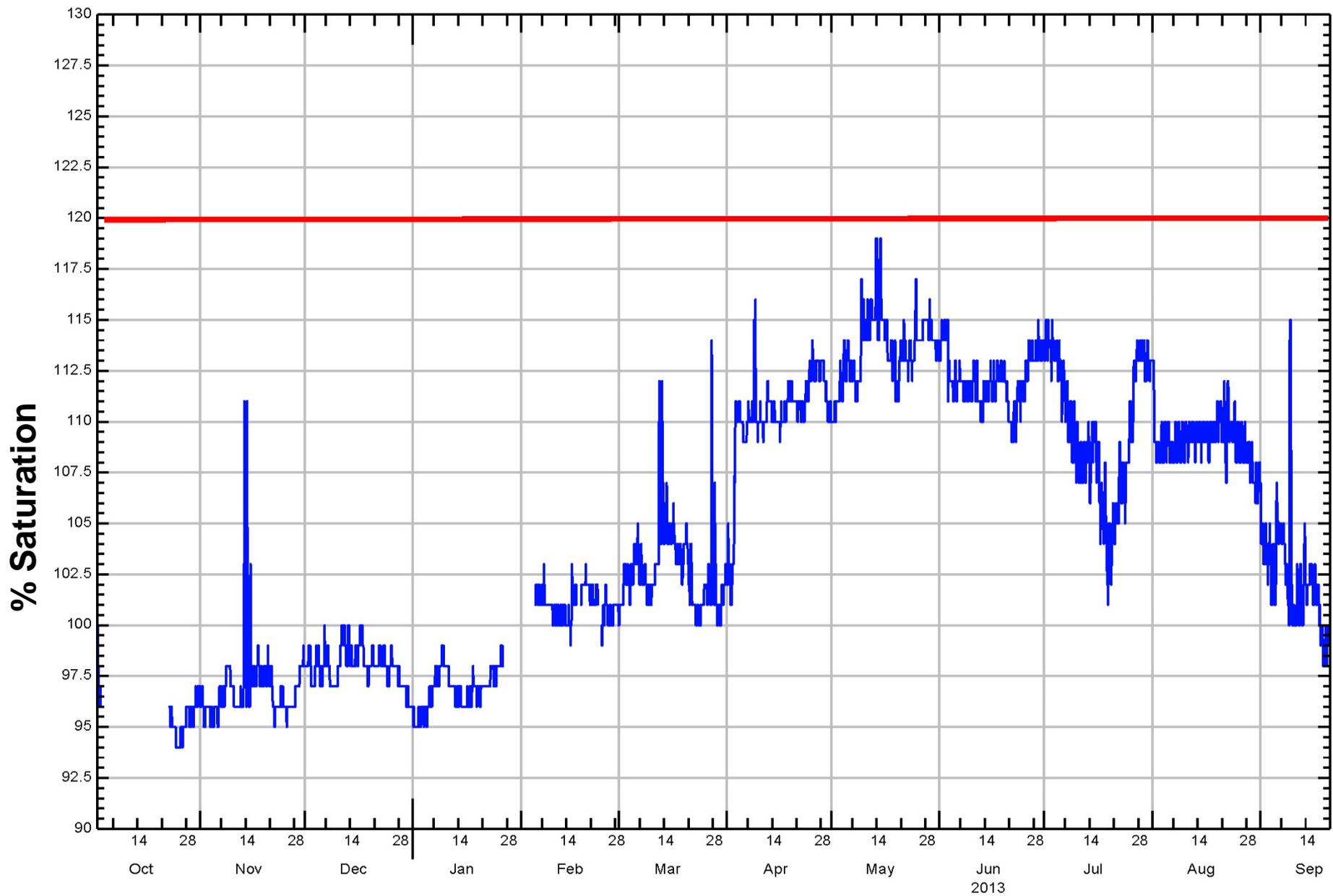
13343855



13343855 LAKE BRYAN FOREBAY AT LITTLE GOOSE DAM, WA (Pressure, diss gases PUBLISHED (\$), COMPUTED) * 1



Little Goose Forebay



13343860 SNAKE RIVER BELOW LITTLE GOOSE DAM, WA (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1



Little Goose Tailwater

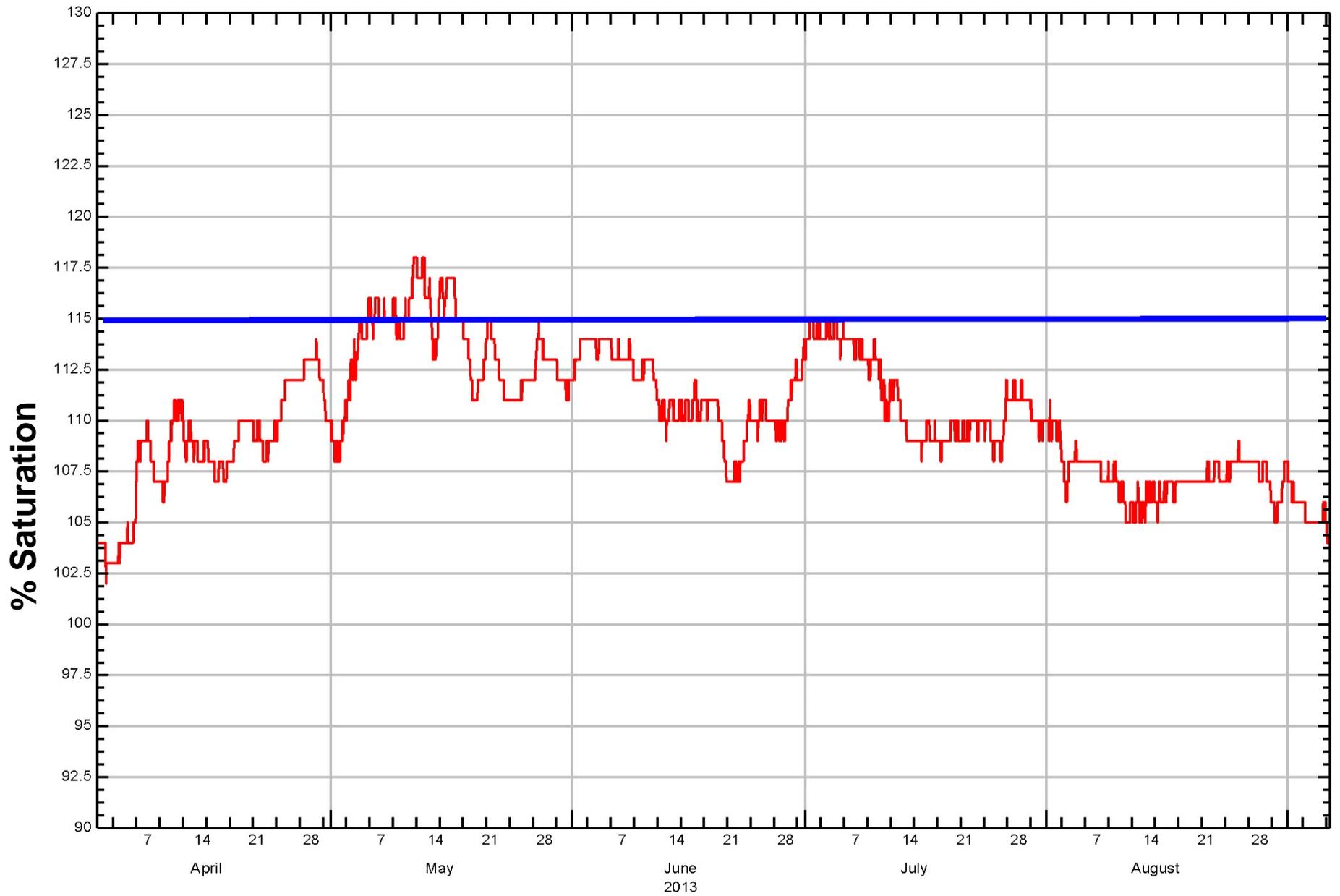
LMNA & LMNW

Snake River at Lower Monumental Dam



