FISH OPERATIONS PLAN IMPLEMENTATION REPORT
August 2015

Submitted by the U.S. Army Corps of Engineers
Northwestern Division
Portland, OR.

Introduction

The U.S. Army Corps of Engineers (Corps) is submitting this report in accordance with the 2015 Fish Operations Plan (2015 FOP) posted to the TMT website on March 1, 2015. The 2015 FOP describes the Corps' project operations for fish passage at its Federal Columbia River Power System (FCRPS) dams during the spring and summer fish migration season, generally April through August. To the extent Corps project operations are not specified in the 2015 FOP, the FCRPS operations will be consistent with the 2014 NOAA Fisheries Supplemental Biological Opinion (2014 Supplemental BiOp), the USFWS 2000 and 2006 BiOps, and/or other operative documents, including the 2015 Water Management Plan (WMP), WMP seasonal updates, and the 2015 Fish Passage Plan (FPP).

The Corps' August 2015 lower Snake and Columbia River project and fish passage operations are contained in this report. In particular, information in this report includes the following:

- Hourly flow through the powerhouse at each dam;
- Hourly flow over the spillway compared to the spill target for that hour; and
- Daily average Total Dissolved Gas (TDG) levels (percent of saturation) in the tailwater at each project, and in the subsequent downstream project's forebay.[1]

This report also provides information on presented issues and unanticipated or emergency situations that arose during implementation of the 2015 FOP in August 2015.

Data Reporting

I. For each project providing fish passage operations, this report contains two figures per operational week[2] in August displaying the performance of the fish passage spill program as follows:

(A) Average % TDG Values - displayed in the upper figure.
(B) Hourly Spill and Generation Flows - described in the lower figure.

[1] Averages reported are consistent with current and applicable Oregon TDG standard modification (120% tailwater) and Washington TDG criteria adjustments (120% tailwater/115% forebay). The Oregon TDG standard modification and Washington TDG criteria adjustments have different methodologies for calculating TDG. When standards vary or conflict, the Corps applies the more stringent standard.

[2] Operations are implemented Monday through Sunday.

The weekly figures begin on August 3 and end on August 31 for the following lower Snake River and lower Columbia River projects: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, The Dalles, and Bonneville.

Each figure represents one week of a project's operation. The figures start at 0000 hours (%TDG graphs) and 0100 hours (flow/spill figures) on August 3 for the lower Snake River and the lower Columbia River projects.

August 3 – August 9	Figures 1 – 8
August 10 –August 16	Figures 9 – 16
August 17 – August 23	Figures 17 – 24
August 24 – August 30	Figures 25 – 32
August 31	Figures 33 – 40

A. Upper Figure: Displays the daily average %TDG for the Corps' lower Snake River and lower Columbia River projects. The Corps' objective is to operate each project in accordance with the spill levels in the 2015 FOP; and to the extent practicable, avoid exceeding the applicable state TDG limits.

1. The green dashed line represents the observed percent TDG in the tailwater of the dam using the Oregon 120 %TDG standard calculated with the high 12-hour average.[1] Applies only to figures which include the lower Columbia dams.
2. The blue dot-dash line represents the observed percent TDG in the tailwater of the dam using the Washington 120 %TDG standard calculated with the high 12-hour average.[1]
3. The black solid line represents the observed percent TDG in the forebay of the next dam downstream using the Washington 115 %TDG standard calculated with the high 12-hour average.[1]

B. Lower Figure: Displays the hourly flow and spill at each dam.

- The dashed blue line shows the flow through the powerhouse each hour, in thousand cubic feet per second (kcfs).
- The heavy grey line represents the average hourly total project outflow in kcfs.
- The dotted pink line represents the average hourly flow through the spillway in kcfs.
- The thin black line represents the hourly spill level as defined in the 2015 FOP.
- The heavy green line represents the target spill. This is the hourly maximum spill level. The hourly target spill may vary as a function of total project outflow, forebay elevation and generator capacity, subject to the following conditions:

    - spill percentage or flow rate specified in the 2015 FOP;
    - spill caps as set daily for TDG management;
    - test spill levels for fish passage research;
    - minimum generation for power system needs;
    - minimum spill at Bonneville Dam (50 kcfs);
    - minimum spill at John Day (25% of project outflow).

II. A table is included at the end of the figures that lists the daily average of high %TDG values for all projects. The numbers in red indicate the project exceeded the %TDG cap -- i.e.115% (forebay of the next downstream dam) or 120% (tailwater) for each project. For the lower Columbia projects, tailwater TDG values are presented by displaying the highest value %TDG (controlling limit), and the lower value is displayed with a strikethrough.

General Implementation Remarks

For all projects that spill for fish passage, the actual spill may vary from the target spill due to various conditions as described below. When spill levels briefly deviate below or above the level specified in the 2015 FOP, the dotted pink line will be below or above the heavy green line in the figures. Actual deviations from the target operation during voluntary spill hours are described below in the August 2015 Spill Variance Table.[3] The Spill Variance Table includes average hourly data; therefore, while spill may vary from target FOP spill for only a portion of an hour, the Spill Variance Table characterizes the variance as a full hour. There are instances when the hourly FOP spill levels are not achievable due to mechanical limitations in setting spill gates to implement the regionally coordinated spill pattern. The project operator sets the spill gate stops to most closely approximate the 2015 FOP level of spill while also avoiding exceeding the %TDG spill cap to the extent practicable.

"Low flow" operations at the lower Columbia and Snake projects are triggered when inflow is insufficient to provide both minimum generation and the specified spill levels. In these situations, the projects operate at minimum generation and pass the remainder of project inflow as spill and through other routes, such as fish ladders, sluiceways, and navigation locks. As flows transition from higher flows to low flows, there may be situations when flows recede at a higher rate than forecasted. In addition, inflows provided by nonfederal projects upstream are variable and uncertain.

The combination of these factors may result in instances when unanticipated changes to inflow result in forebay elevations dropping to the low end of the Minimum Operating Pool (MOP). Since these projects have limited operating flexibility, maintaining minimum generation, MOP elevation, and the target spill may not be possible throughout every hour. During low flow periods at Little Goose Dam, the overall project spill percentage appears to be reduced because the calculations do not account for the volume of water released during navigational lockages; however, the actual spill volume remains constant. When these variances occur, they are recorded in the monthly Spill Variance Table for Little Goose under the variance type "Navigation."

Actual spill levels at Corps projects with set flow targets may vary up to ±2 kcfs within the hour (except as otherwise noted in the 2015 FOP for Bonneville and The Dalles dams,[4] which may

[3] Involuntary spill conditions may appear in the figures but are not considered variances and are not reported in the Spill Variance Table. Involuntary spill conditions result from lack of load, high river inflows that exceed available powerhouse capacity, scheduled or unscheduled turbine unit outages or transmission outages of various durations, passing debris, or any other operational and/or maintenance activities required to manage dam facilities for safety and authorized project uses.

[4] As specified in the 2015 FOP (p. 14), this applies when spill is below 40% of total outflow at The Dalles Dam.

range up to ±3 kcfs) as compared to those specified in the 2015 FOP and the RCC spill priority list (defining the project %TDG spill caps). A number of factors influence actual spill, including hydraulic efficiency, exact gate opening calibration, spillway gate hoist cable stretch due to temperature changes, and forebay elevation (e.g. a higher forebay results in a greater volume of spill since more water can pass under the spill gate).

The 2015 FOP describes project "Operations during Rapid Load Changes" (p. 6). For reporting purposes, the notation "Transmission Stability" in the Spill Variance Table replaces "Rapid Load Changes," and identifies instances when hourly spill levels were not met as a result of load swing hours and other related within-hour load variability issues. "Transmission Stability" occurs because projects must be available to respond to within-hour load variability to satisfy North American Electric Reliability Corporation (NERC) reserve requirements ("on response"). In addition to within-hour load variability, projects on response must be responsive to within hour changes resulting from intermittent generation (such as wind generation). During periods of rapidly changing loads and intermittent generation, projects on response may have significant changes in turbine discharge within the hour while spill quantity remains the same within the hour. Under normal conditions, within-hour load changes primarily occur immediately preceding and following the peak load hours; however, within-hour changes in intermittent generation can occur at any hour of the day. Occasionally, several hours after peak load hours, the project may be decreasing total outflow and generation faster than the corresponding spill decreases causing the percent spill to be slightly higher. Due to the high variability of within-hour load, reporting actual spill percentages that vary by more than the ±1 percent within hour requirement (or other ranges specified in the 2015 FOP) may occur with greater frequency with "Transmission Stability" hours than other hours.

Occurrences requiring an adjustment in operations and/or regional coordination are described in greater detail in the "Operational Adjustments" section below.

August 2015 Operations

The month of August was characterized by well below average flows for both the lower Snake and the lower Columbia rivers. The NOAA Northwest River Forecast Center's Runoff Processor indicated that the August 2015 adjusted volume runoff on the lower Snake River was below the 30 year average (1981-2010): 0.9 MAF (Million Acre Feet) or 70% of average as measured at Lower Granite Dam. For the lower Columbia River, the Runoff Processor indicated the August 2015 adjusted volume runoff was below the 30 year average (1981-2010): 5.2 MAF or 68% of average as measured at The Dalles. The monthly precipitation summary for August was well below average at 56% on the Snake River above Ice Harbor Dam and below average on the Columbia River above The Dalles Dam at 64%.

