



FISH PASSAGE CENTER

1827 NE 44th, Suite 240, Portland, OR 97213

Phone: (503) 230-4099 Fax: (503) 230-7559

<http://www.fpc.org>

e-mail us at fpcstaff@fpc.org

MEMORANDUM

TO: FPAC

FROM: David A. Benner

DATE: March 6th, 2008

This memorandum is in response to your request at the March 3rd FPAC call that I evaluate outflows that can be expected from Dworshak Dam and Grand Coulee under a flood control shift in 2008. For this evaluation, I utilized the 2-27-08 STP. For comparison purposes, evaluations were conducted based on 1. Actual STP flows 2. Flows that could be expected if DWR and GCL were strictly operated to standard Flood Control 3. Flows that could be expected under a full shift and 4. Flows that could be expected under a partial shift. The following explain the methods used in this analysis.

1. Actual STP flows. For this portion, the actual flows displayed in the 2-27-08 STP were utilized. The STP did not necessarily operate the projects to the standard FC on April 10th.
2. Flows that could be expected if projects were operated to standard April 10th FC. Standard April 10th FC was 1255 feet at Grand Coulee and 1497.6 feet at DWR. For this scenario, each project began at its March 3rd actual midnight elevation (1258.9 ft at GCL and 1522 ft at DWR) and drafted or refilled linearly until reaching either April 10th elevation. The draft or refill needed to reach April 10th, was added or subtracted to actual average inflows between March 3-April 10, to produce average outflows over the period. After April 10th, projects again drafted or refilled linearly to the end of April FC elevation (1234.6 ft at GCL and 1511 ft at DWR). The draft or refill needed to reach April 30th, was added or subtracted to actual average inflows between April 11-April 30, to produce average outflows over the period.
3. Flows that could be expected if DWR were operated to its full shifted end of March FC elevation then drafted linearly to the end of April elevation of 1511 feet. In this case the April 10th elevation at DWR was interpolated between the end of March shifted FC elevation of 1524 feet and the end of April FC elevation of 1511 feet. The storage at this April 10th elevation (1519.7ft) was compared to the storage at the April 10th elevation at DWR under normal FC (1497.6 feet) to

determine the volume shifted at DWR on April 10th. The Standard FC Grand Coulee April 10th elevation was shifted by the same amount as the Dworshak full shift – the full shift amount on April 10th at DWR was 267.4 Kaf of less FC space, therefore, the Grand Coulee shifted April 10th elevation was 267.4 Kaf more space than the April 10th regular FC elevation of 1255 feet. The full shifted April 10th at GCL was 1250.9 feet. Under the shifted scenario, Grand Coulee was drafted linearly from its actual March 3rd elevation of 1258.9 ft to its shifted April 10th elevation of 1250.9 feet, this amount of draft was added to average inflows to GCL to produce average outflows at GCL under the full shift scenario between March 3rd and April 10th. After April 10th, GCL was drafted linearly from its shifted April 10th to its end of April elevation of 1234.6 feet.

4. Flows that could be expected if DWR were operated to one half the difference between the full shifted end of March FC elevation (1524 ft) and the end of April elevation of 1511 feet- the full shift difference was 13 feet. This scenario was developed to reduce DWR drafts in April so outflows from Dworshak would be less than 14 Kcfs, which is considered to be the limit for Dworshak outflows to control excessive TDG. For this scenario, the end of March shifted FC was set at 1518 feet, six feet below the full shifted end of March FC elevation. As with the full shift scenario, the April 10th elevation at DWR was interpolated between the end of March half shifted FC elevation of 1518 feet and the end of April FC elevation of 1511 feet. The storage at this April 10th elevation (1515.7 feet) was compared to the storage at the April 10th elevation at DWR under normal FC (1497.6 feet) to determine the volume shifted at DWR on April 10th under a half shift. The Standard FC Grand Coulee April 10th elevation was shifted by the same amount as the Dworshak half shift – the half shift amount on April 10th at DWR was 215.9 Kaf of less FC space, therefore, the Grand Coulee shifted April 10th elevation was 215.9 Kaf more space than the April 10th regular FC elevation of 1255 feet. The half shifted April 10th at GCL was 1251.7 feet. Under the half shifted scenario, Grand Coulee was drafted linearly from its actual March 3rd elevation of 1258.9 ft to its half shifted April 10th elevation of 1251.7 feet, this amount of draft was added to average inflows to GCL to produce average outflows at GCL under the half scenario between March 3rd and April 10th. After April 10th, GCL was drafted linearly from its half shifted April 10th to its end of April elevation of 1234.6 feet.