13352595

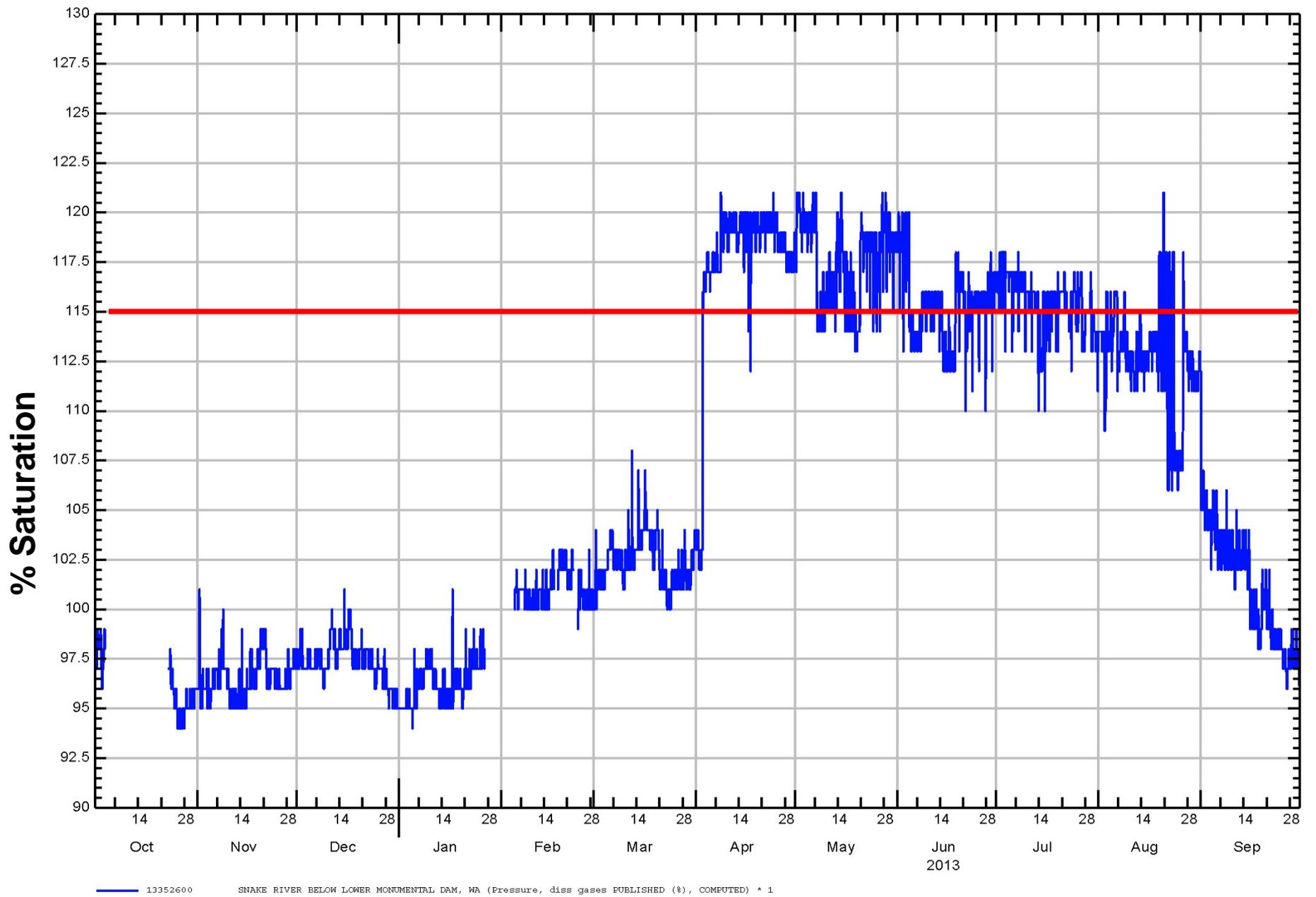
13352600



13352595 LAKE H G WEST FOREBAY AT LOWER MONUMENTAL DAM, WA (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1

Lower Monumental Forebay





13352600 SNAKE RIVER BELOW LOWER MONUMENTAL DAM, WA (Pressure, diss gases PUBLISHED (*), COMPUTED) * 1



IHRA & IDSW

Snake River at Ice Harbor Dam



13352950

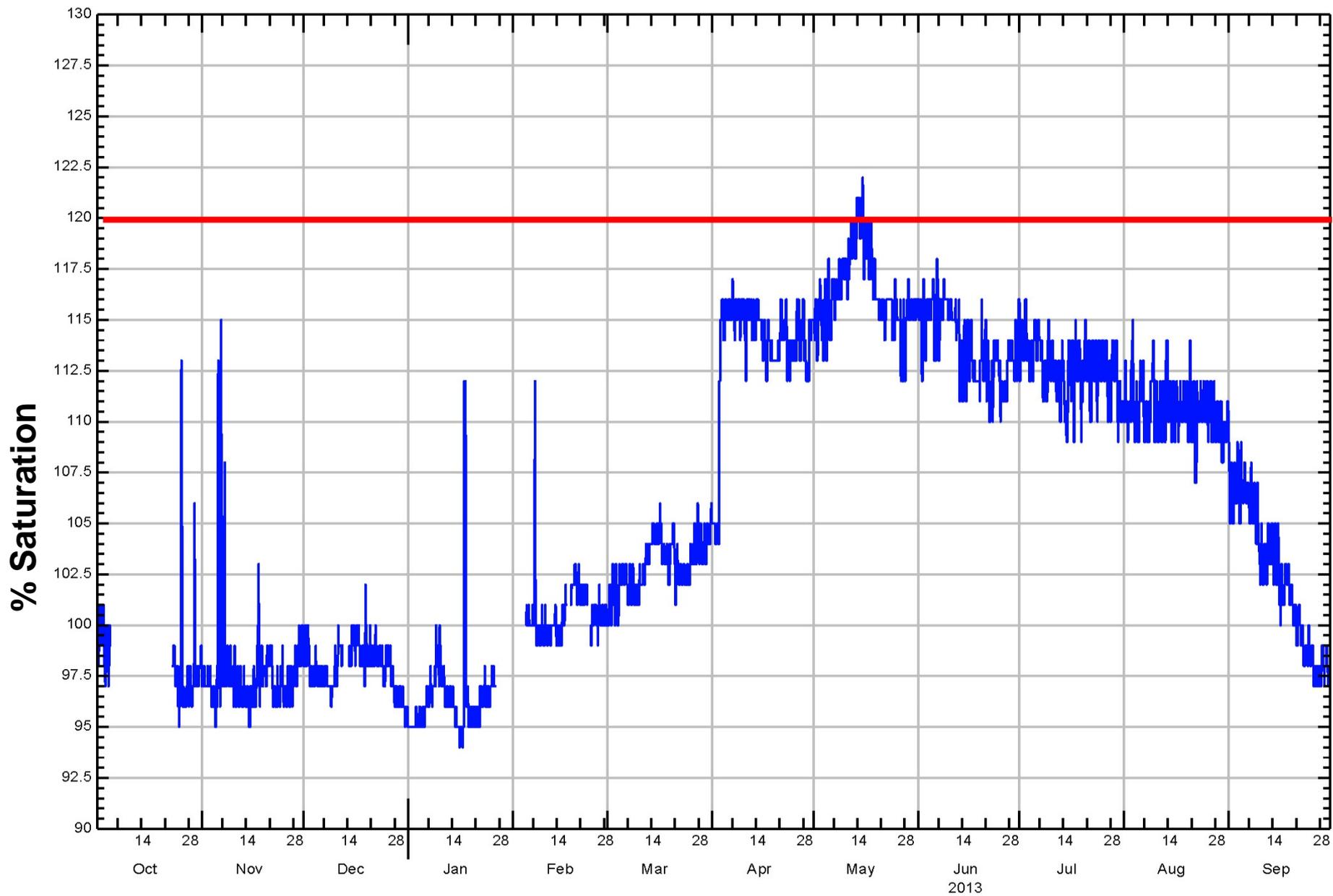
