Wells Hydroelectric Project
Total Dissolved
2014 Annual Report

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USACE TDG
Review

Portland OR

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Wells Dam

- Nameplate rating of ~ 774 MW and a peaking capacity of approximately 840 MW.
- Generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine.

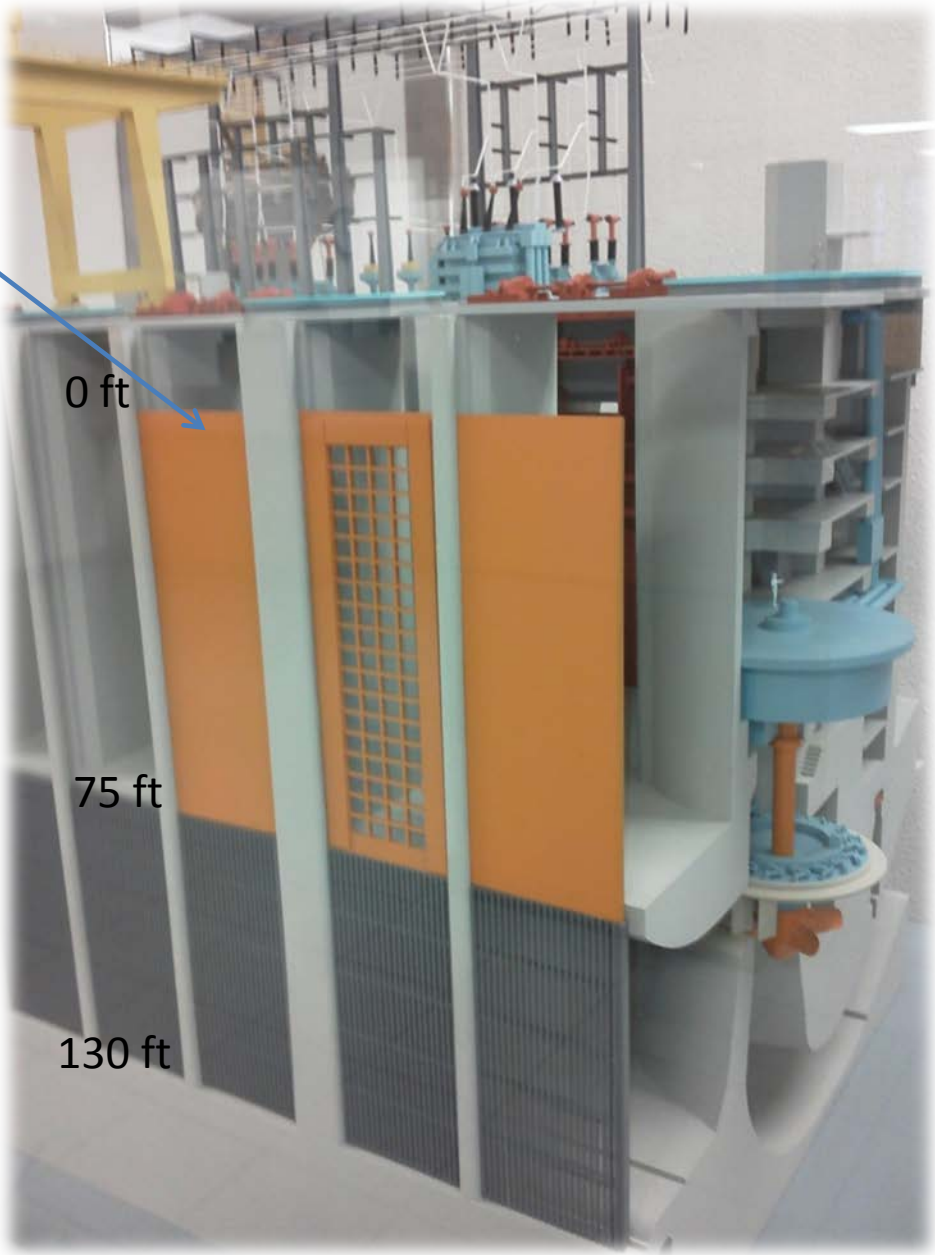
- **Incoming, forebay and tailrace TDG stations**
- **Report data to USACE year-round**
- **Data available at DCPUD.org**
- Bypass season: April 9th - Aug 19th
- PH capacity is roughly 180-200 kcfs if all units are working

