Dana Hall
Low Impact Hydroelectric Institute
PO Box 194
Harrington Park, NJ 07640

Re: Pelton Round Butte Project Comments

Dear Ms. Hall:

The Deschutes River Alliance (DRA) is a science-based nonprofit, tax-exempt organization advocating for the health of the Deschutes River. DRA submits these comments to LIHI because evidence demonstrates that the Pelton Round Butte Project, Federal Energy Regulatory Commission License #2030, Low Impact Hydropower Institute # 25 (the "Project"), has created changes in the water quality of the lower 100 miles of the Deschutes River – the reach between the Project and the confluence with the Columbia River.

These changes have affected aquatic invertebrate species by altering life cycles and emergence patterns of some species and reducing populations of others, including the near complete elimination of *Antocha* crane flies, a previously common aquatic insect, from the lower river. Studies funded by Portland General Electric (PGE) have also documented increases in roundworm, flatworm and snail populations in the river below the Project, conditions typically associated with a decline in other important invertebrates such as mayflies, stoneflies and caddisflies (R2 Resource Consultants 2014). Finally, two previously unreported species of stalk-forming diatoms (*Gomphoneis herculeana* and *Cymbella mexicana janschii*), which are detrimental to the habitat and food resources of aquatic invertebrates, have been found growing in large colonies throughout the lower river.

These changes have occurred subsequent to the initiation of Selective Water Withdrawal (SWW) at the Project. SWW allows withdrawing primarily surface water or bottom water, or any mixture of the two; historically, bottom water withdrawal was used exclusively. Although the time elapsed since SWW activation has not yet fully encompassed fish life cycles, DRA believes the changes are, and will increasingly be, deleterious to the health of resident fish populations, and will likely have substantial negative effects on the health and viability of anadromous species, including Mid-Columbia Summer Steelhead, a listed species under the Endangered Species Act.

DRA acknowledges that the Applicants attempted in the initial stages of the Project to comply with all conditions of their FERC license, including the Settlement Agreement and the Section 401 certificate. DRA also takes note of the numerous instances in the initial reviewer's report of stakeholders complimenting the Applicants on their willingness to work in a collaborative manner to address issues (Goldfarb 2007). We do not believe the Applicants intended to cause the problems now appearing. But those problems are real, render the Project out of compliance with applicable water quality standards and LIHI criteria, and require decisive action to ameliorate them.

DRA's comments focus on specific Low Impact Hydroelectric Institute (LIHI) criteria regarding water quality and effects on the watershed.

I. Clean Water Act Section 401 Water Quality Conditions

In response to LIHI certification question B.1., the Applicants assert that the Project is in compliance with all conditions of its 401 Certification, or is in compliance with state standards in the Project area and in the downstream reach. The Applicants do not meet this requirement.

Section 401. D. 1. This section requires the Applicants' Selective Water Withdrawal (SWW) facility to be operated in accordance with the Dissolved Oxygen Management Plan (DOMP) contained in the Pelton Round Butte Water Quality Management and Monitoring Plan (WQMMP), which is Exhibit A, CWA Section 401 Certification, September 2002.

Specifically the DOMP states in section 3.4 (page 9 of WQMMP):

> *Controlled spills at the Reregulating Dam have been shown to increase DO concentration in the discharge (Raymond et al. 1999). Therefore, if under the temperature management selective withdrawal regime it appears that the DO concentration in the Reregulating Dam discharge is going to drop below 11.0 mg/l or 95% saturation, the Joint Applicants will institute controlled spills at the Reregulating Dam to maintain ambient DO concentrations above 11.0 mg/l or 95% saturation.*
>
> *Based on modeling results, it is also anticipated that DO concentrations will exceed 9.0 mg/l at all times, regardless of whether controlled spills are instituted at the Reregulation Dam. If post-selective withdrawal monitoring of IGDO* (Intergravel Dissolved Oxygen) *demonstrates that IGDO levels exceed 8.0 mg/l at all times, the alternate water column criterion of 9.0 mg/l will apply. The need for controlled spills at the Reregulating Dam to meet the 11.0 mg/l criterion would thus be eliminated.*

Data collected by the Applicants and reported in the 2014 water quality report (Campbell 2014) document that the conditions cited above have not been met. Specifically:

1.) Campbell 2014, on page 6, reports: *Individual readings of IGDO from both grab and diel samples dropped to below 8.00 mg/L during sample dates in August and September. However, the daily median for IGDO remained above the ODEQ criteria of 8.00 mg/L for all sample dates.*

The above statement confirms that individual readings of IGDO dropped below 8.00 mg/l, but because the "daily median" IGDO remained above 8.00 mg/l, Applicants assert that they are in compliance. However, the DOMP clearly states that IGDO levels should exceed 8.00 mg/l "at all times" or the 11.0 mg/l water column criterion would apply, and does not refer to a "daily median" value of IGDO as being acceptable.

