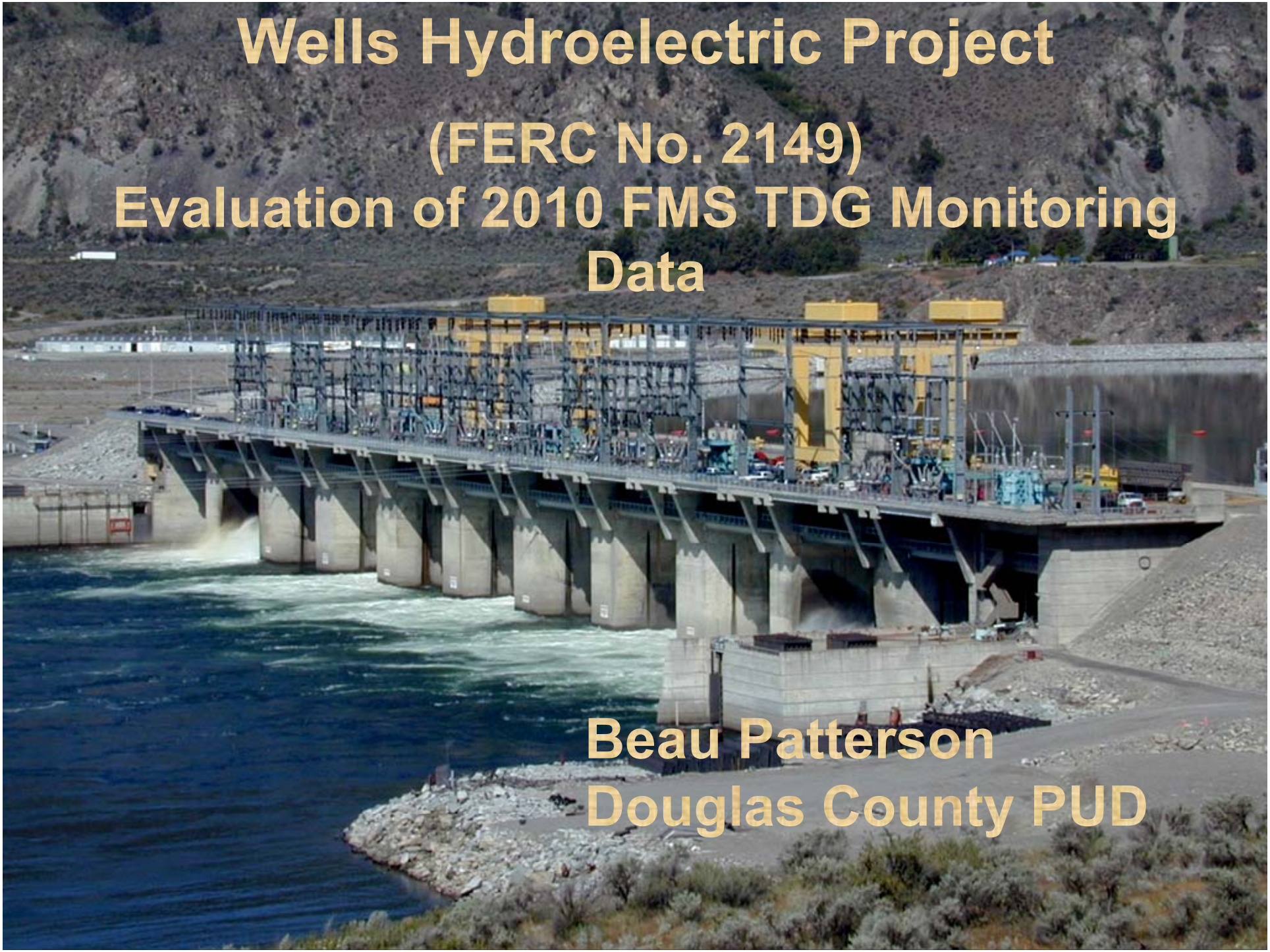


Wells Hydroelectric Project

(FERC No. 2149)
Evaluation of 2010 FMS TDG Monitoring Data

Beau Patterson
Douglas County PUD

Vancouver
Nanaimo
Victoria
Neah Bay
WASHINGTON
Everett
Port Orchard
Shelton
Montesano
18
5
3
1
1
Nighthawk
Osoyoos
Molson
Castlegar
Colville
WASHINGTON
Wenatchee
Ephrata
Ellensburg
Yakima
Spokane
90
Colfax
395
Lewiston
WASHINGTON
GIFFORD PINCHOT NATL FOR.
Walla Walla
Paterson
Alderdale
St. Helens
Hood River
84
Pendleton
Portland
Tillamook
The Dalles
La Grande
Oregon City
MOUNT HOOD

Unique Features of Wells Dam

- Hydrocombine design
- 11 spillbays located directly over 10 units
- East and west Fishways integrated into concrete structure, switchyard on deck