JBS at Wells Dam

- The bypass consists of flow barriers placed in five of eleven spillbays (2, 4, 6, 8, and 10)
- 92% of the spring migration and 96% of the summer migration bypassed.
- Survival studies: >96%.

<u>Several features that allow for high guidance and survival of juveniles:</u>

- 10 turbine intakes very deep
- Situated immediately above the turbine intake are the 11 spillways.
- Fish hesitate to follow the water flowing into the deep turbine intakes.
- Instead follow modest spill flow.
- Vertical opening 16 ft wide and 70 ft deep
- The five bypass gates operate in conjunction to the operation of paired turbines immediately below.
- i.e, 6 turbines operating, those 3 gates located above are opened.



Year Round TDG Criteria

Ecology requirements once Fish Passage Waiver is obtained (110% otherwise):

1. **No hourly value above 125% in tailrace***

2. **12-C high (rolling 12 hour average) during any hour of the day in the Wells tailrace of 120%***

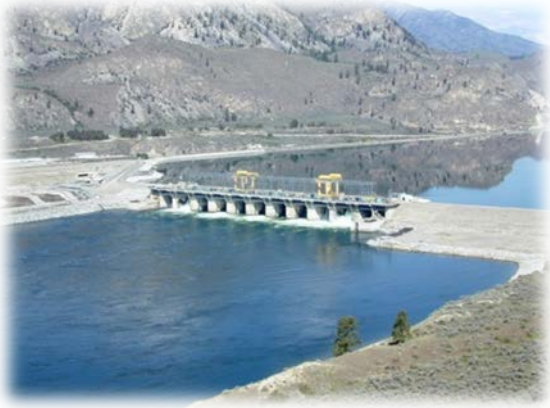
3. **12-C high (rolling 12 hour average) during any hour of the day in the Rocky Reach forebay of 115%***

- *If 7Q-10 flows are occurring violations not considered.