2.) Campbell 2014, pages 6 & 7, reports: *In 2013 the project operators, according to an interim agreement with ODEQ and the CTWSRO WCB, initially operated to meet the 9.0 mg/L criterion throughout the year. During July and August discharge oxygen levels began to drop and various controlled spill scenarios were initiated to maintain concentrations above compliance. However, dissolved oxygen concentrations continued to drop and, following consultation with ODEQ and the CTWSRO WCB, project operators on August 28 changed operations to instead meet the current ambient DO standard (8.0 mg/L) for that section of the lower river during the non-spawning season (June 16 - October 14), and the 9.0 mg/L criteria for the remainder of the year.*

These results violate the DOMP. Lowering the required water column DO standard from 9.0 mg/l (as defined in the DOMP) to 8.0 mg/l was arbitrary, and there was no supporting rationale for lowering the standard, other than the inability of the operations to meet 9.0 mg/l. Nowhere in the DOMP does it indicate a water column criterion of 8.0 mg/l is acceptable. Moreover, data presented by Campbell 2014, figure 8, page 13, shows that both IGDO and water column dissolved oxygen concentrations in September 2013 dropped <u>below</u> 8.0 mg/l.

The failure of the Project Applicants to meet these DOMP requirements prevents the Applicants from meeting the LIHI criteria for clean water.

Section 401. E.1. This section requires the SWW facility to be operated in accordance with the pH Management Plan (PHMP) contained in the WQMMP. Additionally, in accordance with Oregon Administrative Rule (OAR) 340-041-0565(2)(D), the PHMP must identify those measures (including "all practicable measures in impoundments") that the Applicants will undertake to reduce the Project's contribution to exceeding the water quality criteria for pH.

The PHMP requires the Applicants to take actions that reduce pH levels below the Project. The Project Applicant has not operated the Project in accordance with the PHMP in the following material ways:

1.) Section 4.3 of WQMMP states: *The facility, which will have intake gates at near* (sic) *the reservoir's surface and at depth, will be operated to blend water from the two intakes to meet the applicable ODEQ and CTWS pH standards in the lower Deschutes River and in Project Reservoirs.*

Based on data submitted under the PHMP by the Applicants (FERC no. 2030 Project Water Quality Monitoring Reports for 2011, 2012, & 2013), pH values have exceeded ODEQ and CTWS pH standards (maximum pH value of 8.5) in the lower Deschutes River at all sites monitored every year since surface water withdrawal began. In addition, the Reregulation Dam Tailrace is the only site where continuous pH data has been collected, and the time of day when pH grab samples were taken from other lower river sites is not reported. In the absence of continuous data or a practice of consistently collecting grab samples during peak diel periods for pH, it is probable that pH values even higher than those reported by the Applicants regularly occur in the river.

2.) Section 4.4 of the WQMMP states: *Based on an iterative model-run sequence, the percentages of surface and bottom withdrawals listed in Table 2.1 <u>would</u> result in Project discharge values of pH that are lower than inflow pH values (see section 4.2). Because of this, the selective withdrawal regime proposed for the management of temperature and DO <u>will</u> suffice for management of pH as well* (emphasis added).

Section 4.4 assumes that Project discharge pH values will be lower than inflow values. However, data submitted by the Applicants (FERC no. 2030 Project Water Quality Monitoring Reports for 2011, 2012, & 2013), show that pH values discharged from the Project are in fact <u>higher</u> than the weighted average inflow pH values for nearly all dates sampled from May through September (see attached data tables below from PGE Water Quality Monitoring Reports).

The simple fact is that the assumption in the WQMMP is incorrect, and SWW regimes for managing water temperature and DO do not "suffice for management of pH as well." (As noted above, they do not suffice for DO either.)

Table 22. Tributary flow weighted pH compared to pH at the Reregulating Dam tailrace, 2011.