During the August 2015 reporting period, the planned 2015 FOP spill operations were carried out as follows:

- Lower Granite Dam - The hourly target spill level was 18 kcfs, 24 hours/day.
- Little Goose Dam - The hourly target spill level was 30% of total project outflow, 24 hours/day. Due to low flow conditions, the operation transitioned to an hourly constant spill

target of 7/9/11 kcfs operation[5], depending on the previous day's outflow as coordinated with TMT on June 25.

- Lower Monumental Dam - The hourly target spill level was 17 kcfs, 24 hours/day.
- Ice Harbor Dam - The hourly target spill level was 45 kcfs spill during the daytime and the %TDG cap spill during the nighttime. Nighttime spill hours (1800-0500).
- McNary Dam - The hourly target spill level was 50% of total project outflow, 24 hours/day.
- John Day Dam - The hourly target spill level was 30% of total river flow for 24 hours/day.
- The Dalles Dam - The hourly target spill level was 40% of total project outflow, 24 hours/day.
- Bonneville Dam - The hourly target spill level alternated in 2-day blocks between 95 kcfs, 24 hours/day vs. 85 kcfs during the day and 121 kcfs during the nighttime.

Operational Adjustments

No Operational Adjustments to report.

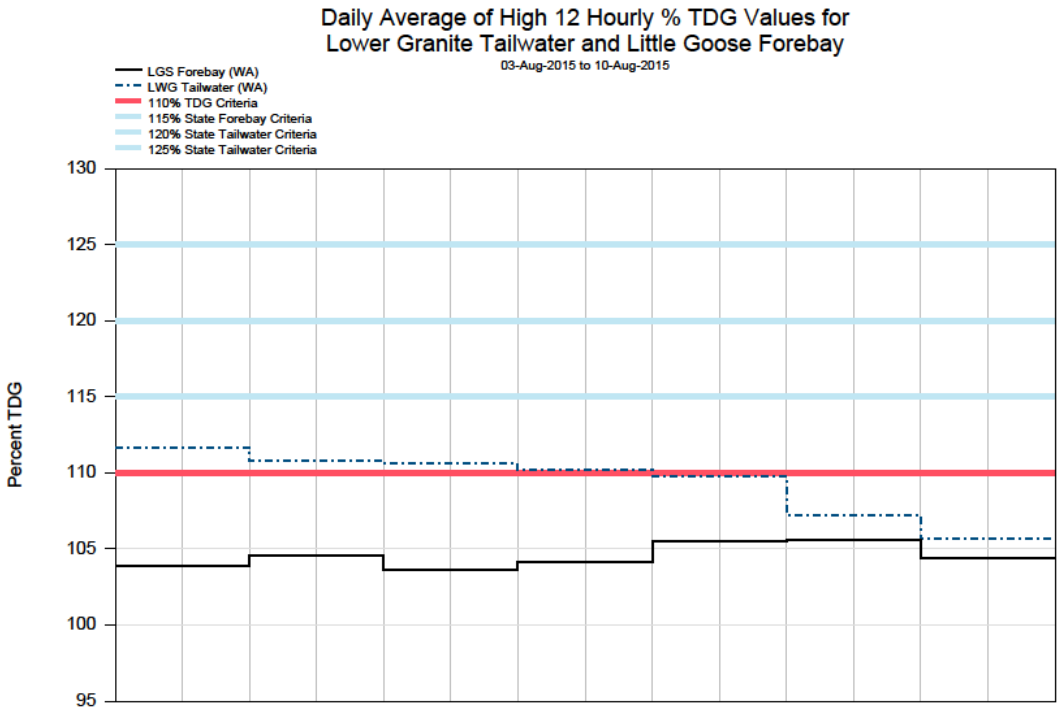
[5] See FOP (p. 6) for low flow operations at Little Goose Dam.

August 2015 Spill Variance Table

Project	Parameter	Date	Time[6]	Hours	Type	Reason
Lower Granite	Reduced Spill	8/26/15	1300	1	Maintenance	Hourly spill was reduced from 5.9 kcfs to 3.2 kcfs to operate unit 4 for maintenance in addition to operating unit 2 at minimum generation (FOP Table 1).
John Day	Additional Spill	8/31/15	2300	1	Transmission Stability	Hourly spill increased to 33.1% (above 30% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg. spill 30.1%.
The Dalles	Reduced Spill	8/14/15	1200	1	Transmission Stability	Hourly spill decreased to 38.9% (below 40% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg. spill 39.9%.
The Dalles	Reduced Spill	8/29/15	2000	1	Transmission Stability	Hourly spill decreased to 38.4% (below 40% ±1% range). Project on response during rapidly changing load and/or intermittent generation (see p. 3-4). 24-hr avg. spill 39.9%.
Bonneville	Additional Spill	8/8/15	0100	1	Operational Limitations	Hourly spill increased to 99.4 kcfs (above 95 kcfs FOP spill). Operation for offloading a transformer from a barge ended earlier than planned and required drafting the Bonneville pool to resume the normal forebay operating range. 24-hr avg. spill 95.2 kcfs.

[6] Note: Data collected for reporting spill variances is reported using hourly-averaged data. Therefore, while spill may be increased or decreased for only a portion of an hour, it is represented in the Spill Variance Table as an hour.

Figure 1


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
03-Aug-2015 to 10-Aug-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

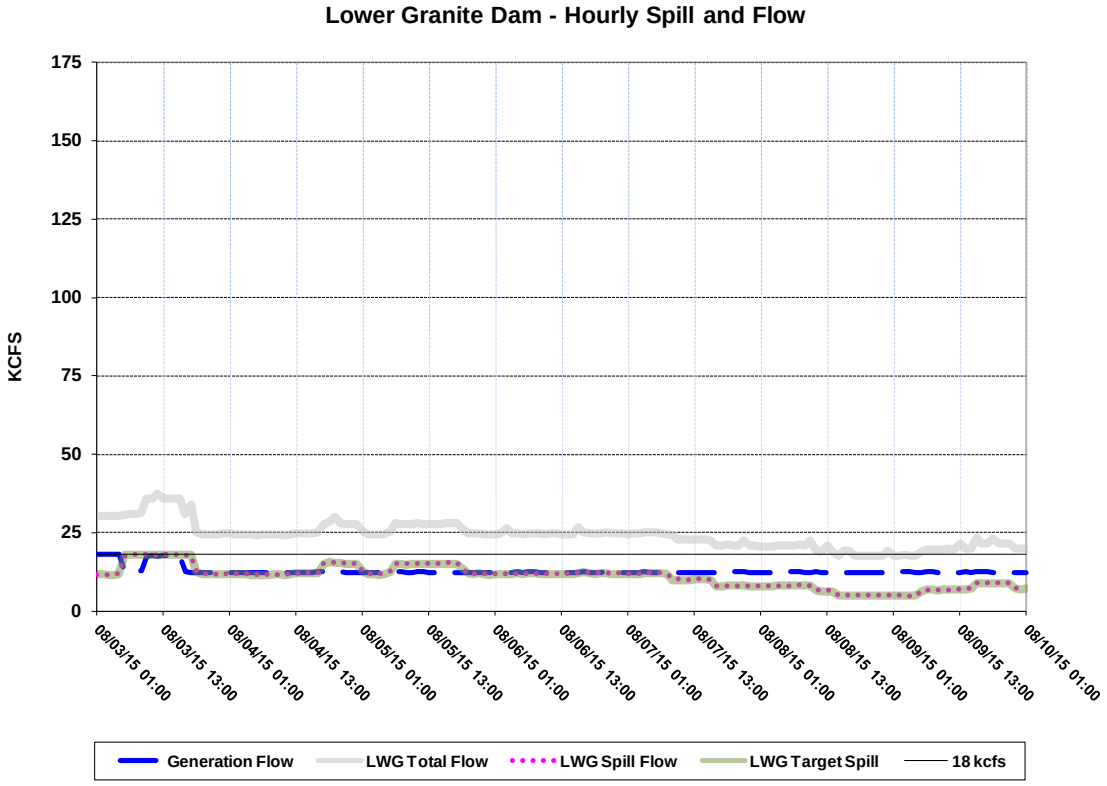
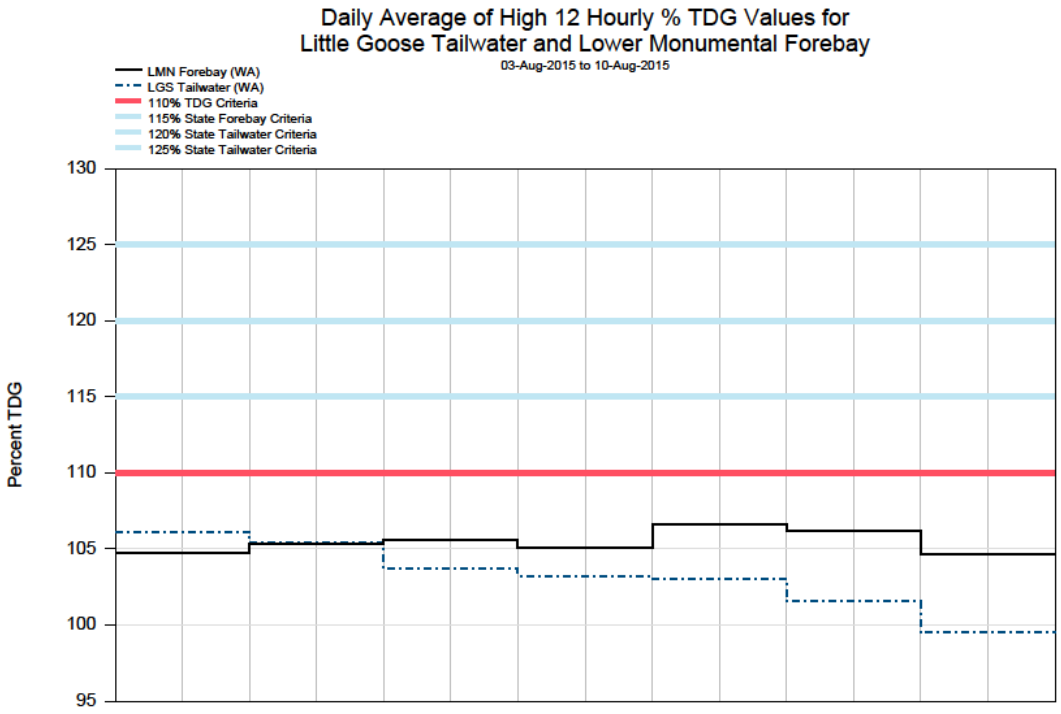