13353010



13352950 LAKE SACAJAWEA FOREBAY AT ICE HARBOR DAM, WA (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1



Ice Harbor Forebay



13353010 SNAKE RIVER EL GOOSE ISLAND EL ICE HARBOR DAM, WA (Pressure, diss gases PUBLISHED (*), COMPUTED) * 1

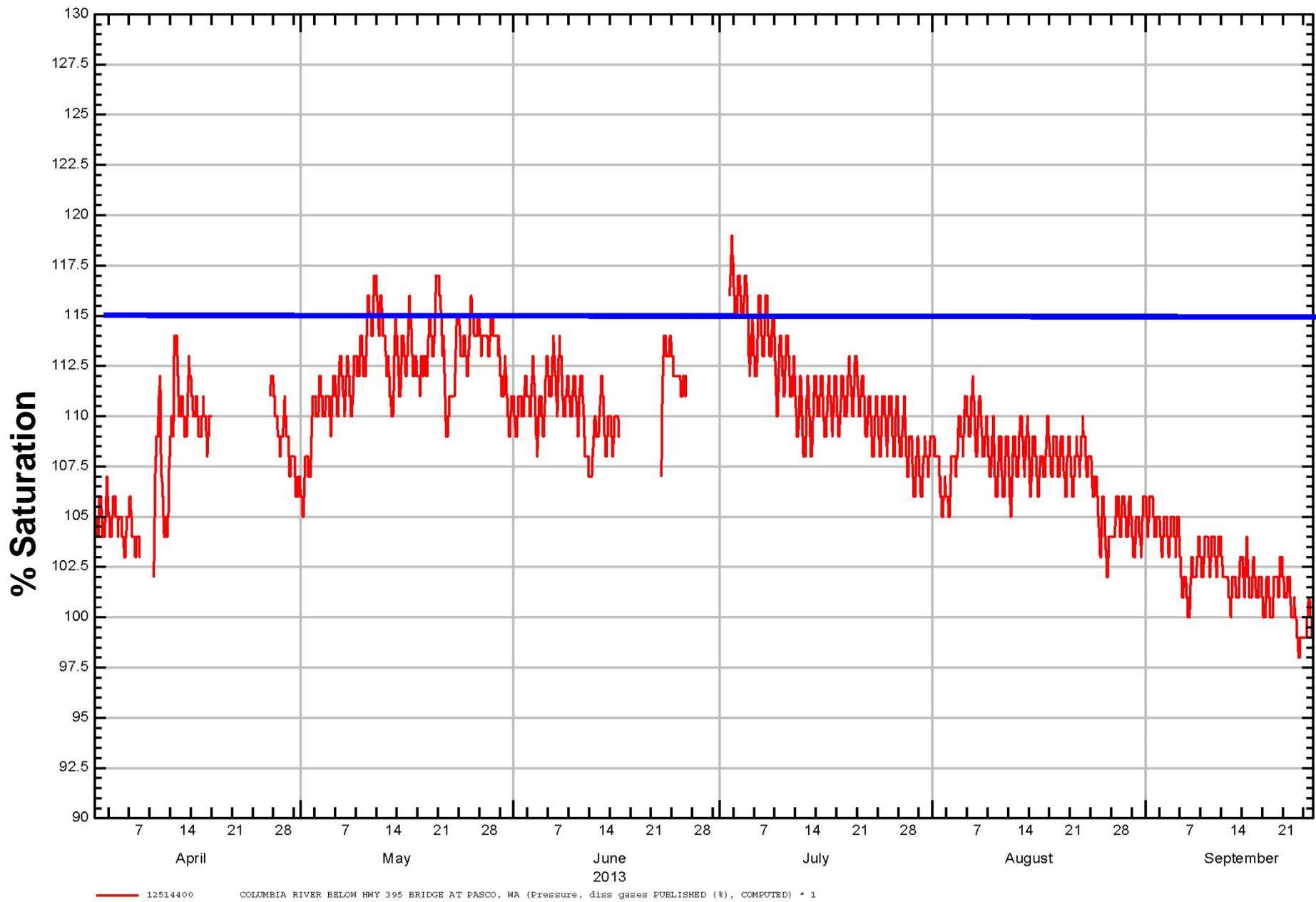


Ice Harbor Tailwater

PAQW – Columbia River at Pasco, WA



12514400