- Juvenile Bypass System utilizes constricting flow barriers in spillbays 2,4,6,8 and 10 to guide downstream migrating juveniles away from turbines into a surface-oriented passage route
- JBS uses up to 11 kcfs, passes >90% of migrants

FMS's

- 2 seasonal sites
- 1 Forebay site, 1Tailwater site
- Both sites visited and probes calibrated at beginning, end, and at monthly intervals during spill season (n = 8 forebay, 7 tailrace)
- Installation, servicing and calibration conducted under contract by John Lemons, CBE

FMS Locations

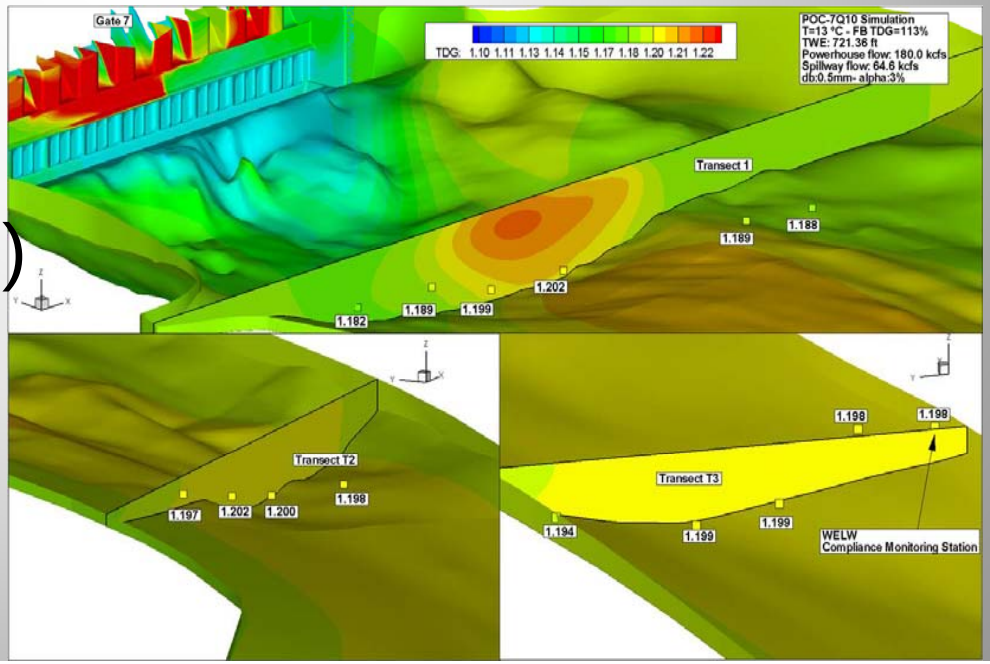
- Forebay site is on the upstream face of Wells Dam at Unit 6
- Tailrace site is 2.6 miles downstream of Wells Dam