Lower Granite Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/03/15 01:00
08/03/15 13:00
08/04/15 01:00
08/04/15 13:00
08/05/15 01:00
08/05/15 13:00
08/06/15 01:00
08/06/15 13:00
08/07/15 01:00
08/07/15 13:00
08/08/15 01:00
08/08/15 13:00
08/09/15 01:00
08/09/15 13:00
08/10/15 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 2


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
03-Aug-2015 to 10-Aug-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

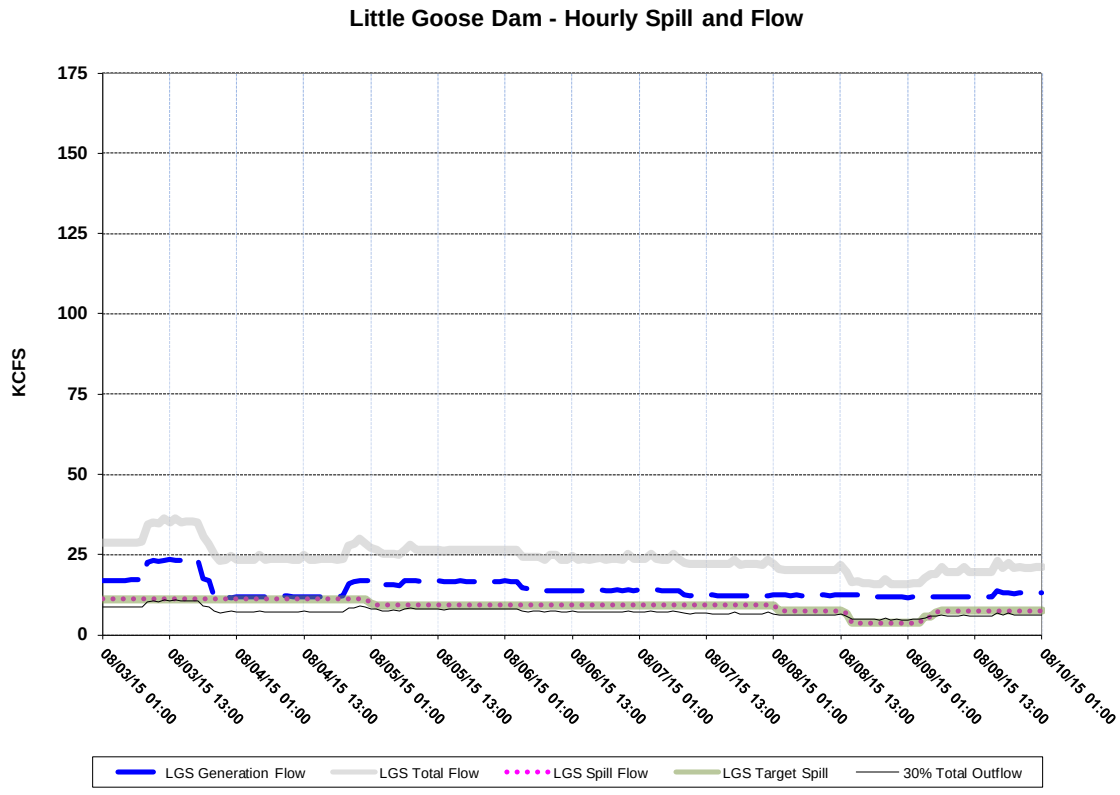
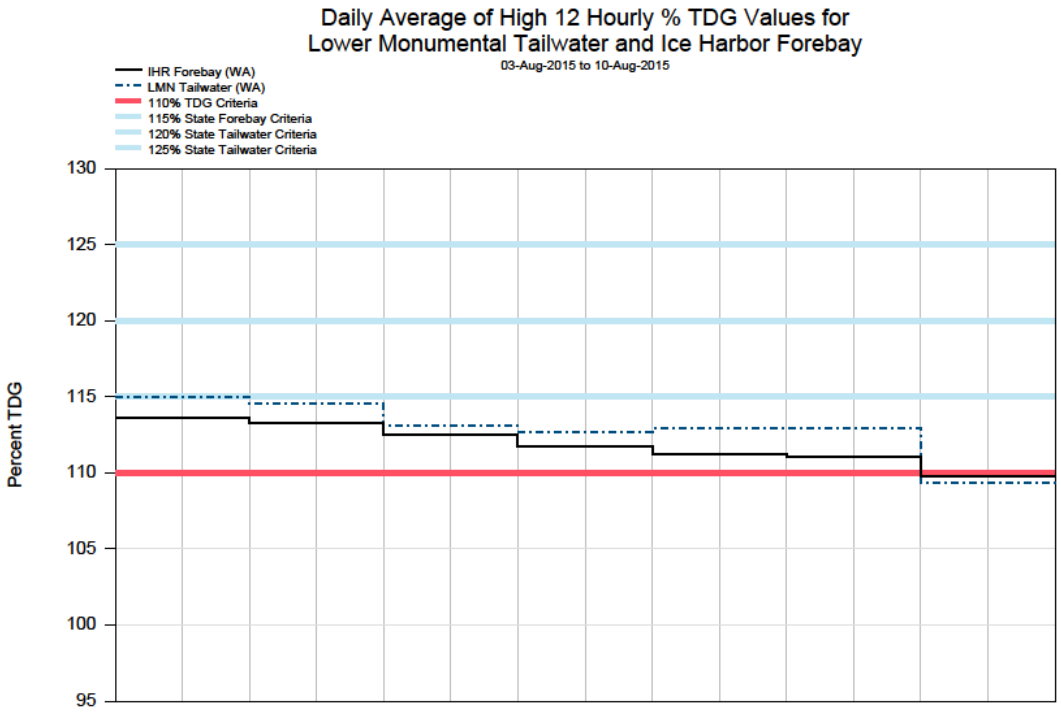

Little Goose Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/03/15 01:00
08/03/15 13:00
08/04/15 01:00
08/04/15 13:00
08/05/15 01:00
08/05/15 13:00
08/06/15 01:00
08/06/15 13:00
08/07/15 01:00
08/07/15 13:00
08/08/15 01:00
08/08/15 13:00
08/09/15 01:00
08/09/15 13:00
08/10/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 3


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
03-Aug-2015 to 10-Aug-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

