Wells Hydroelectric Project
Total Dissolved Gas Abatement Plan
2012 Annual Report

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Prepared for:

USACE TDG
performance meeting

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.

- **Forebay and tailrace TDG stations**
- **Report data to USACE March through August**
- **Moving to year-round monitoring in 2013**
- Bypass season: April 9th from 0000 to Aug 19th 1200
- JBS in spillways 2, 4, 6, 8, and 10
- 96% juvenile bypass efficiency
- PH capacity is roughly 180-200 kcfs if all units are working

TDG Criteria

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

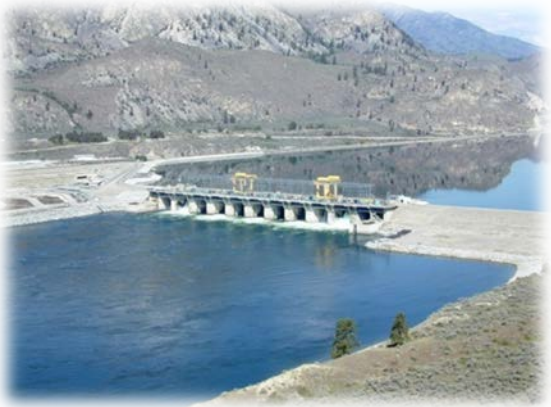
1. **No hourly value above 125% in tailrace***

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).*



2012 Compliance

1. Wells Tailrace 125% hourly standard

- Exceeded for 752 hours on 41 of 130 days.
- On 38 of the 41 days: 7Q-10. **(n = 3 days; 98% compliant).**
- *On the remaining 2 days forebay exceeded 110% and 115% on one of the two days.*

In my humble opinion - probably the most important criteria for fish

2. Wells Tailrace 120% 12C-High standard

- Exceeded 65 days during the 130.
- On 51 of those 65 days: 7Q-10 **(n = 14 days; 89% compliant).**
- *On all 14 of those days received water above 110% and on five of those days above 115%.*

3. Rocky Reach Forebay 115% 12C-High standard

- Exceeded 98 of 125 days.
- Of the 98 days 57: 7Q-10. **(n = 41 days; 67% compliant).**
- *Of the remaining 41 days, Wells forebay exceeded 110% on 24 days and exceeded 115% on 17 days.*

Compliance Summary

- **84.73% during the 2012 fish passage season**.
- Exceptionally high given:
  - 3rd highest flows on record.
  - Reduced turbine capacity: unscheduled maintenance U6 and the continued unscheduled delay in rebuilding U7.
  - compliance average was at or near 100% if incoming TDG 'violations' were factored into the compliance analyses.