The results of this exercise are displayed in the following table.

Table 1.

	Scenario #1 2-27-08 STP	Scenario #2 Operate to Feb FC	Scenario #3 Full April DWR/GCL Shift	Scenario #4 Half April DWR/GCL Shift
Dworshak March 31st El. (ft)	1507.7	1507.8	1524.0	1518.0
Dworshak April 10th El. (ft)	1504.1	1497.6	1519.7	1515.7
Dwroshak April 15th El. (ft)	1504.0	1492.5	1517.5	1514.5
Dwroshak April 30th El. (ft)	1510.8	1511.0	1511.0	1511.0
Dworshak March 3-31 Ave Out (Kcfs)	7.3	7.7	4.1	5.5
Dwroshak April 1-15 Ave Out (Kcfs)	10.3	14.8	14.3	13.0
Dworshak April 16-30 Ave Out (Kcfs)	11.3	6.9	14.3	13.0
Grand Coulee March 31st El. (ft)	1249.3	1256**	1253.0	1253.6
Grand Coulee April 10th El. (ft)	1247.9	1255.0	1250.9	1251.7
Grand Coulee April 15th El. (ft)	1247.0	1249.9	1246.8	1247.4
Grand Coulee April 30th El. (ft)	1234.8	1234.6	1234.6	1234.6
Grand Coulee March 3-31 Ave Out (Kcfs)	73.0	68.1	71.5	70.9
Grand Coulee April 1-15 Ave Out (Kcfs)	74.7	88.3	88.5	88.4
Grand Coulee April 16-30 Ave Out (Kcfs)	130.1	130.1	123.4	124.7
Priest Rapids March 3-31 Ave Out (Kcfs)	78.2	73.3	76.7	76.1
Priest Rapids April 1-15 Ave Out (Kcfs)	80.2	93.8	93.9	93.9
Priest Rapids April 16-30 Ave Out (Kcfs)	140.5	140.5	133.7	135.0
Bonneville March 3-31 Ave Out (Kcfs)	152.0	147.5	147.4	148.1
Bonneville April 1-15 Ave Out (Kcfs)	166.5	184.6	184.2	182.8
Bonneville April 16-30 Ave Out (Kcfs)	238.1	233.7	234.4	234.4

** The actual FC elevation at GCL on March 31st is 1267.2 feet.

From the above table, it can be seen that a full shift at DWR would lead to an April draft of over 13 feet. With this draft, Dworshak outflows would average 14.3 Kcfs over April, which would be a TDG risk to operators.

The half shift scenario appears to provide reasonably high outflows at Dworshak over April while reducing the risk that outflows will exceed 14 Kcfs. Under this scenario, outflows over April would average 13 Kcfs at Dworshak Dam. This half-shift scenario would allow for higher outflows from Dworshak over the second part of April relative to standard FC, while reducing the TDG risk associated with the full shift. Outflows under a half shift would be slightly lower at GCL relative to standard FC, however flows from GCL under a half-shift would still provide enough water to meet the spring flow objective at PRD (135 Kcfs) over the second half of April. For all these reasons, the half-shift scenario appears to be the most logical operation to pursue.

As with any shift between GCL and DWR it should be clear to operators that both projects will be at their shifted FC elevations by April 10th as to avoid any decreases in

flow during the beginning of the spring migration period. If both projects are at their shifted FC elevation, this half-shift operation would effectively create slightly higher flows in the Snake River and slightly lower flows in the Mid-Columbia relative to flows under standard FC over the second half of April.