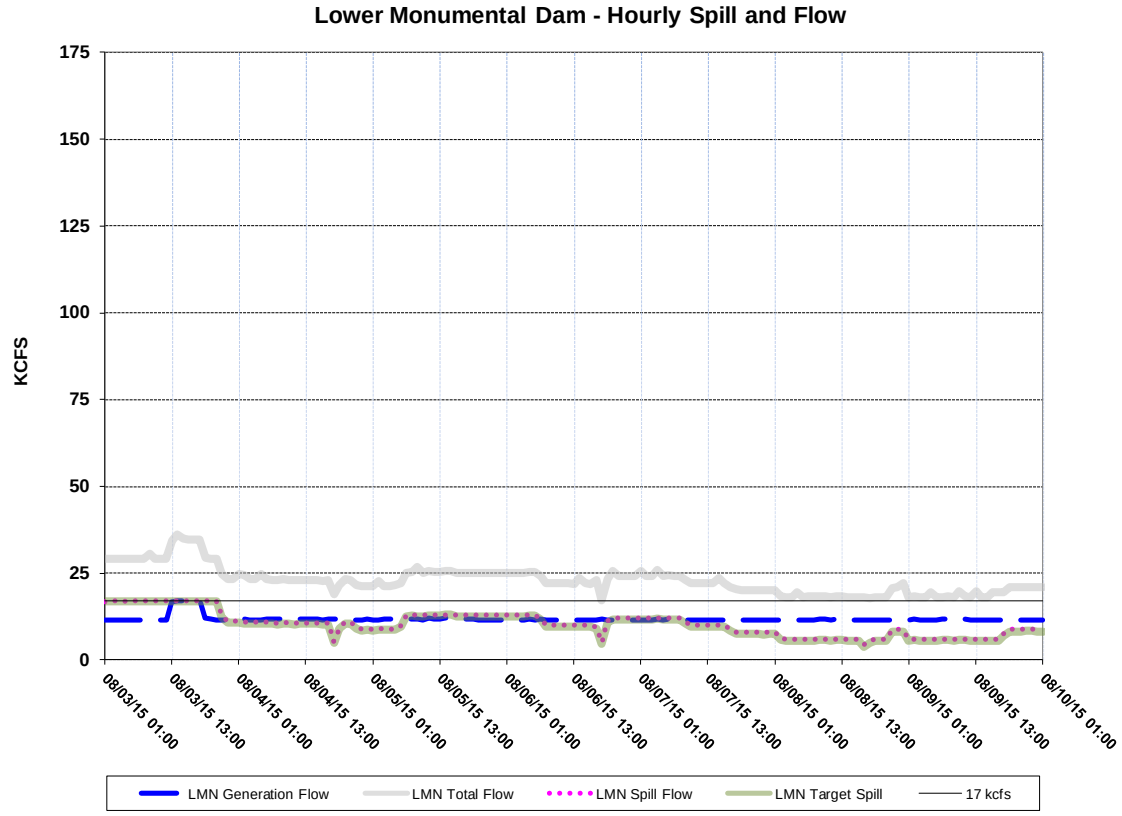
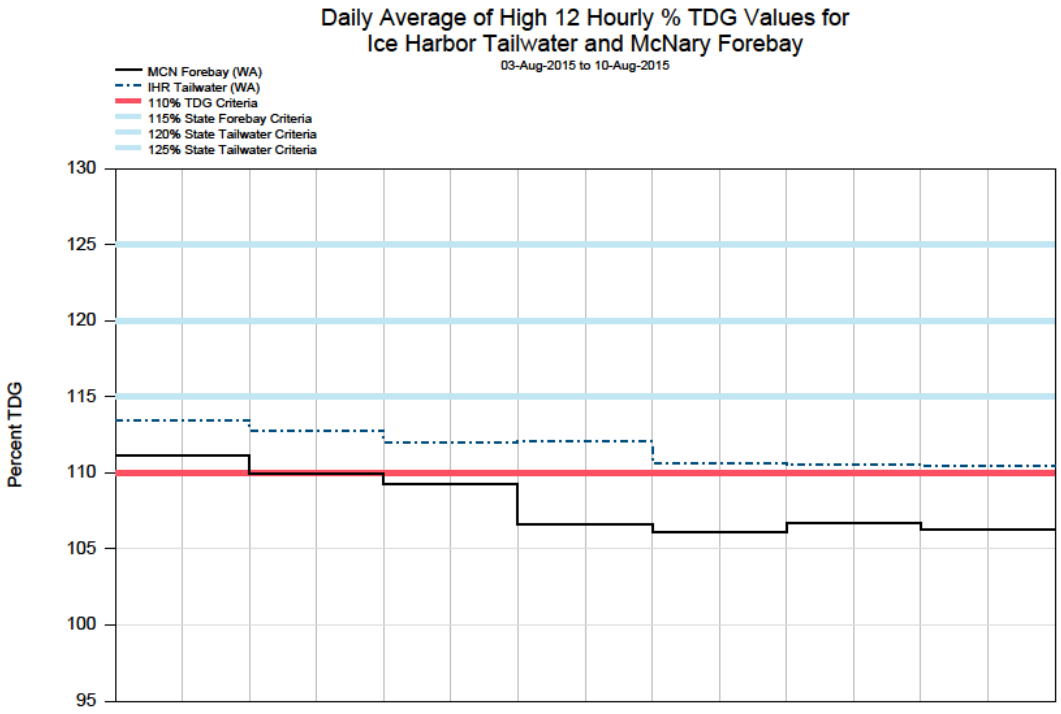

Lower Monumental Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/03/15 01:00
08/03/15 13:00
08/04/15 01:00
08/04/15 13:00
08/05/15 01:00
08/05/15 13:00
08/06/15 01:00
08/06/15 13:00
08/07/15 01:00
08/07/15 13:00
08/08/15 01:00
08/08/15 13:00
08/09/15 01:00
08/09/15 13:00
08/10/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 4


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
03-Aug-2015 to 10-Aug-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

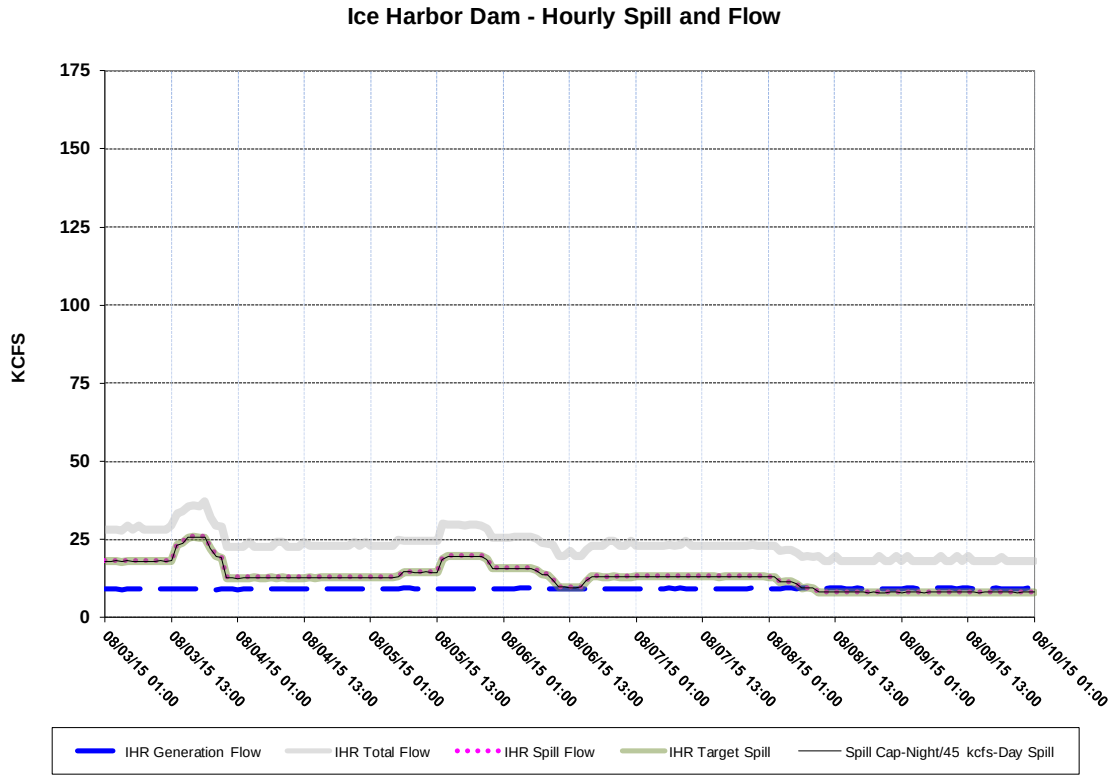
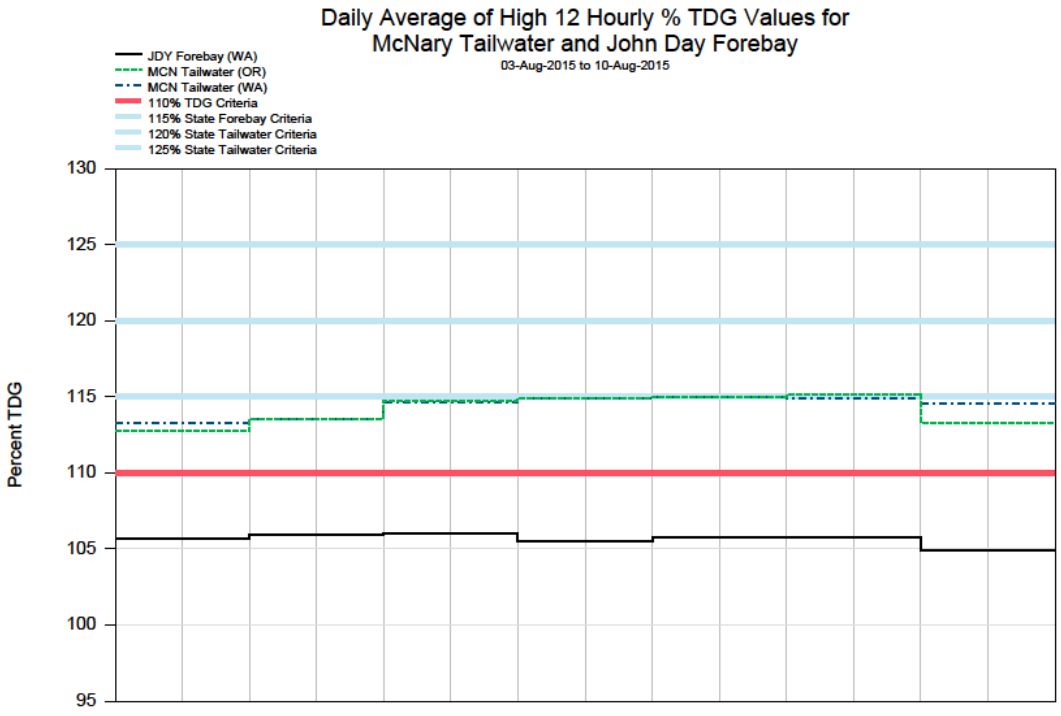

Ice Harbor Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/03/15 01:00
08/03/15 13:00
08/04/15 01:00
08/04/15 13:00
08/05/15 01:00
08/05/15 13:00
08/06/15 01:00
08/06/15 13:00
08/07/15 01:00
08/07/15 13:00
08/08/15 01:00
08/08/15 13:00
08/09/15 01:00
08/09/15 13:00
08/10/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 5