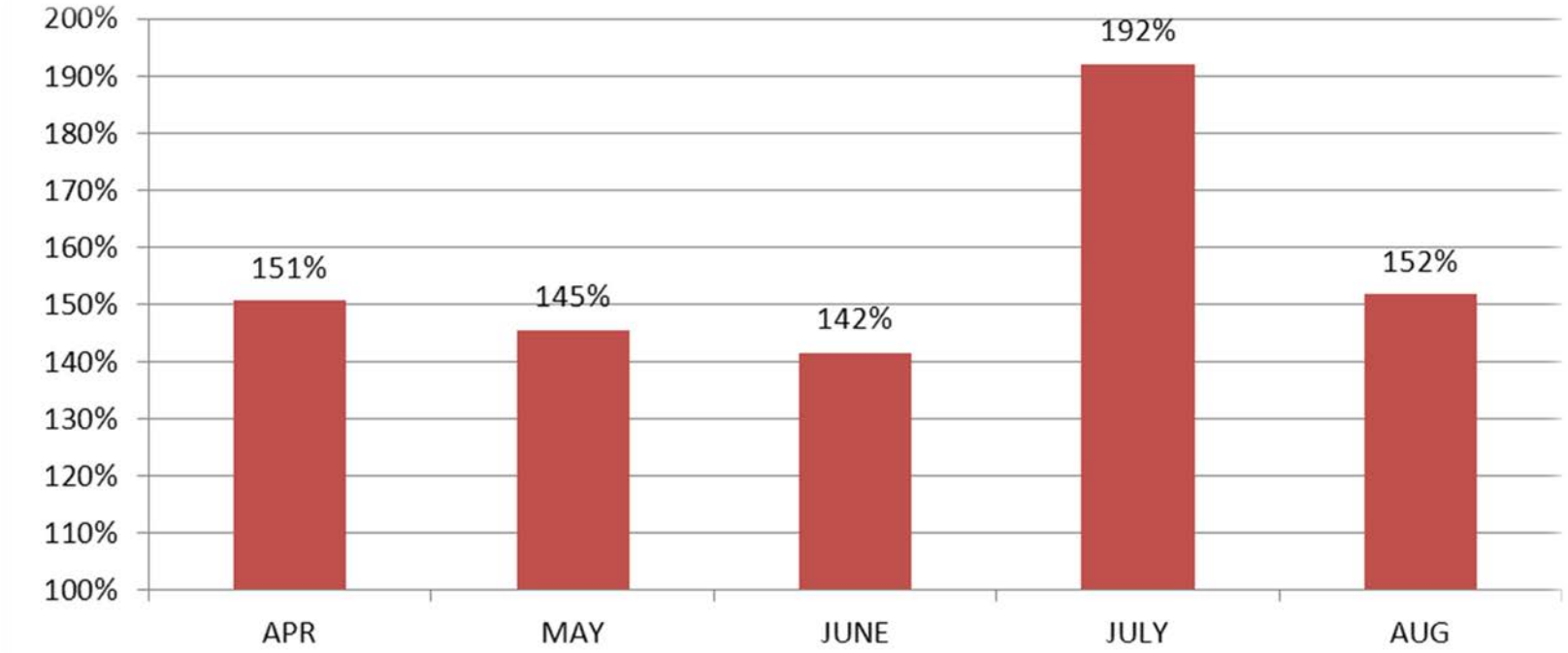
Wells Dam - Unique WQ Challenges

- 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?
- **<u>Hydrocombine:</u>**
  - 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.

2012 River Conditions at Wells

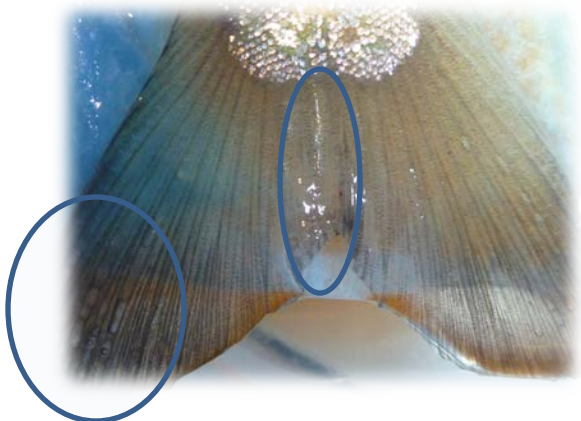
Month	Mean Q 1969- 2011 (kcfs)	Mean Q 2012 (kcfs)	Percent Difference from 42-year Average
April	115.6	174.1	+151%
May	149.4	217.2	+145%
June	164.5	232.9	+142%
July	132.2	253.8	+192%
August	104.6	158.7	+152%

- **3rd highest volume of water passing Wells Dam since 1968** through the fish passage season (April-Aug).
- **July almost twice as much Q as typical month of July**.