Date	Tributary flow weighted pH	Daily minimum of pH at the Rereg Dam	Daily maximum of pH at the Rereg Dam
April 5	8.21	8.09	8.56
April 10	8.17	8.20	8.43
May 3	8.04	8.28	8.47
May 10	7.95	8.18	8.43
May 16	8.01	8.24	8.42
May 24	8.13	8.18	8.43
May 30	8.12	8.18	8.42
June 6	8.10	8.24	8.47
June 14	8.35	8.43	8.59
June 22	8.24	8.34	8.51
June 27	8.32	8.36	8.58
July 8	8.45	8.25	8.46
July 12	8.42	8.34	8.90
July 18	8.36	8.74	8.87
July 25	8.76	8.76	8.85
August 3	7.82	8.61	8.76
August 10	8.22	8.79	9.10
August 21	8.36	8.65	8.85
August 27	8.42	8.67	8.92
September 7	8.65	8.58	8.87
September 14	8.76	8.48	8.70
September 20	8.49	8.44	8.71
September 27	8.56	8.47	8.94
October 3	8.64	8.37	8.69
October 13	8.57	8.29	8.47
October 20	8.52	8.26	8.41
October 24	8.59	8.26	8.41

Attachment 1. Table 5. Tributary flow weighted pH compared to pH at the Reregulating Dam tailrace, 2012.

Date	Tributary flow weighted pH	Daily minimum of pH at the Rereg Dam	Daily maximum of pH at the Rereg Dam
May 2	8.28	8.19	8.36
May 7	8.13	8.24	8.36
May 16	8.23	8.27	8.36
June 27	8.34	8.41	8.65
July 5	8.31	8.40	8.79
July 11	8.18	8.41	8.65
July 17	8.13	8.39	8.56
July 26	8.31	8.52	8.79
August 2	8.19	8.26	8.42
August 6	8.21	8.34	8.18
August 13	7.96	8.16	8.34
August 23	8.40	8.25	8.50
August 29	8.22	8.20	8.35

Appendix 1. Table 1. Tributary flow weighted pH compared to pH at the Reregulating Dam tailrace, 2013.

Date	Tributary flow weighted pH	Daily minimum of pH at the Rereg Dam	Daily maximum of pH at the Rereg Dam
May 2	8.30	8.09	8.31
May 6	8.11	8.17	8.34
May 20	8.28	8.02	8.34
May 27	8.25	8.13	8.30
June 3	8.14	8.18	8.31
June 11	8.22	8.18	8.31
June 17	8.18	8.08	8.34
June 24	8.35	8.24	8.39
July 2	8.31	8.25	8.41
July 8	8.28	8.05	8.33
July 17	8.18	8.02	8.33
July 29	8.24	8.2	8.38
August 5	8.18	8.39	8.55
August 12	8.21	8.37	8.51
August 19	7.97	8.41	8.65
August 26	7.90	8.39	8.53
September 2	8.28	8.15	8.3
September 19	7.64	8.18	8.41
September 23	8.04	8.22	8.31

3.) Section 4.6 of the WQMMP states: *If pH at the Reregulating Dam is found to exceed that of the weighted average of the inflows, the Joint Applicants will immediately contact ODEQ and the CTWS WCB to develop an approach to reduce pH that is consistent with maintaining compliant temperature and DO values and surface withdrawal volumes necessary to facilitate smolt movement in Lake Billy Chinook.*

Based on results presented in Joint Applicants water quality monitoring reports it is clear that pH at the Reregulating Dam has consistently exceeded the weighted average pH values of the inflows, yet no effective approach to reduce pH to inflow levels has been developed.

The failure of Applicants to meet these PHMP requirements prevents the Applicants from meeting the LIHI criteria for clean water.

Section 401. F.1. This section requires the SWW facility to be operated in accordance with the Nuisance Phytoplankton Growth Management Plan (NPGMP) contained in the WQMMP. The NPGMP must identify those measures that the Joint Applicants will undertake to reduce the Project's exceedances of the nuisance phytoplankton growth standard criteria in the event that nuisance conditions develop.

The NPGMP requires chlorophyll-*a* sampling according to paragraph 5.3 of the Water Quality Management and Monitoring Plan (Exhibit A of the Clean Water Act Section 401 certification for the Pelton-Round Butte Project). Sampling is mandated to take place between April and September in the forebays of Lake Billy Chinook and Lake Simtustus. Comparisons of pre- and post-selective withdrawal chlorophyll *a* concentrations are to be based on the average values from at least three consecutive months. The NPGMP also states:

> *If average chlorophyll a concentrations after implementation of selective withdrawal exceed average pre-selective withdrawal concentrations by more than 10% for two consecutive years, the Joint Applicants will consult with ODEQ and CTWS WCB regarding the need to conduct a recreational user survey to assess whether or not beneficial uses have been impaired. If result of any required recreational survey indicate that impairment has occurred, the Joint Applicants - under the guidance of ODEQ and the CTWS WCB - will assess the feasibility of implementing a control strategy for attaining compliance that is technically and economically practicable.*

Results comparing pre and post SWW chlorophyll-*a* concentrations were presented in PGE's 2012 Water Quality Report (Campbell 2013). Table 24 below is from page 46 of that report.