12514400 COLUMBIA RIVER BELOW HWY 395 BRIDGE AT PASCO, WA (Pressure, diss gases PUBLISHED (\$), COMPUTED) ^ 1

Pasco



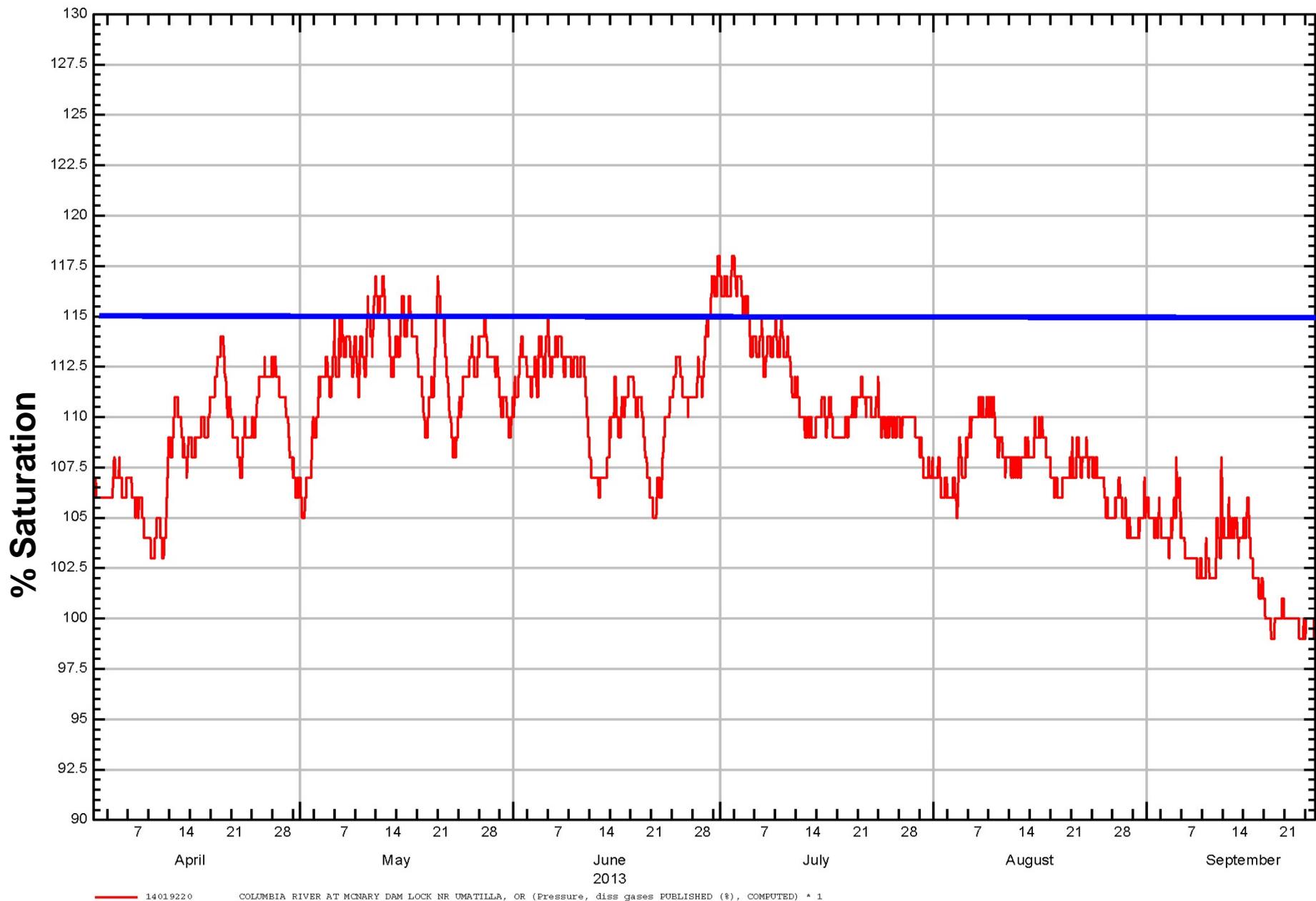
MCNA & MCPW

Columbia River at McNary Dam



14019240

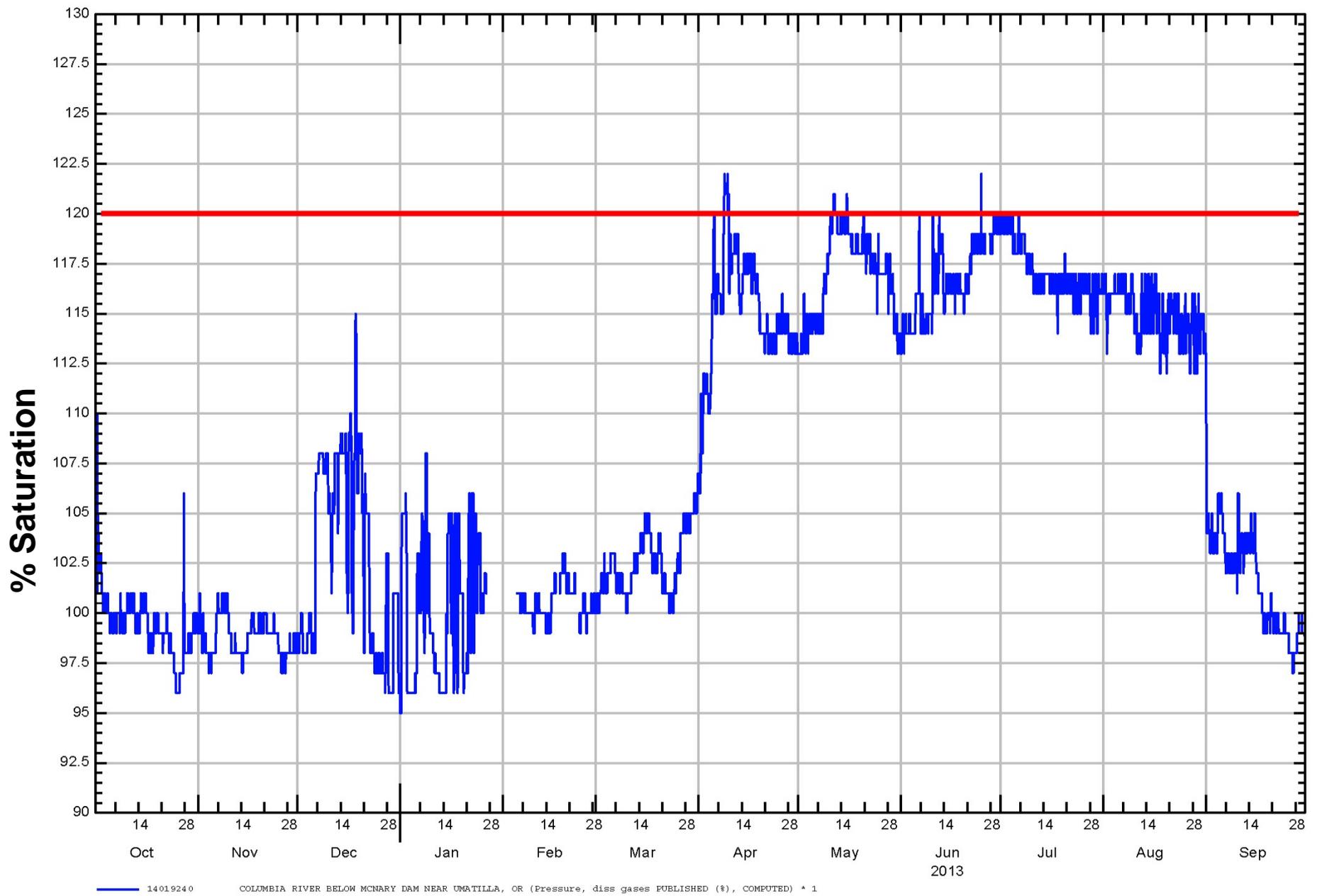
14019220



14019220 COLUMBIA RIVER AT McNARY DAM LOCK NR UMATILLA, OR (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1

McNary Forebay