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
03-Aug-2015 to 10-Aug-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

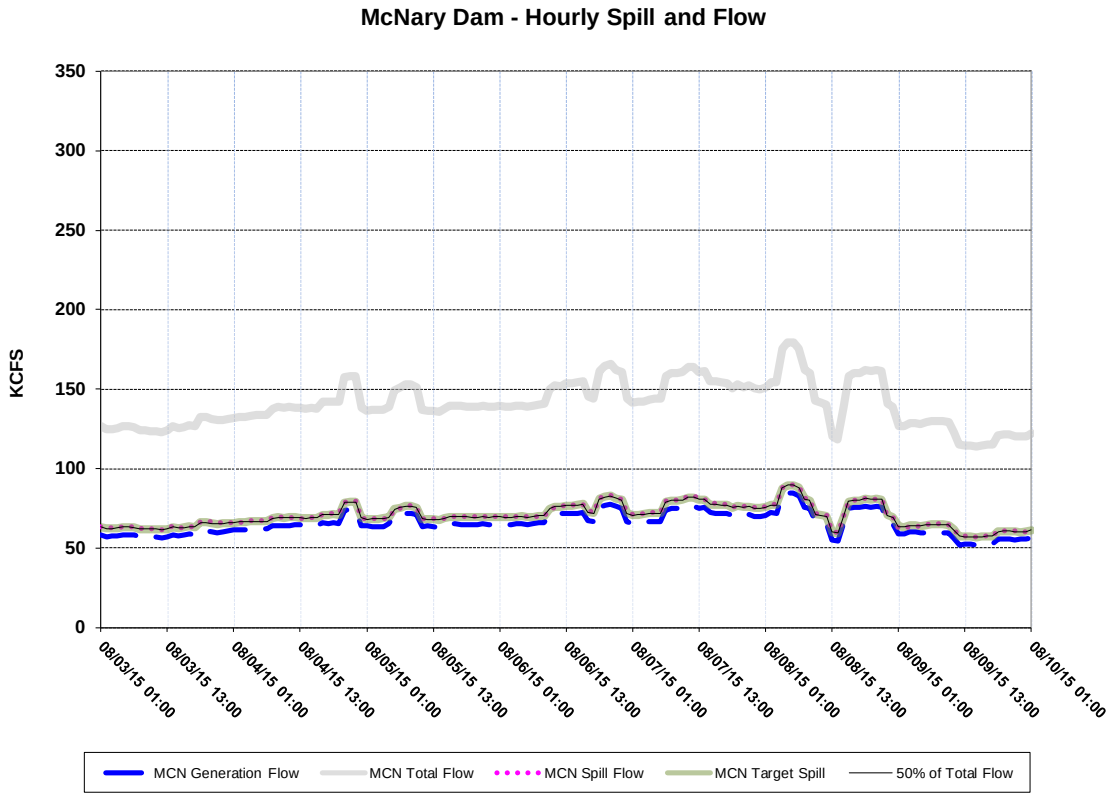
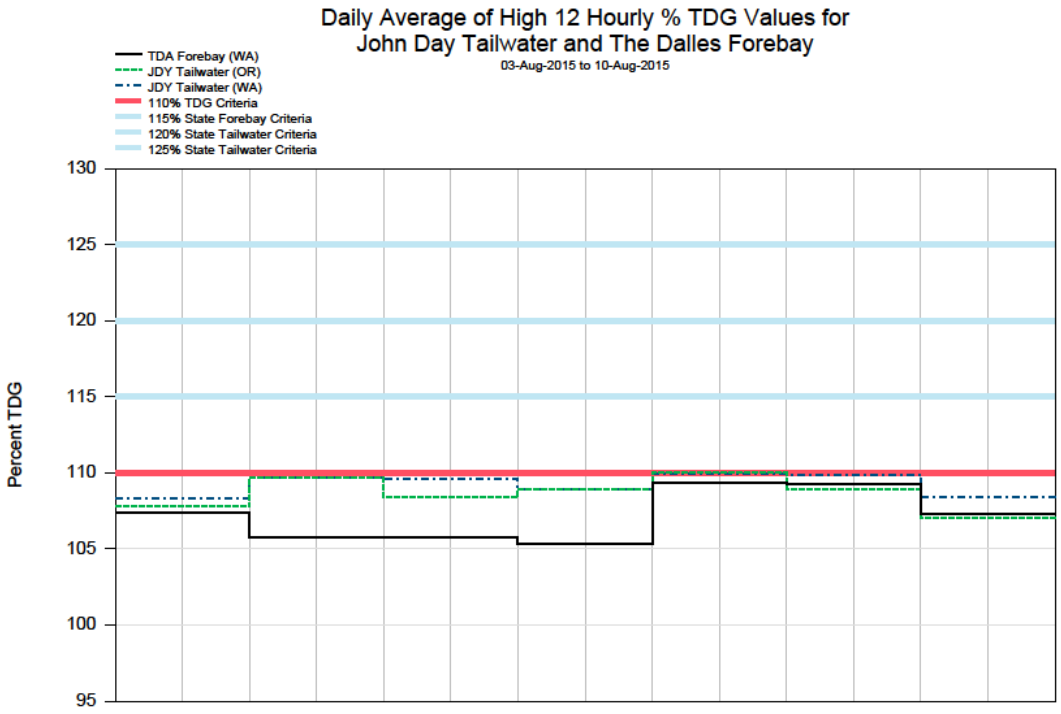

McNary Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/03/15 01:00
08/03/15 13:00
08/04/15 01:00
08/04/15 13:00
08/05/15 01:00
08/05/15 13:00
08/06/15 01:00
08/06/15 13:00
08/07/15 01:00
08/07/15 13:00
08/08/15 01:00
08/08/15 13:00
08/09/15 01:00
08/09/15 13:00
08/10/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 6


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
03-Aug-2015 to 10-Aug-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

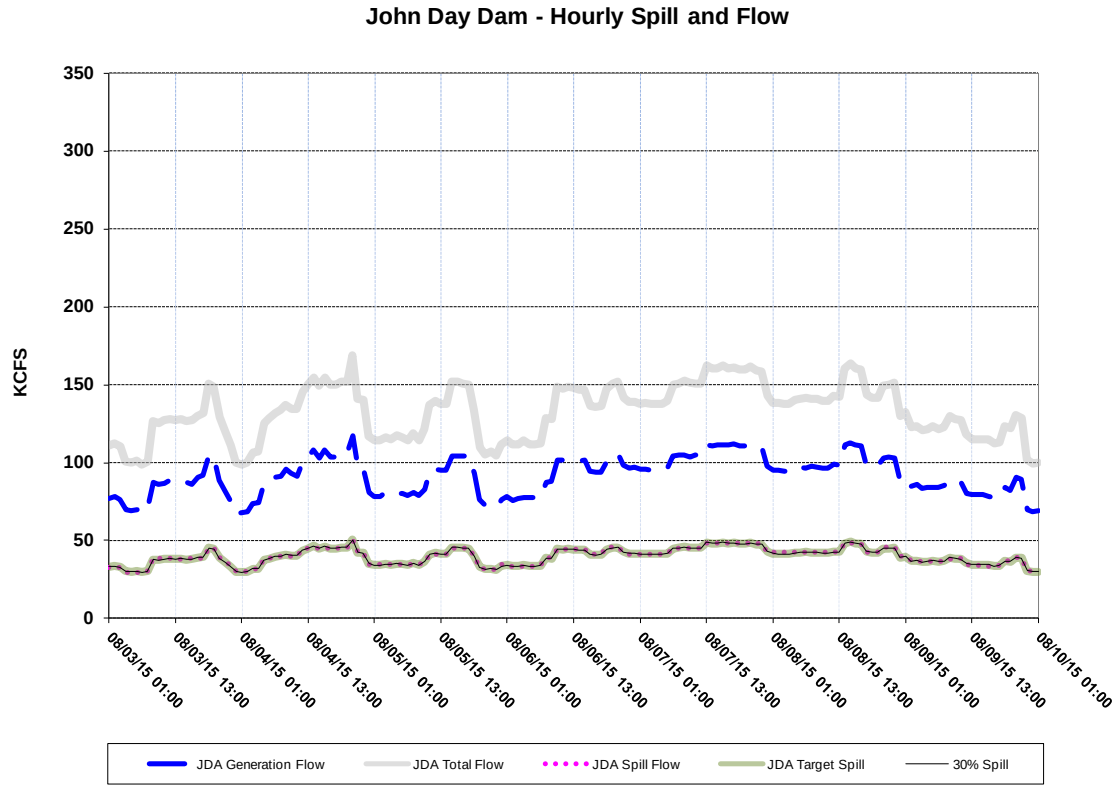
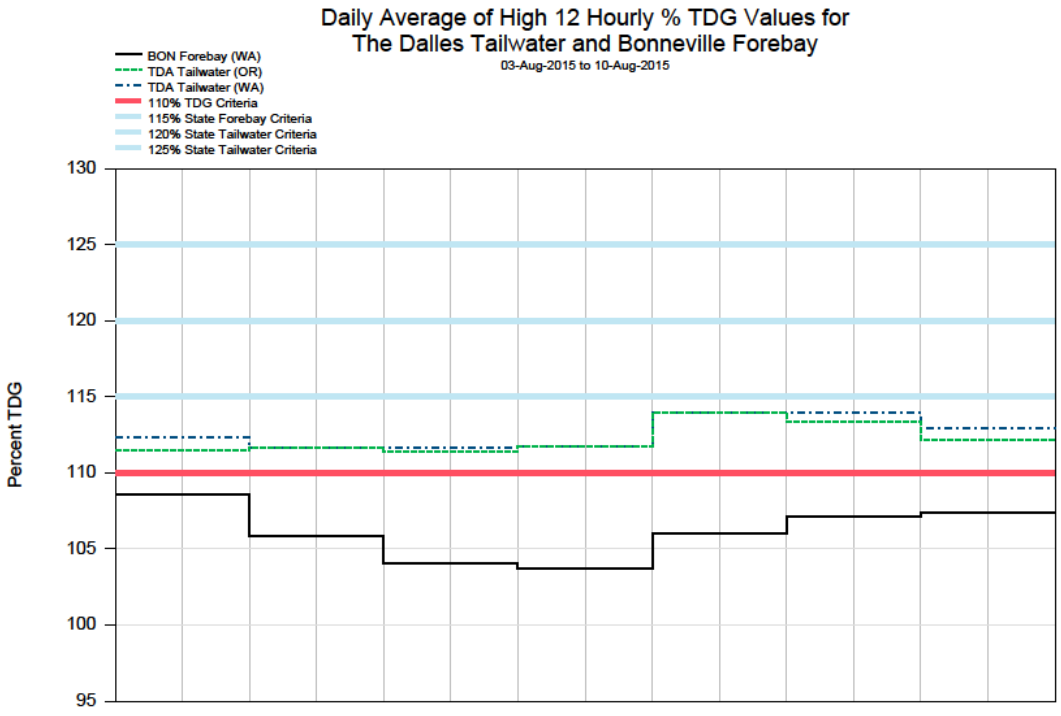