Table 24. Average (July - September) Secchi depth and chlorophyll *a* at the PRB project in years 2011 and 2012 compared to before selective water withdrawal.

	2011		2012		2006 (pre SWW)		Atlas of Oregon Lakes
Site	Secchi (m)	Chl a (mg/L)	Secchi (m)	Chl a (mg/L)	Secchi (m)	Chl a (mg/L)	Chla (mg/L)
CRABR (10)	3.3	17.8	1.2	81.6	3.3	19	
DRABR (13)	2.9	18.9	1.5	77.8	4.1	13.3	
MRAIS (16)	3.7	12.6	5.8	14.5	3.8	8.6	
RBFB (7)	3.3	24	1.4	38.9	3.6	12	2.3 - 21.8
RBTR (6)		8.9		9.8		1.5	
PELFB (4)	2.6	48	1.1	51.2	1.7	16.7	19.1
REG TR (2)		9.2		11		6.1	

Note: "Red" highlights have been added for clarity.

Table 24 shows that chlorophyll-*a* concentrations of post-selective water withdrawal greatly exceeded the 10% increase above pre-SWW concentrations allowed in the NPGMP. Specifically, the Round Butte Forebay (RBFB) and Pelton Forebay (PELFB) chlorophyll-*a* results for 2011 and 2012 (post-SWW) ranged from 200% to 320% higher than pre-SWW levels in 2006. Based on these results, the Applicants were required to seek guidance from ODEQ and CTWS WCB to conduct recreational surveys, and to implement a control strategy for nuisance phytoplankton growth. However, no such survey or control strategy has been described or reported, and as such is a violation of the NPGMP.

Section 401. G.1. SWW Facility: This section requires the Applicants to operate the Selective Water Withdrawal (SWW) facility in accordance with conditions D (DO), E (pH), and F (nuisance phytoplankton).

Because the Applicants have failed to meet requirements for these conditions as described in the sections above, Applicants do not meet this requirement.

II. Other Water Quality Indicators Signaling Water Quality Degradation

A. DRA conducted macroinvertebrate studies of the Deschutes River below the Project in 2013 and 2014, with the following findings (Hafele 2015):

Changes in adult insect abundance have been an ongoing concern of fishing guides and long-time anglers on the Deschutes River since operation of the Surface Water Withdrawal tower began in 2010. During the 2014 fishing season concerned guides and long-time anglers submitted 100 hatch abundance surveys over the period from May 10 through the end of October. Each survey ranked the abundance of 17 possible aquatic insect adults on a scale of from 0 to 3; 0 indicating no adults present, 1 low numbers, 2 moderate numbers, and 3 high numbers. While qualitative, such rankings provide a good indication of the general abundance of adult insects. All those submitting surveys have a long history of experience fishing the river and observing adult insect activity.

Survey results found few adults present in high numbers. Those with the largest percentage of high abundance were salmonflies (17% of surveys ranked as high) and golden stones (14%). Net-spinning caddis and Diptera were next highest at 13% and 12% of surveys noted with high numbers of adults, respectively. Mayfly adults were noticeably sparse with just 4 surveys out of 100 indicating high numbers of adults. Overall, caddisflies were most widespread and common, but still dominated by low to moderate numbers of adults. The crane fly Antocha continued to show the most troubling decline with virtually no adults seen along the entire lower river (a small number of adults observed on only 3 occasions throughout the survey period), compared to large numbers of adults present in years before surface water withdrawal began.

An assessment of six separate stream reaches found low numbers of adults to be relatively consistent along the entire length of the lower river from Warm Springs to the mouth. One possible cause for a decline in insect numbers is the proliferation of stalked diatom species noted in the lower river over the past several years. Unlike other beneficial diatoms that provide a significant food source for many aquatic insect larvae, these diatoms produce dense

growths of indigestible stalks that not only lack food value, but also change habitat quality for invertebrates.

These diatoms densely colonize streambed rocks and crowd out nymphal invertebrates. The rapid proliferation of these diatom species, which were rarely found on the lower river prior to the implementation of SWW, suggests that SWW is increasing nutrient loads and promoting nuisance algae growth in the river below the Project. Further studies should be done to evaluate changes in nutrient levels being released into the lower Deschutes as a result of SWW, and evaluate the effects of these changes in nutrients on the river and the algal communities downstream.