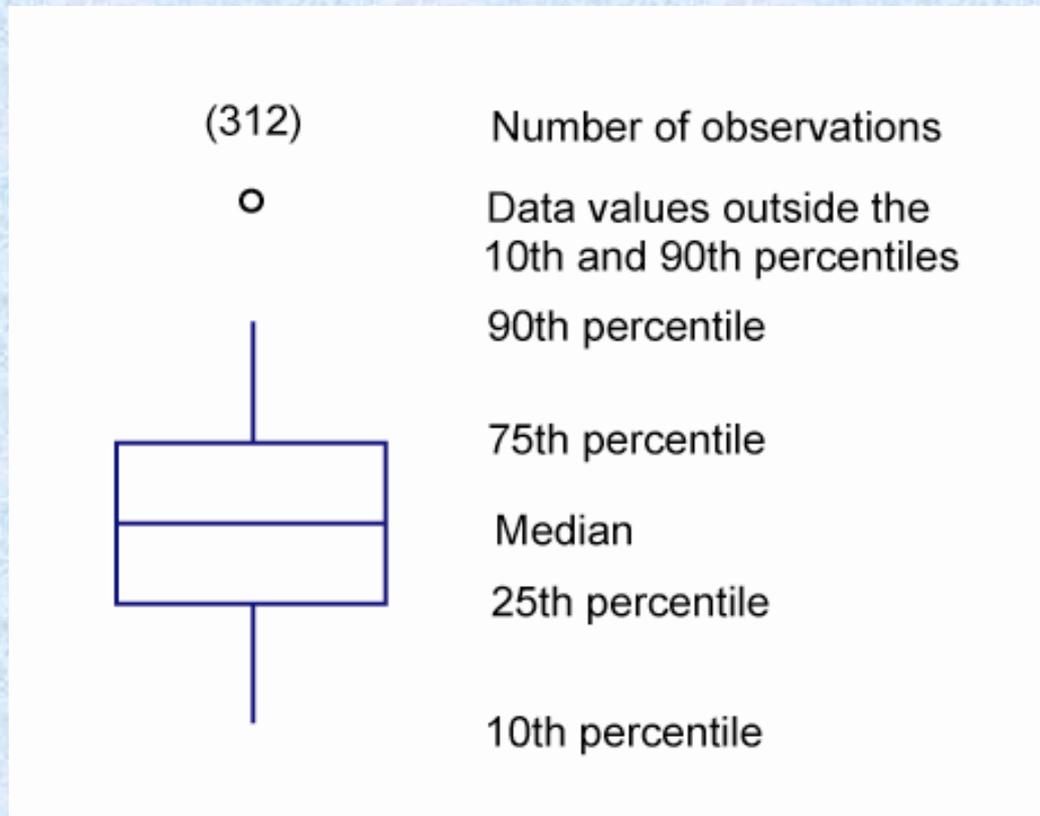


14019240 COLUMBIA RIVER BELOW MCNARY DAM NEAR UMATILLA, OR (Pressure, diss gases PUBLISHED (%), COMPUTED) * 1

McNary Tailwater

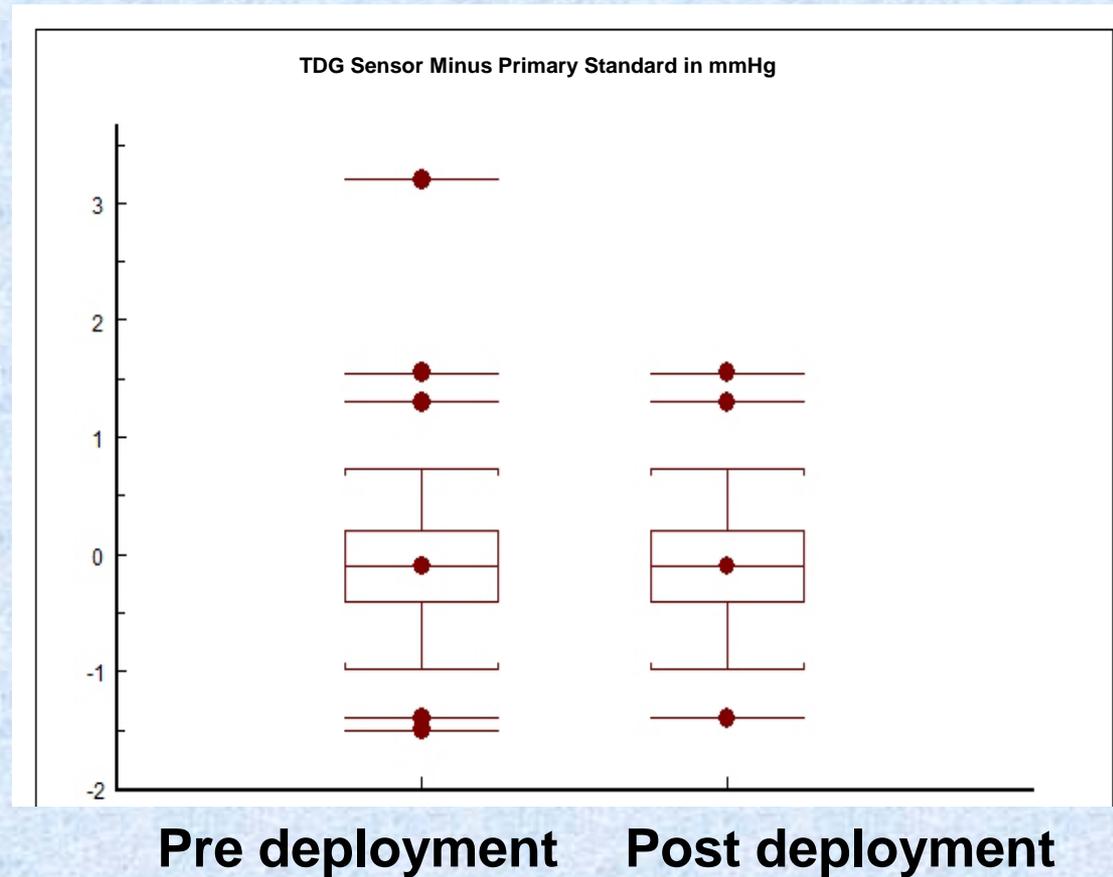


Explanation of a Boxplot



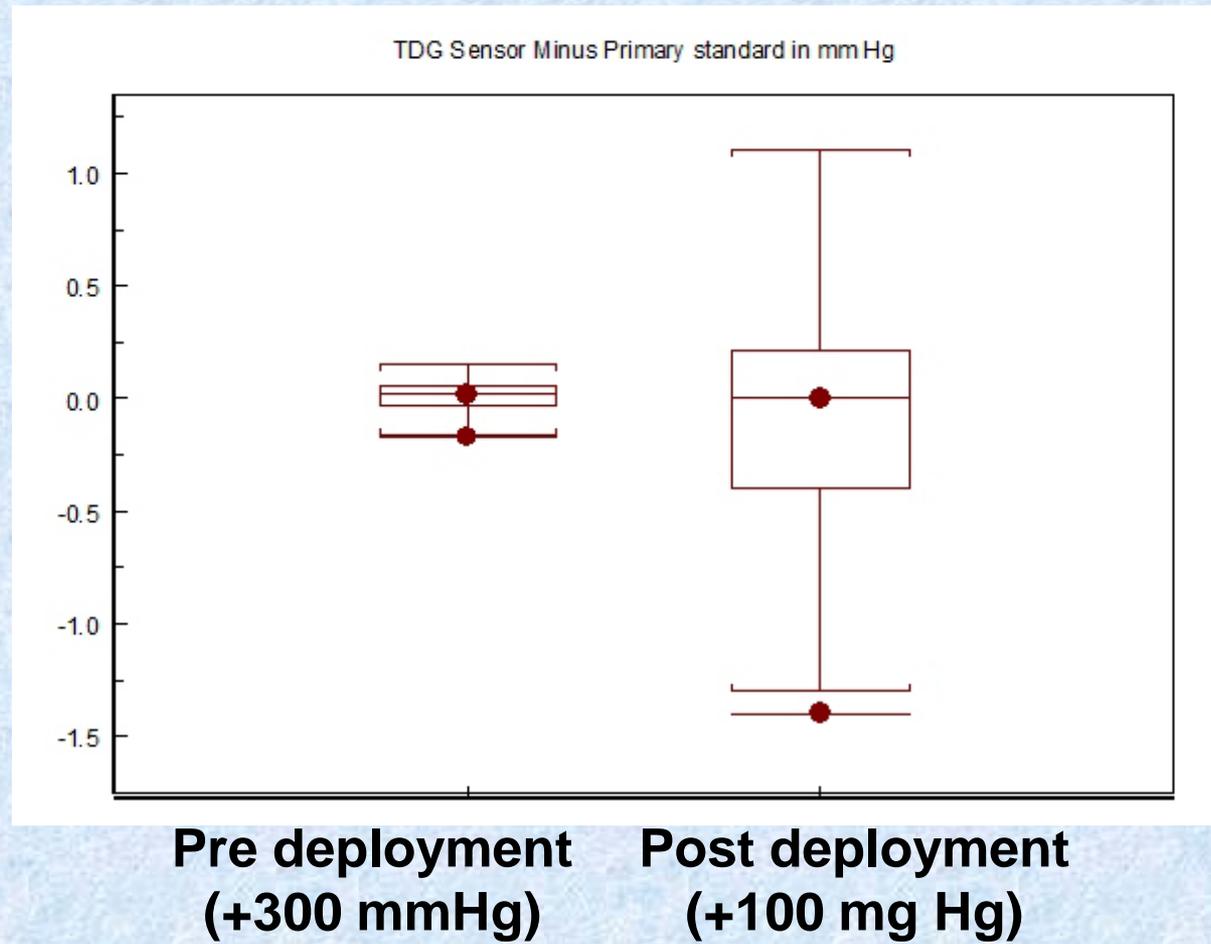
TDG Sensor vs Primary Standard

Barometric Pressure



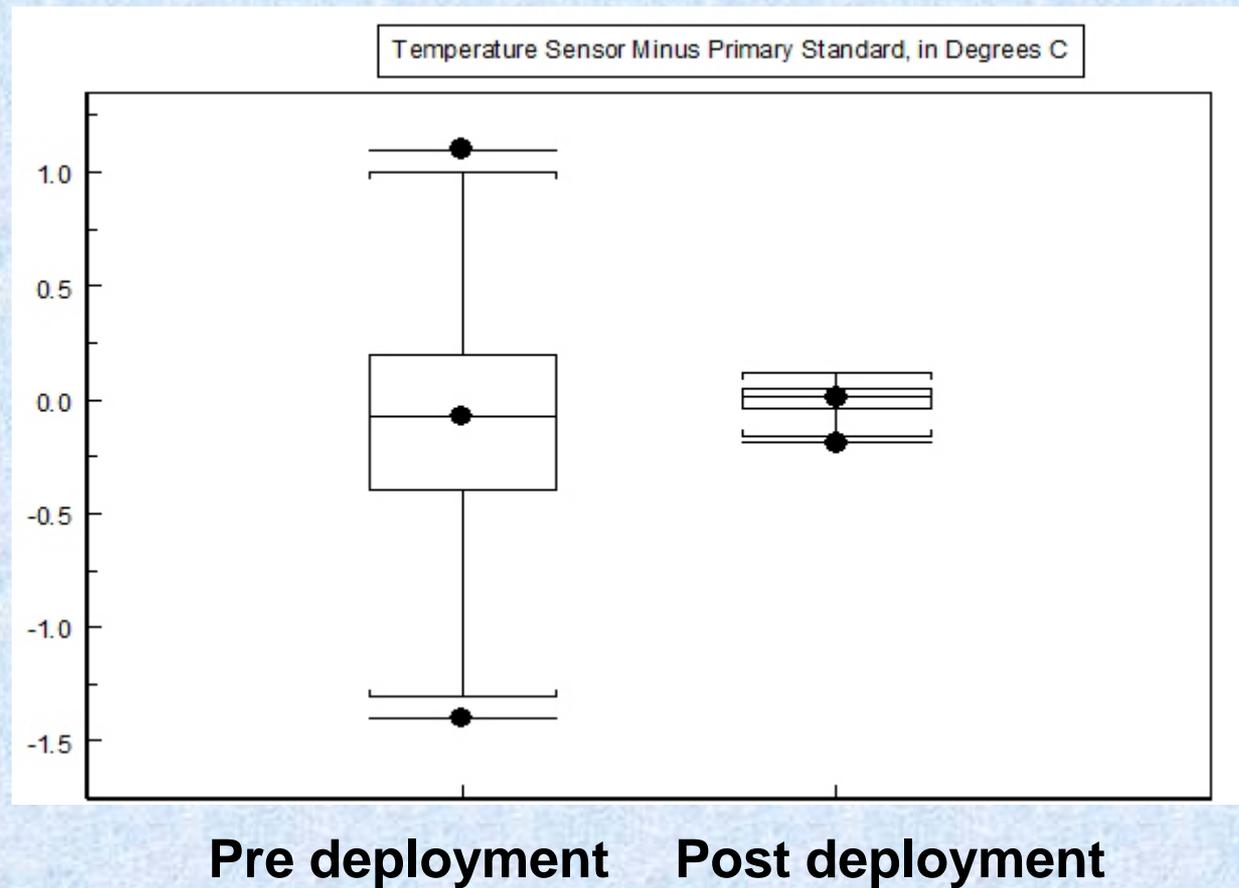
TDG Sensor vs Primary Standard