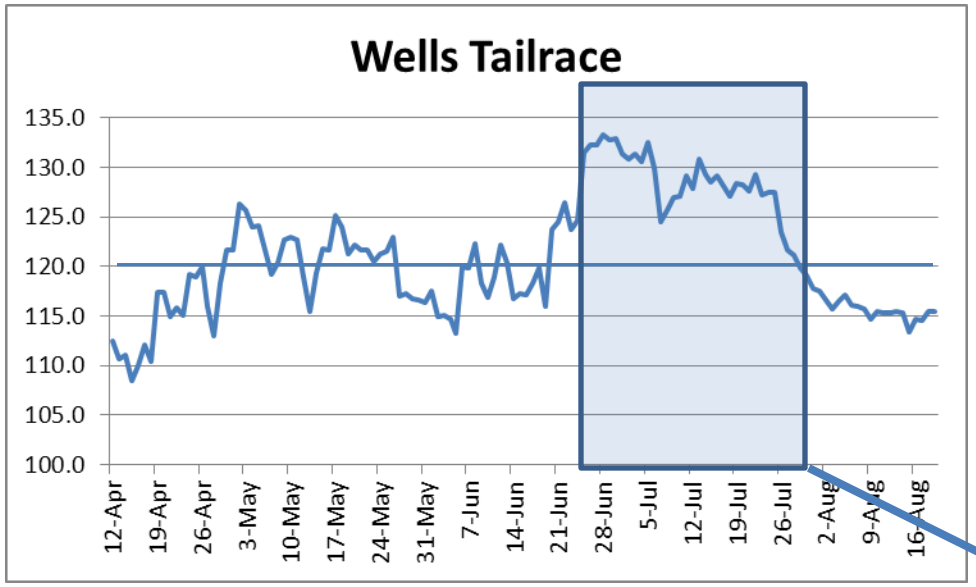


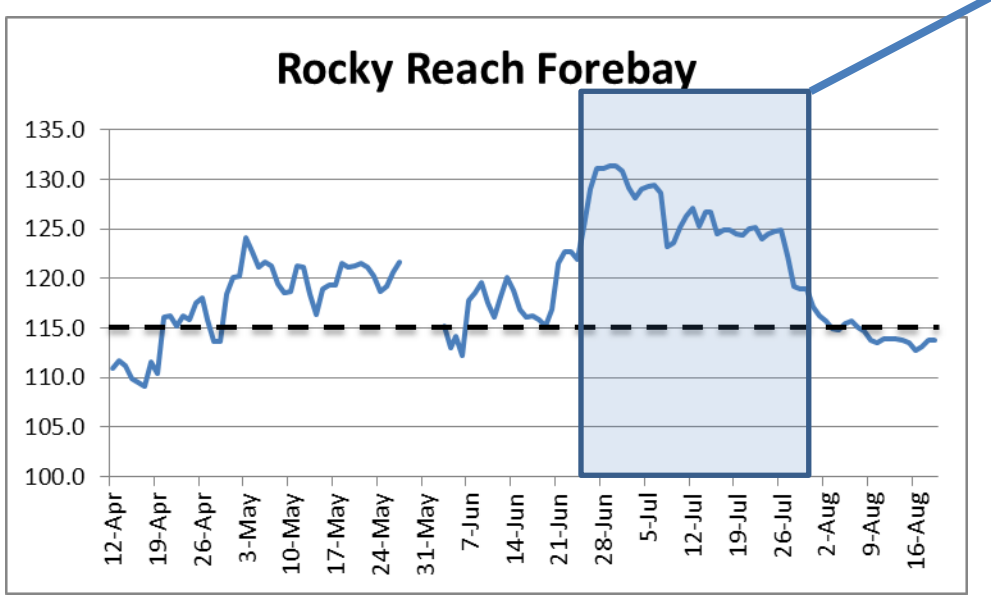
Biological Monitoring - Required by GAP

- Sample juveniles at RRJBS on subsequent day of 125% hourly violation. Adults on same day as violation at Wells.
- **Results:**
- Sampled juveniles on 24 days over a three month span (May 3 to July 25).
    - An average of 23 ±18 (standard deviation) juveniles were sampled on each of these days, across a TDG range of 118.1-130.6% (daily mean; Rocky Reach forebay).
    - 562 juveniles.
    - 7 of them showing signs of **GBT expression (1.2% in juveniles)**.
- **over 800 adult salmon - none showing signs of GBT**. Even when 125% in the Wells tailrace.