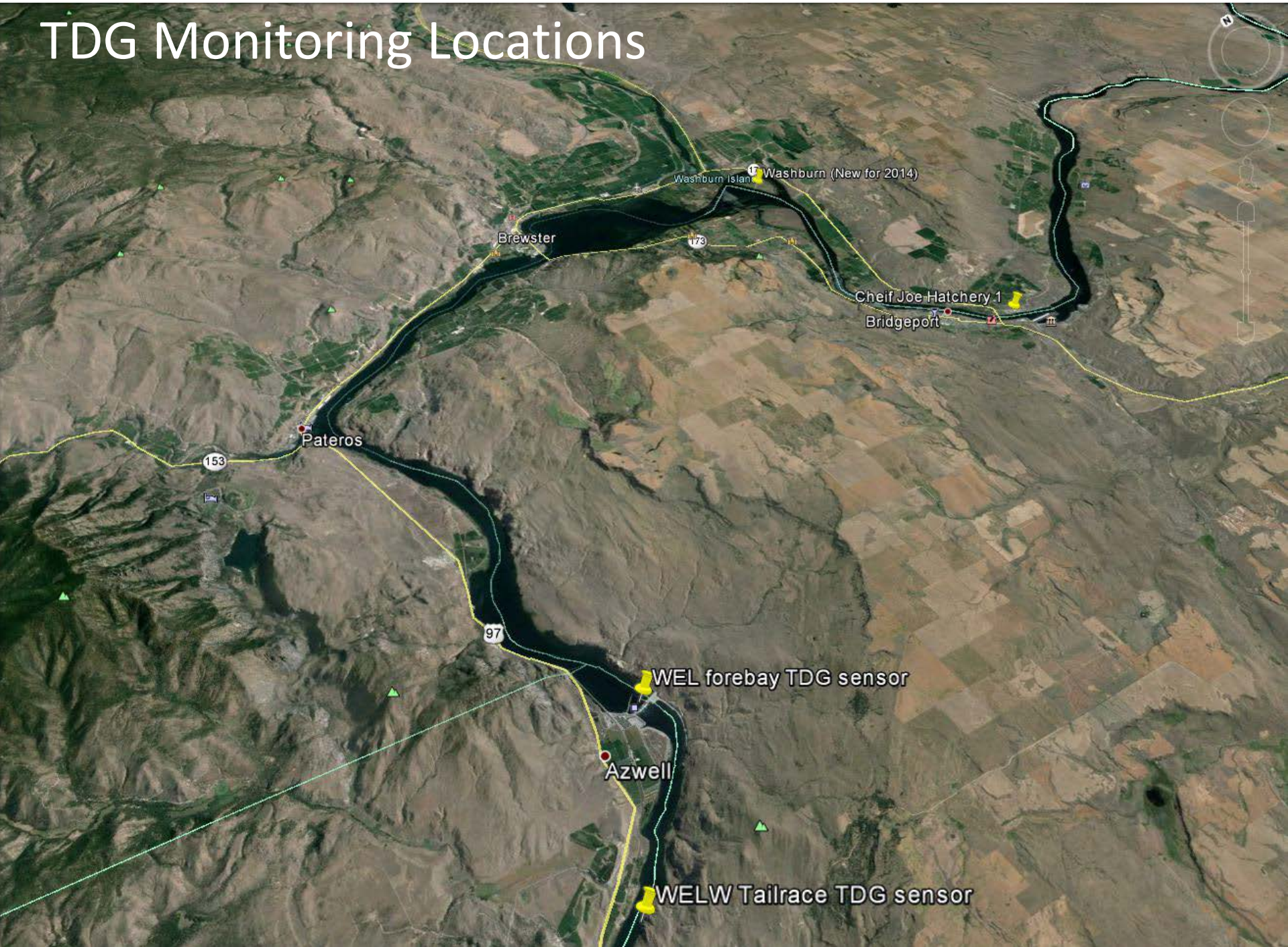
- *Also unwritten rule: If TDG is out of compliance incoming - as long as the project doesn't add any TDG, still in compliance (Not in the rule book however).*

Typically no problem with 110% WQS outside of fish passage season

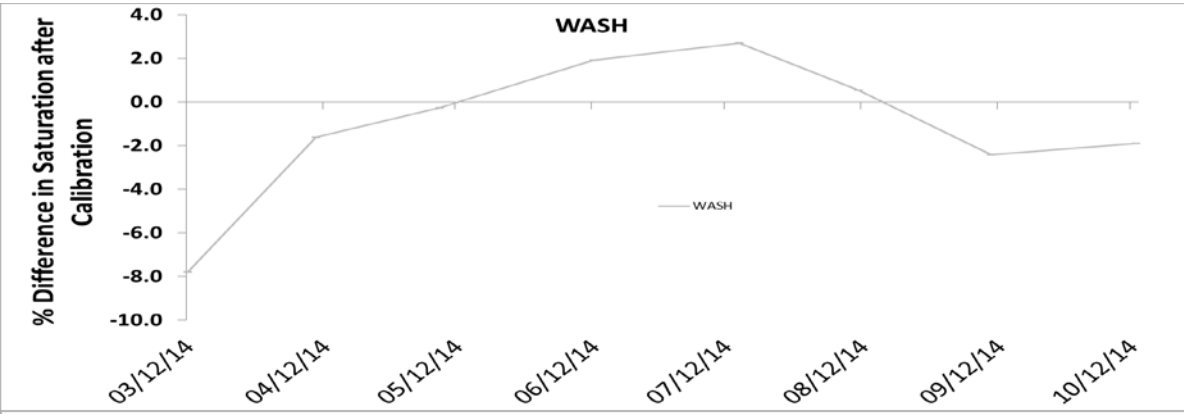
- Basically always in this range: 95-102%