John Day Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/03/15 01:00
08/03/15 13:00
08/04/15 01:00
08/04/15 13:00
08/05/15 01:00
08/05/15 13:00
08/06/15 01:00
08/06/15 13:00
08/07/15 01:00
08/07/15 13:00
08/08/15 01:00
08/08/15 13:00
08/09/15 01:00
08/09/15 13:00
08/10/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 7


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
03-Aug-2015 to 10-Aug-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

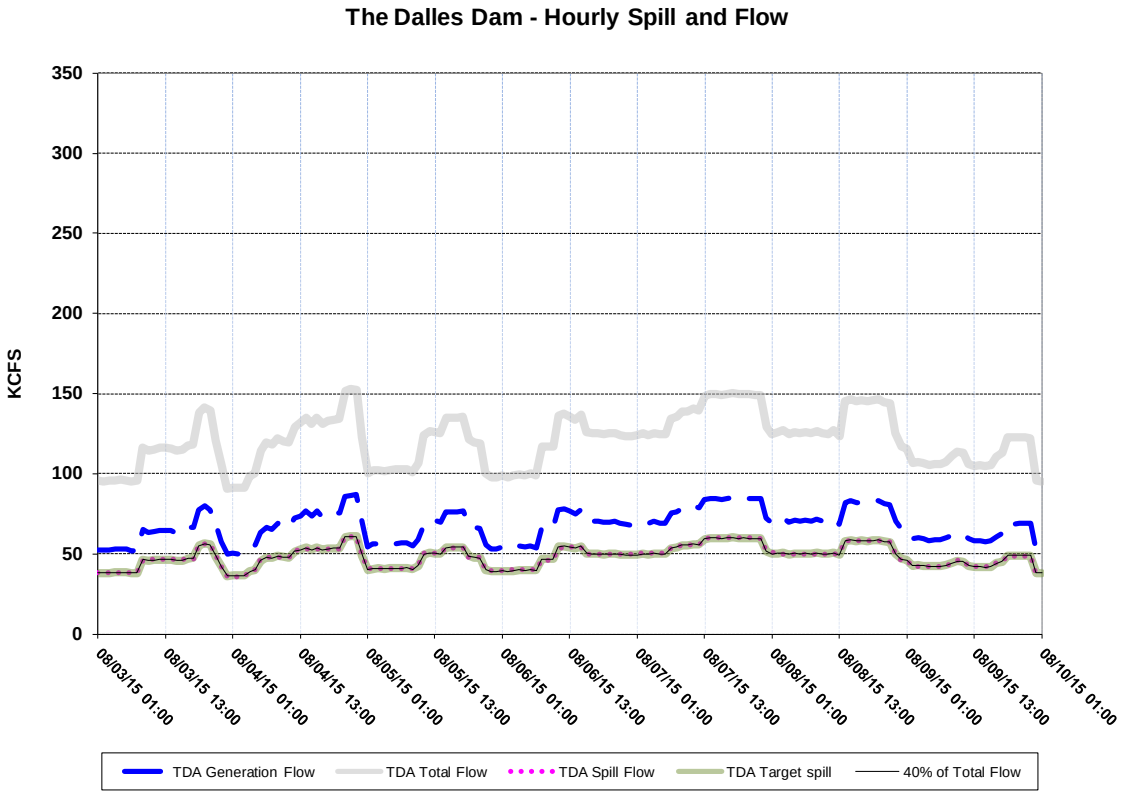
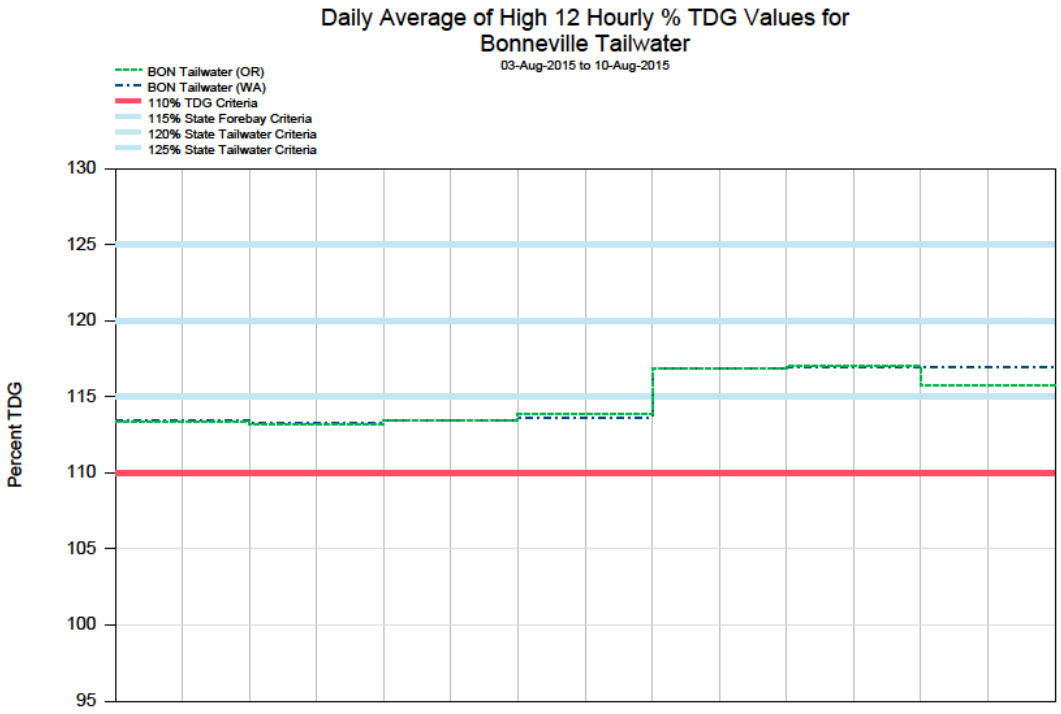

The Dalles Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/03/15 01:00
08/03/15 13:00
08/04/15 01:00
08/04/15 13:00
08/05/15 01:00
08/05/15 13:00
08/06/15 01:00
08/06/15 13:00
08/07/15 01:00
08/07/15 13:00
08/08/15 01:00
08/08/15 13:00
08/09/15 01:00
08/09/15 13:00
08/10/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 8


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
03-Aug-2015 to 10-Aug-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