Daily Averages





Almost all 7Q-10 (no violation).

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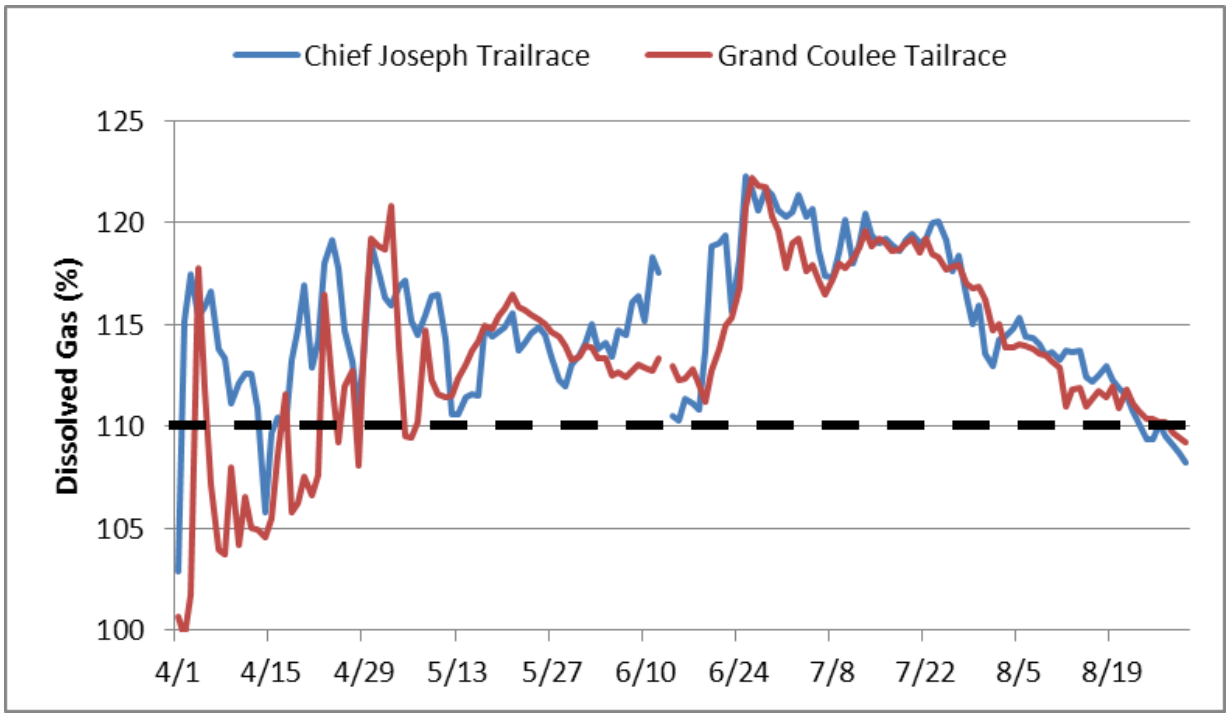
Upstream Achievements and Challenges?



- Federal projects did a great job of keeping TDG below 125% in 2012. Because of this Wells had 98% compliance in tailrace for the 125% standard.
- Not so great at 110% standard.
  - 120% and 115% standards hard to meet when running JBS, flows approach 7Q-10, and incoming TDG is high. Also, unit outages.

Path Forward: DCPUD has a 10 year compliance schedule from Nov 9th 2012.

- ***Need to develop Attainability Plan in year one of new license as required by 401 certification.***

Comments?

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Extras

- 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: 1997 – 1999, 2010 with PIT-tagged fish. Two species (Chinook and steelhead yearlings) survival of >96%.

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

- 10 turbine intakes very deep in the profile of the river.
- 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.