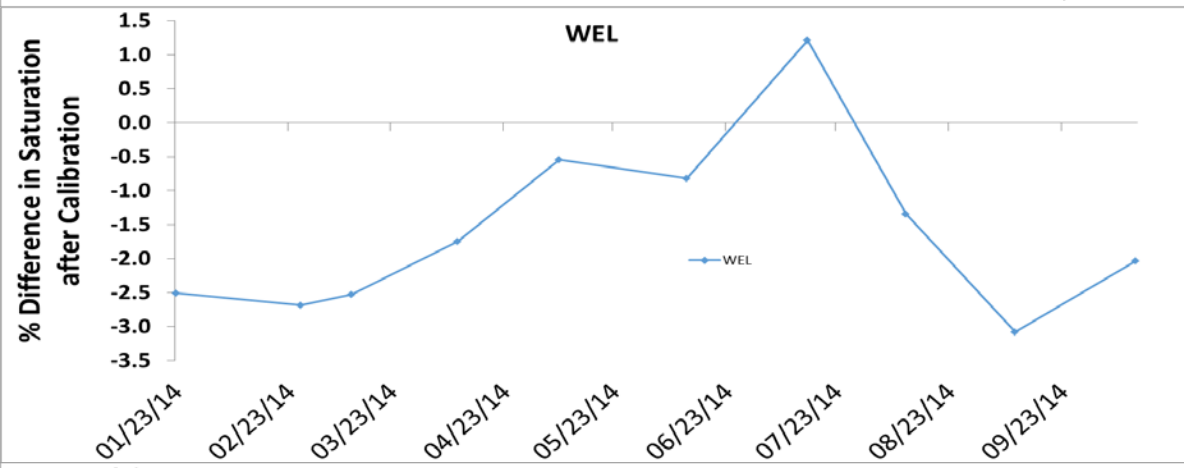


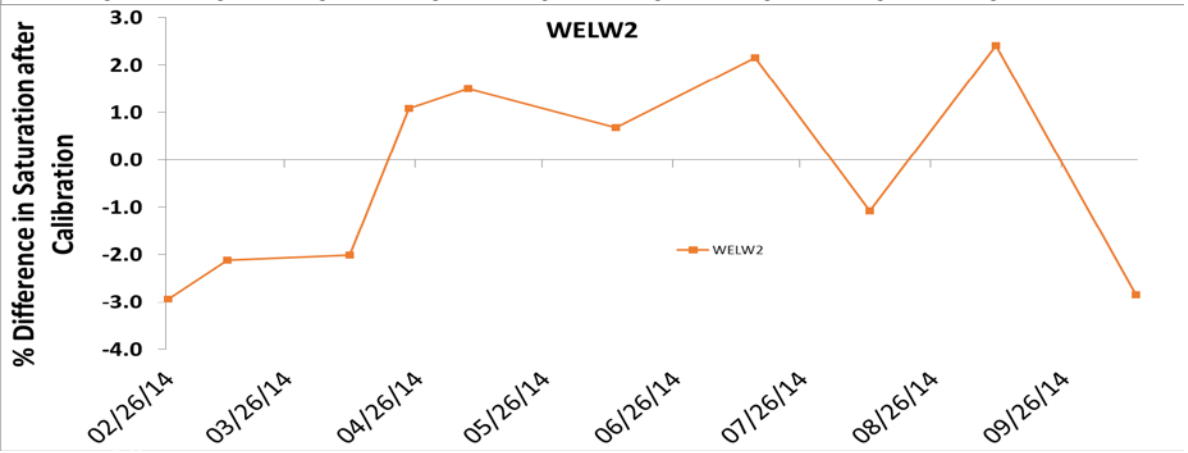
TDG Monitoring Locations



Calibration Performance







Average Difference after Calibration

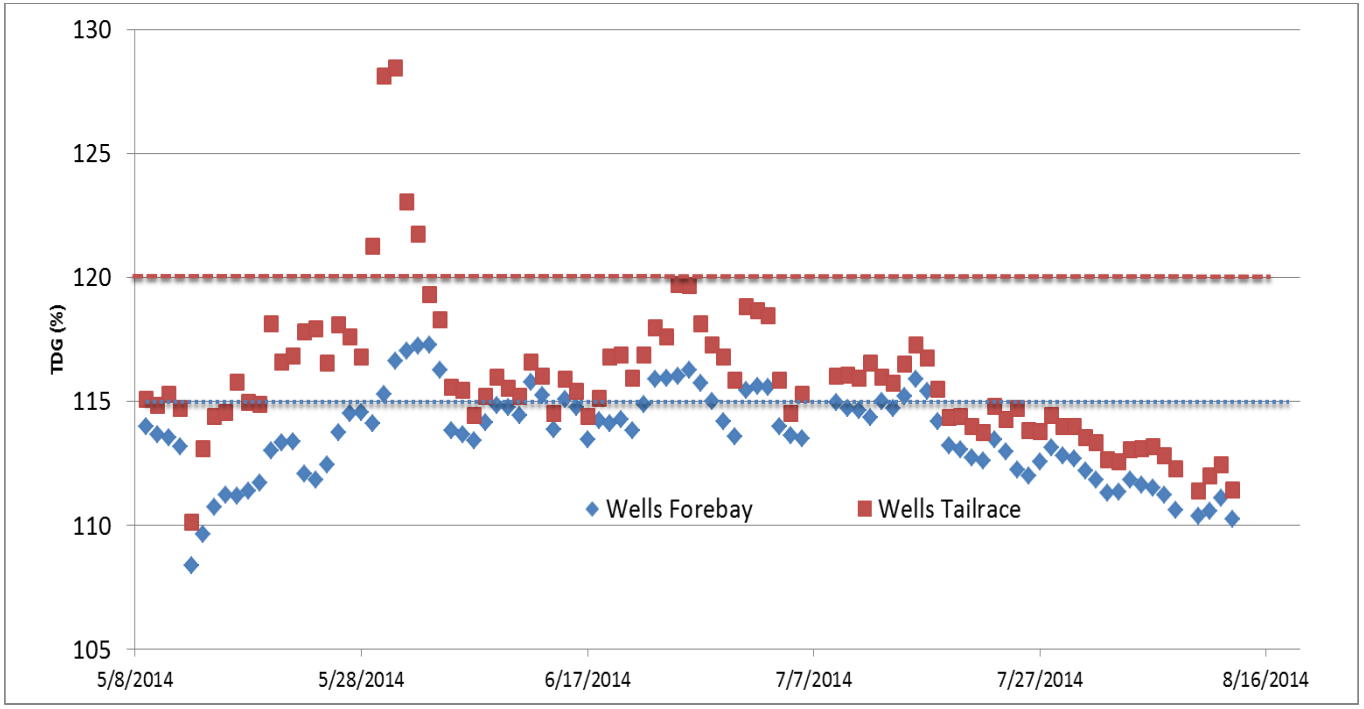
- Washburn -0.1 (with 3/12/14 outlier removed)
- Wells forebay -1.6
- Wells tailrace -0.3

2014 Compliance

- N = 5 d of 120% 12-C high violations
- N = 2 days where instantaneous values of 125% or higher were measured.

- Violations were a response to Regional Reliability Coordinator requests to reduce load as a direct result of a Malaga, WA wildfire that damaged transmission lines in Chelan County.
  - Reduced load constraints required 106 hours of spill volumes that averaged 54.3 kcfs and had maximum hourly mean spill values of 95 kcfs.