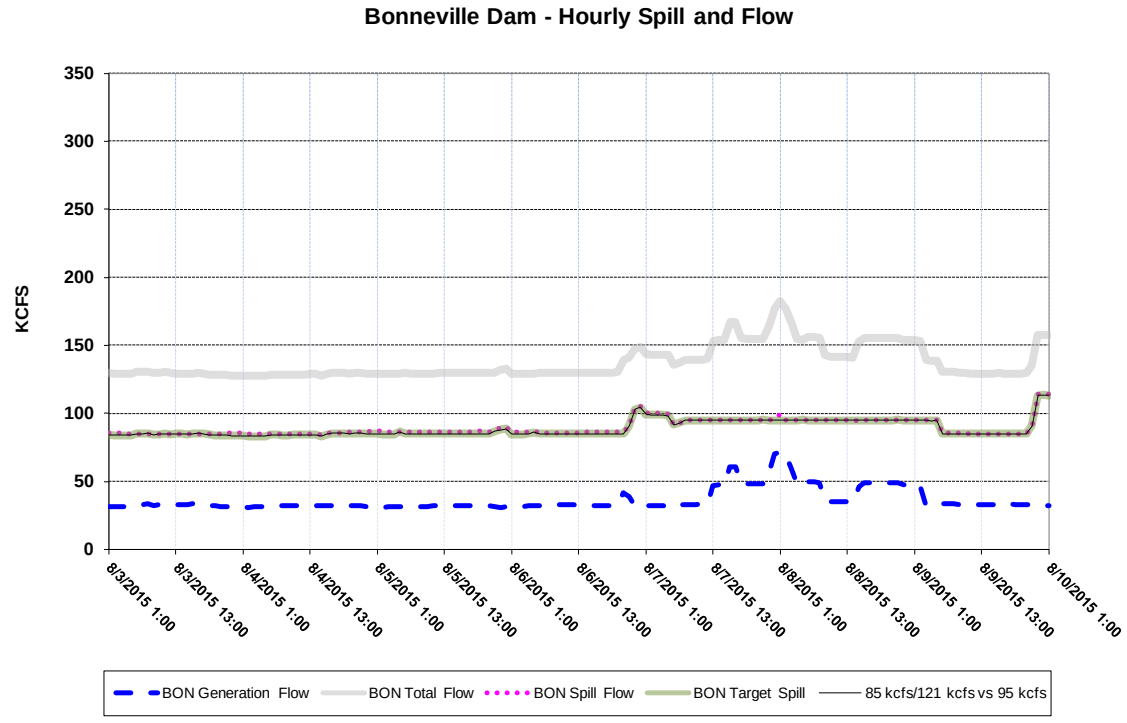
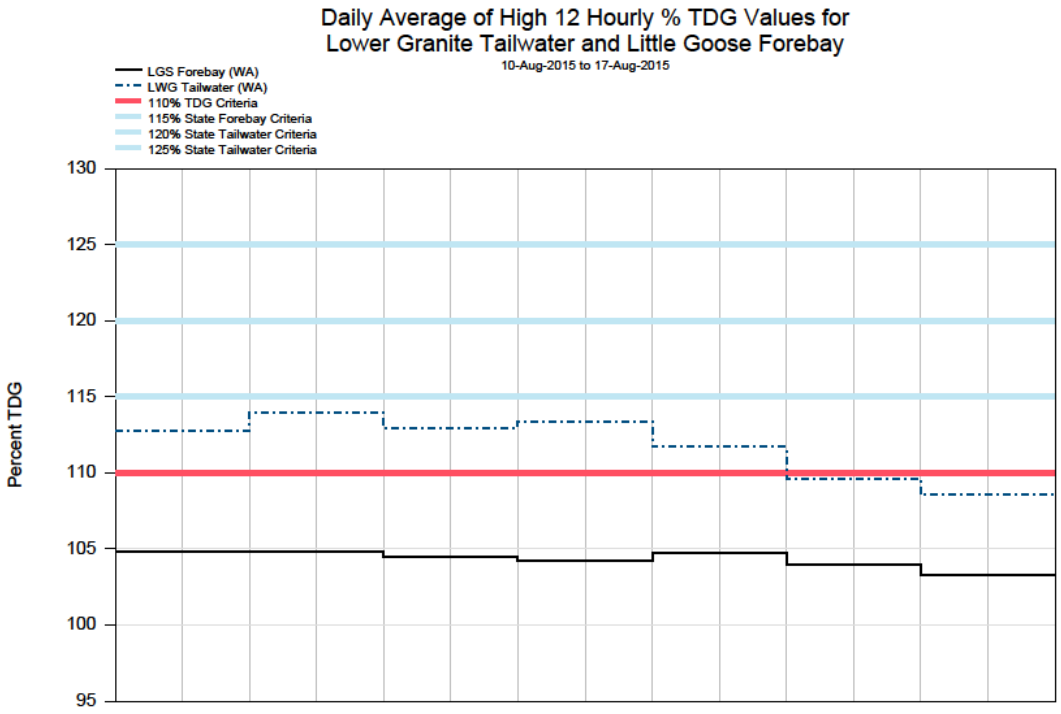

Bonneville Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
8/2/2015 1:00
8/3/2015 13:00
8/4/2015 1:00
8/4/2015 13:00
8/5/2015 1:00
8/5/2015 13:00
8/6/2015 1:00
8/6/2015 13:00
8/7/2015 1:00
8/7/2015 13:00
8/8/2015 1:00
8/8/2015 13:00
8/9/2015 1:00
8/9/2015 13:00
8/10/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/121 kcfs vs 95 kcfs

Figure 9


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
10-Aug-2015 to 17-Aug-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

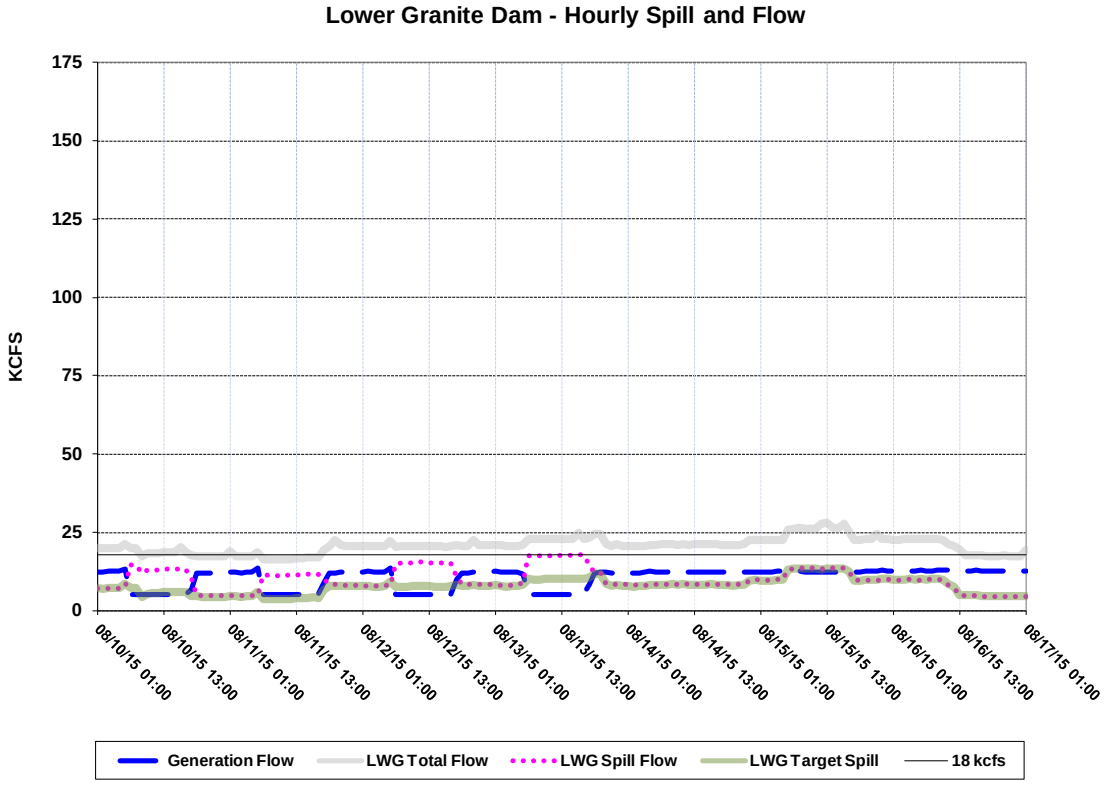
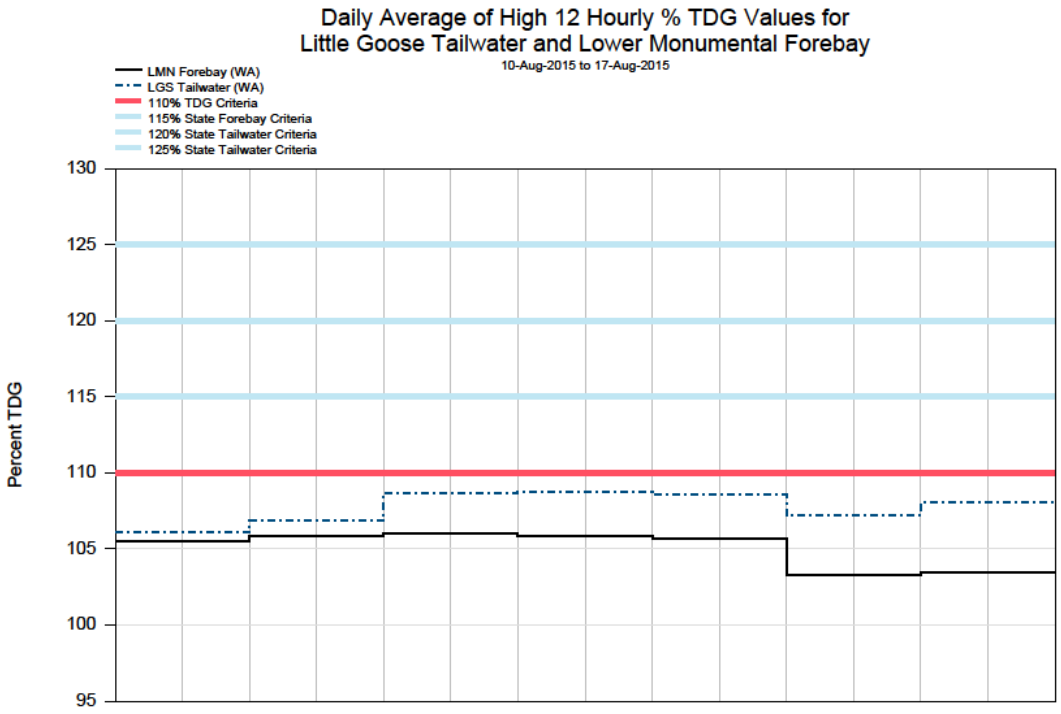