Barometric Pressure + 300 or 100 mm Hg



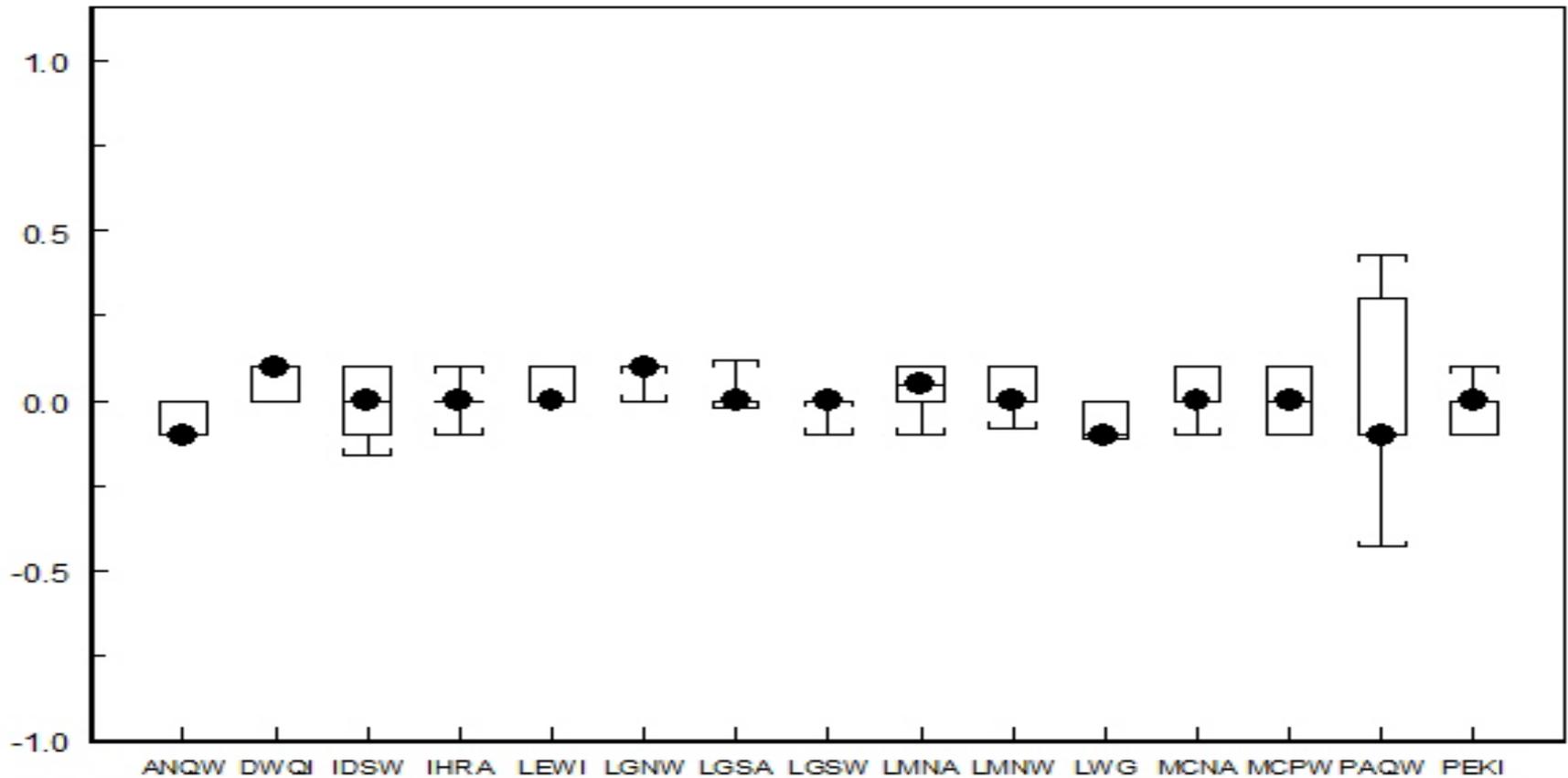
Temperature Sensor vs Primary Standard

Water temperature



In-Place Barometer vs Secondary Standard Barometric Pressure

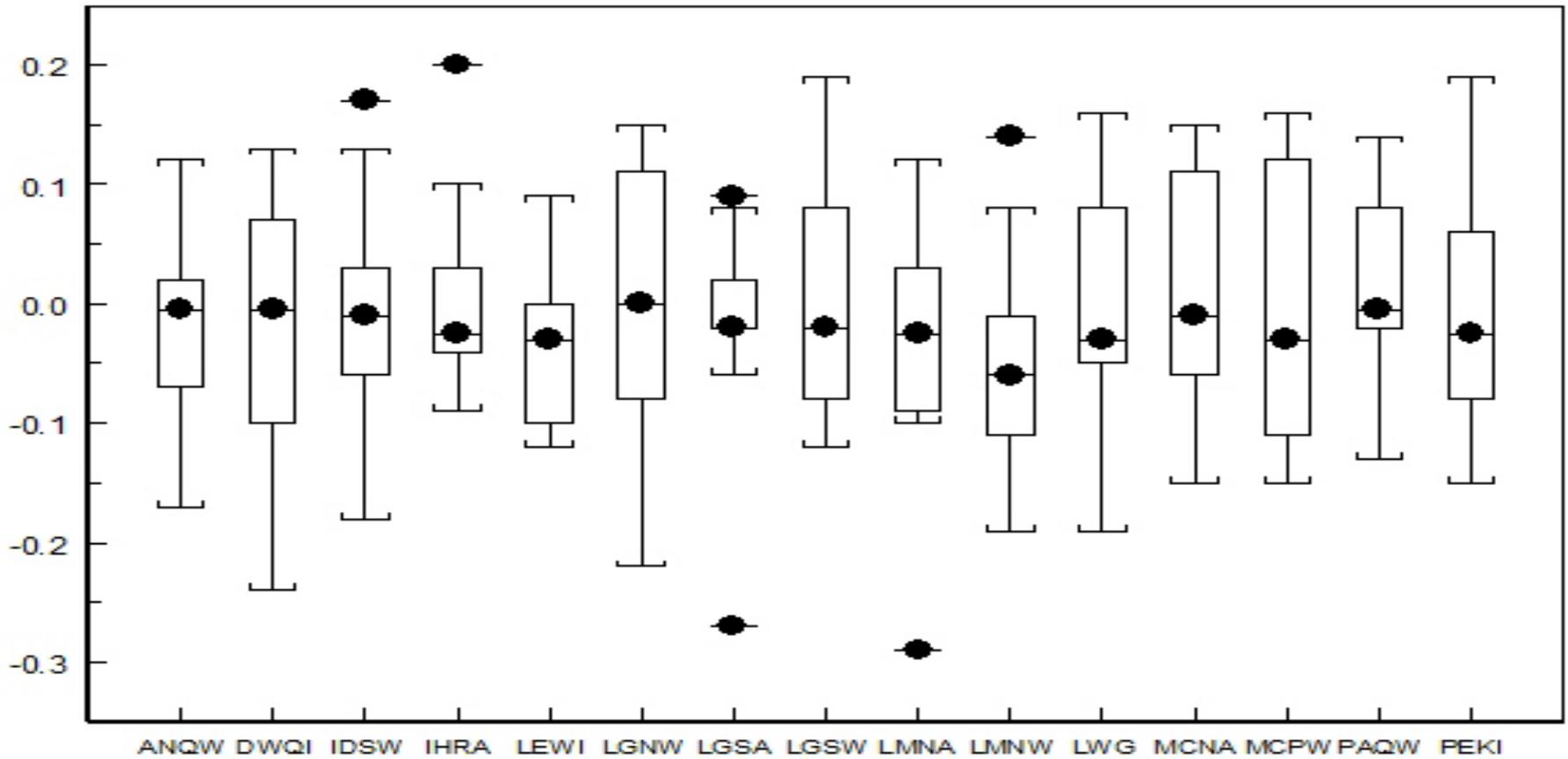
In-Place Barometer Minus Secondary Standard (Hand-Held Barometer), In mmHg



Temperature Sensor vs Secondary Standard

Water Temperature

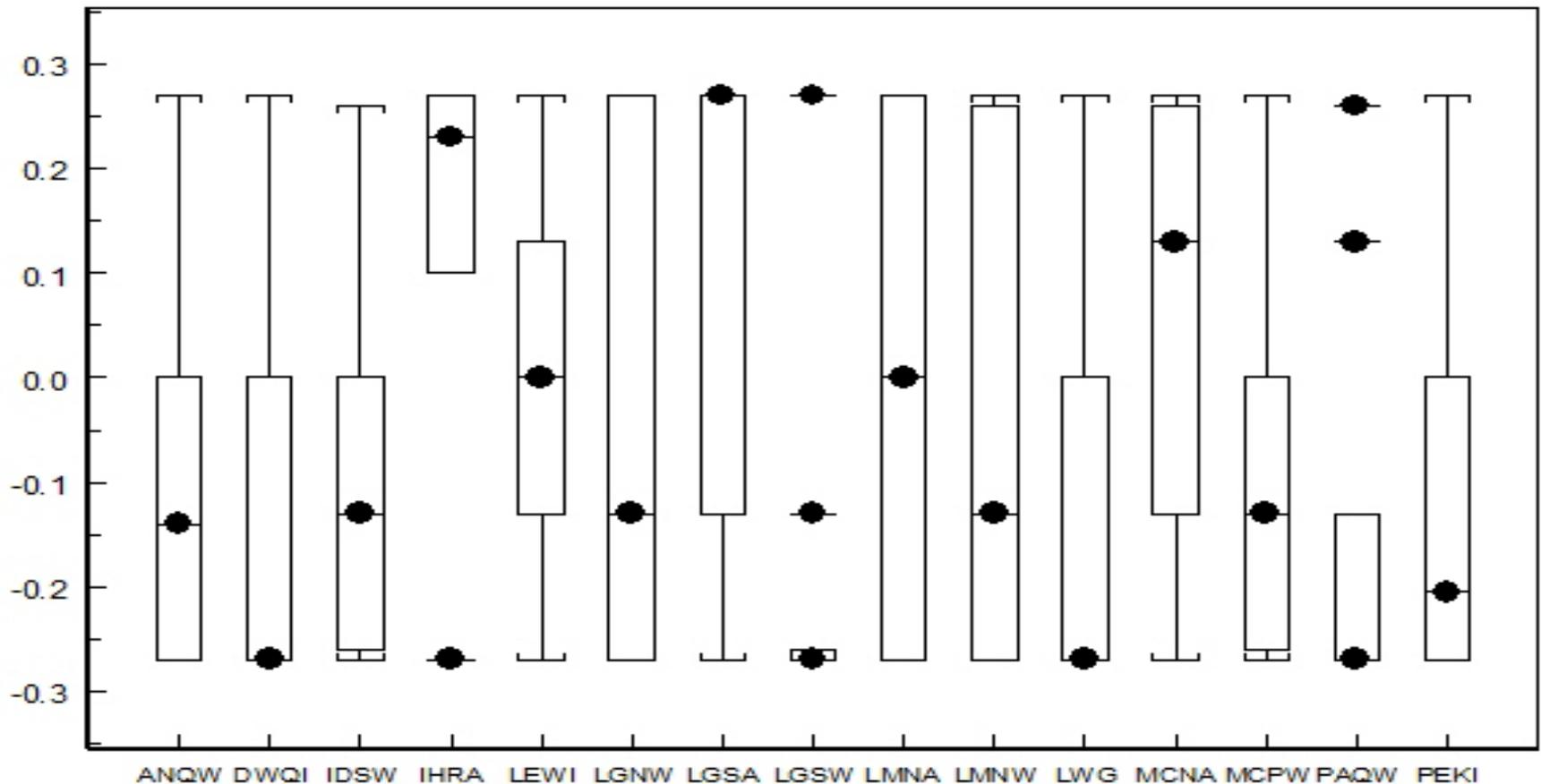
In-Place Temperature Minus Secondary Standard (Replacement Sensor). In Degrees C



TDG Sensor vs Secondary Standard

Difference in TDG (Percent Saturation)

In-Place TDG Sensor Minus Secondary Standard (Replacement Sensor), in Percent



Summary

- 15 sites: 6 year-round and 9 seasonal stations
- 2.5% missing/ anomalous data



Summary

Median differences between TDG Sensors vs. Primary Standards (performed in lab)

- **Barometric pressure**
 - Pre deployment: -0.1 mm Hg
 - Post deployment: 0.0 mm Hg
- **Water temperature**
 - Pre deployment: 0.02 °C
 - Post deployment: 0.01 °C



Summary

Median differences between TDG Sensors vs. Secondary Standards (performed in field)

Barometric pressure: 0.0 mm Hg

Water temperature: -.02 °C

TDG, in percent saturation: -0.1%

Which Site is this?