B. The Project's Operators commissioned a water quality study by the environmental consulting firm R2 Resource Consultants in 2013. This study is mandated under requirements set forth in paragraph 6.2.6 of the Water Quality Management and Monitoring Plan of the Section 401 Certificate.

The interim report for this study (R2 Resource Consultants 2014) found that biological shifts are taking place in the river downstream from the Pelton-Round Butte Project subsequent to implementation of SWW. The report notes that one species of aquatic insect (*Antocha* crane flies), once prolific, has disappeared from the lower Deschutes River. Other species of aquatic insects have declined. Concurrently, populations of round and flat worms, along with snails, have increased.

Sampling by the R2 study is heavily weighted to the "upper" portion of the lower river (Site 10, just below Warm Springs River, and above), with just two sites located below site 10, at Sandy Beach and Mack's Canyon. However, declines in macroinvertebrate adult activity and the growth of nuisance stalked diatom species have been equally observed lower in the river, from Maupin to the mouth. Thus future evaluation of water quality, algae, and invertebrates should include more downstream sites, including from Mack's Canyon to the Deschutes' confluence with the Columbia.

III. Water Quality Conclusions

LIHI requires the Project to meet applicable water quality standards in order to obtain both initial certification and recertification. As was made clear by several parties in the initial application process, the efficacy of the SWW in establishing acceptable water temperature, DO and pH levels below the Project, and in re-establishing anadromous fish returns above the Project, was entirely speculative. (Goldfarb 2007). DRA believes that the Project Operators acted in good faith to design and operate the SWW in a manner calculated to achieve the desired results. However, recent evidence has shown that water quality standards are not in fact being met. There is also strong evidence that operation of the SWW program has degraded water quality and fish habitat below the Project, without to date promoting fish returns above it.

DRA has presented evidence of this degradation to both Portland General Electric Company (PGE) and to ODEQ, and has offered to work collaboratively to find solutions that could be implemented through adaptive management. Unfortunately, ODEQ has not addressed these water quality problems. PGE initially agreed to include DRA representatives in a work group whose purpose would be to study nuisance algae, but then cancelled the group's meetings, and has not rescheduled them.

Oregon water quality standards are being violated in the 100 miles of the Deschutes River below the Project. Water being discharged by the Project is not supporting the designated beneficial uses which LIHI's standards are designed to protect, including the spawning and rearing of listed species of resident and anadromous fish. Nothing in the Project's application for recertification under the LIHI Certification Criteria shows any recognition or acknowledgement of these violations of water quality standards, or provides any assurance of compliance in the future.

IV. Comments on Oregon Department of Environmental Quality (ODEQ) Letter of Support

Section B of the LIHI Recertification Questionnaire asks if the Project is:

> a) In *compliance with all conditions* (emphasis added) issued pursuant to a Clean Water Act Section 401 water quality certificate issued for the Project after December 31, 1986.
>
> Or
>
> b) In compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Project area *and in the downstream reach* (emphasis added).

ODEQ has placed the Deschutes River on Oregon's Clean Water Act Section 303(d) list for not meeting water quality standards for several parameters including flow modification, dissolved oxygen, pH, and temperature. Additionally, two reservoirs within the Project are listed for not meeting water quality standards for pH and chlorophyll-*a*. Despite these instances of noncompliance, ODEQ's letter inexplicably asserts that the Project is in compliance with all conditions of the Clean Water Act Section 401 Certificate. Based on the evidence presented in these comments (some of it generated by the Applicants and submitted to ODEQ), the Project is not in compliance with all conditions in the Project's Clean Water Act Section 401 Certificate.

In response to LIHI Recertification Question #3 (if there has been a determination that, despite the existing violations of Oregon water quality standards, the Project does not cause, or contribute to the ongoing violations of the water quality), ODEQ answers affirmatively that such a determination was made to support issuance of the Section 401 certification, and referenced in ODEQ's 2006 comments supporting the original LIHI certification.

ODEQ's statement is non-responsive to the specific question. ODEQ's original determination was made prior to the construction of the SWW structure. ODEQ's failure to evaluate the Project's impacts upon ongoing water quality standard violations arising from new Project facilities and operations precludes ODEQ from affirmatively answering Question #3.

V. Conclusion

For the reasons set forth in these comments, the Project fails to meet LIHI criteria and should not be re-certified.

Submitted by:

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Literature Cited

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