FMS Validation

- TDG monitoring at the Wells Project forebay has occurred since 1984
- Tailrace monitoring across tailrace began 1997
- Tailrace FMS established 1998
- FMS location validation as appropriate and representative

  (EES et al. 2007;

  Politano et al. 2009)

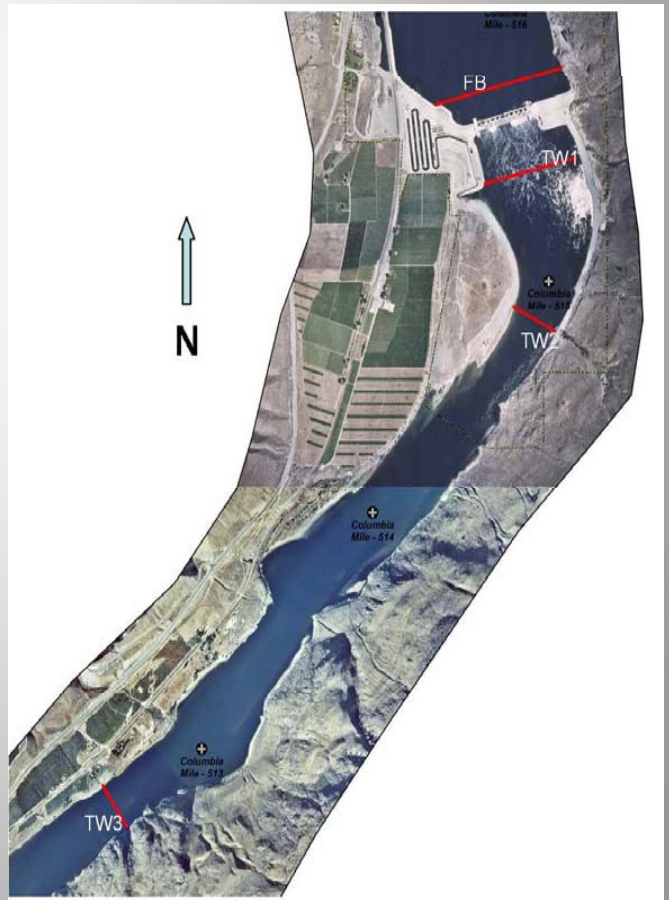


Calibration Results

- **Mean deviation from standards** for temperature and total gas pressure (100%, 113%, 126%, 140%) ranged from -0.1 to 0.1

Maximum deviation was:

- +/-0.3mmHg for 100% TDG
- +/- 0.2mmHg for 113%, 116% and 140% TDG
- 0-0.2 ºC for Temperature



Calibration Summary Stats

(Courtesy of John Lemons, CBE)

	Temperature	TDG Pressure (mmHg)			
	(ºC)	100%	113%	126%	140%
Mean	0.05	-0.05	-0.04	-0.05	-0.06
Median	0.00	-0.14	-0.12	-0.11	-0.10
Standard Deviation	0.06	0.15	0.12	0.12	0.11
Variance	0.00	0.02	0.02	0.01	0.01
Minimum	0.00	-0.27	-0.24	-0.21	-0.19
Maximum	0.20	0.27	0.24	0.21	0.19
n	15	15	15	15	15

Data Gaps WEL

- 210 hours missing data
- 179 hours 4/12 0000 – 4/19 1100
- 10 hours calibration events (minimum)
- 21 hours unknown
- 6.4% of fish spill season (4/12-8/26)

Data Gaps WELW

- 68 hours missing data
- 38 hours 4/12 0000 – 4/13 1400
- 9 hours calibration events (minimum)
- 21 hours unknown
- 2.1% of fish spill season (4/12-8/26)

2010 TDG Exceedances

- No exceedances WEL
- 4 days out of compliance WELW (97% compliance)
- 8 days out of compliance RRH (94% compliance)
- Exceedances occurred 6/17-7/2