- **Aside from Regional Reliability Coordinator operational constraints, 100% compliant with 120% 12-C high WQS and 125% instantaneous WQS.**

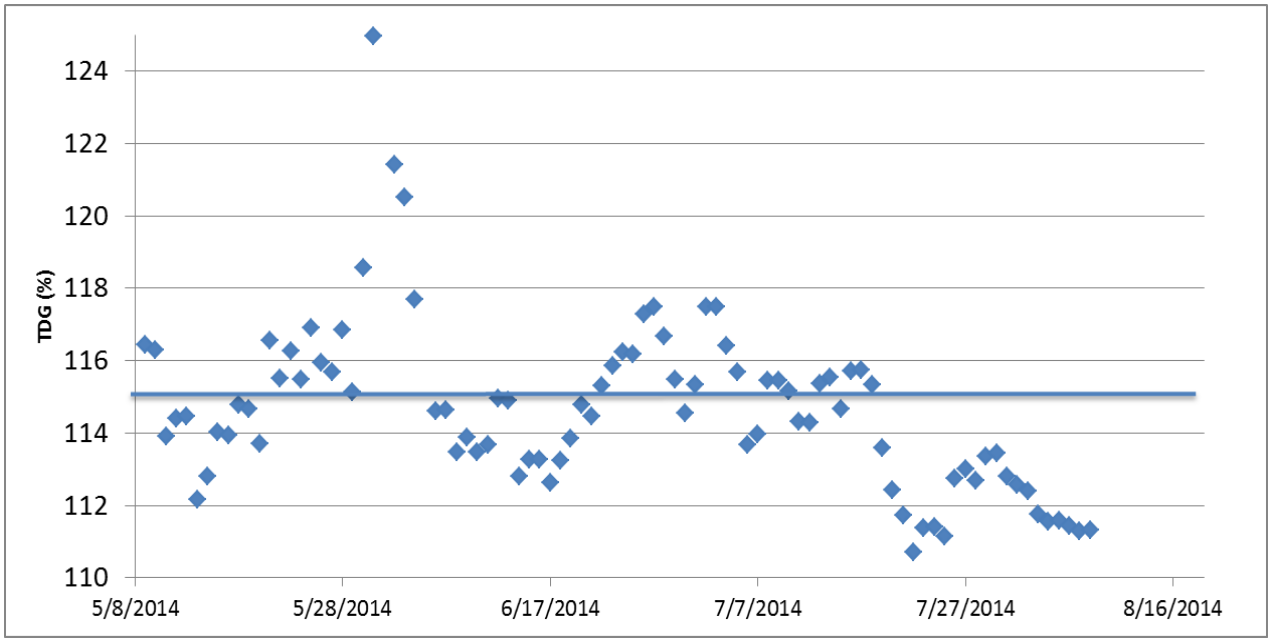


2014 Compliance

Rocky Reach Forebay 115% 12C-High standard

- N = 38 days of the spill season so far are over 115% 12-C high in the Rocky Reach forebay
- On N = 21 of those days Wells forebay 12-C high was already above 115%
- N = 5 days where standard was not met due to Malaga Fire

- Required JBS @ Wells = 10 kcfs of spill. Therefore, TDG always additive at Wells
  - Water arriving at 113% at the face of Wells Dam is problematic for Rocky Reach forebay 115% standard
  - E.g. Average TDG at the Wells Dam forebay from May 9th to July 7th = 113.4. Average TDG in the tailrace of Wells Dam over the same period 115.9%



Wells Dam - Unique WQ Challenges

- Limited storage (maybe not very unique).
  - GCL has 58 X storage capacity than Wells - 98K acre ft.
- First project downstream of federal projects.
  - Regulated differently than PUD projects. How are Ecology standards reconciled?
- **Hydrocombine:**
  - Highest downstream survival of smolts >96%.
  - Over 4 years of survival studies (93% juvenile survival standard and 97% adult).
  - However, JBS operates through spill and even small volumes of spill can add 1-3% TDG.
  - When incoming TDG is out of compliance and Douglas PUD adds even 0.1% Ecology determines DCPUD is in violation - even though JBS needs to run (required by HCP and NMFS).
    - Fighting regulatory standards, which conflict in this case.

Comments?

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