Lower Granite Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/10/15 01:00
08/10/15 13:00
08/11/15 01:00
08/11/15 13:00
08/12/15 01:00
08/12/15 13:00
08/13/15 01:00
08/13/15 13:00
08/14/15 01:00
08/14/15 13:00
08/15/15 01:00
08/15/15 13:00
08/16/15 01:00
08/16/15 13:00
08/17/15 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 10


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
10-Aug-2015 to 17-Aug-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

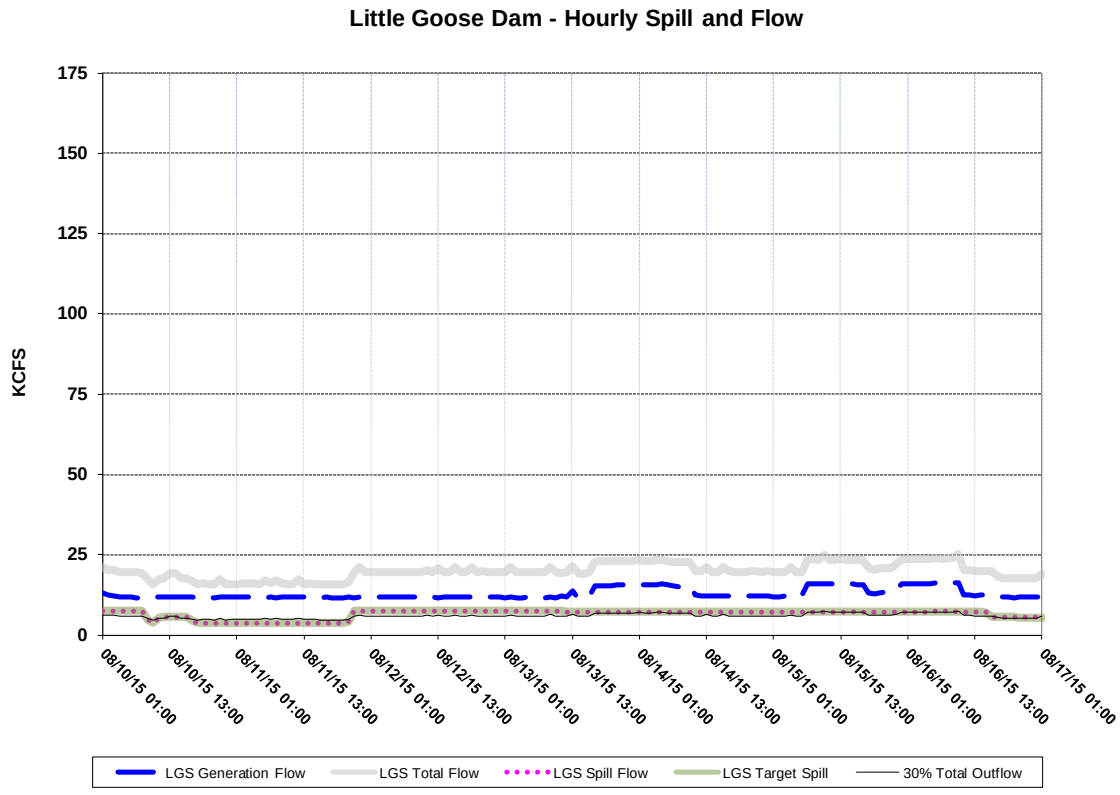
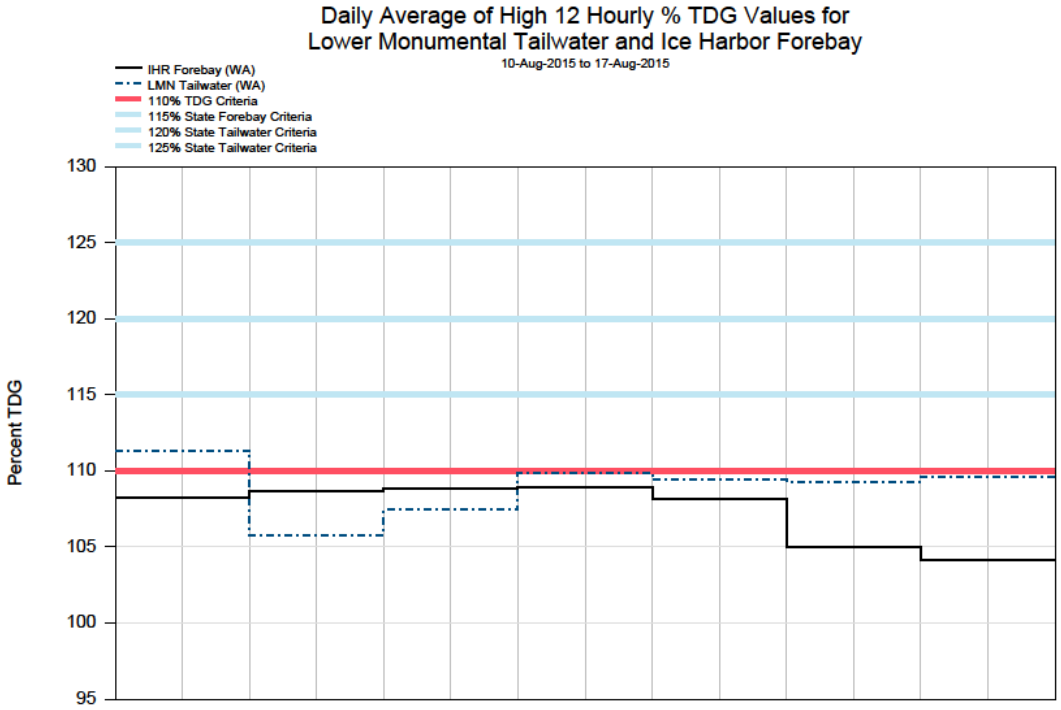

Little Goose Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/10/15 01:00
08/10/15 13:00
08/11/15 01:00
08/11/15 13:00
08/12/15 01:00
08/12/15 13:00
08/13/15 01:00
08/13/15 13:00
08/14/15 01:00
08/14/15 13:00
08/15/15 01:00
08/15/15 13:00
08/16/15 01:00
08/16/15 13:00
08/17/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 11


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
10-Aug-2015 to 17-Aug-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

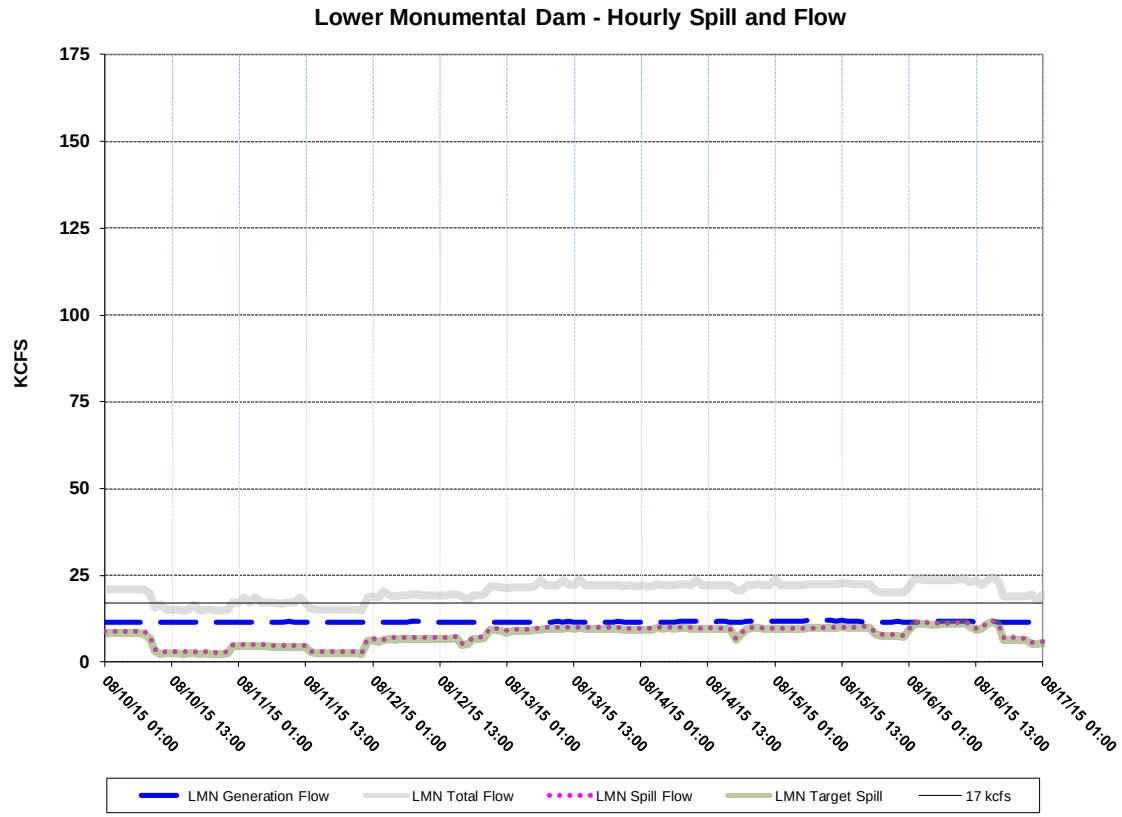
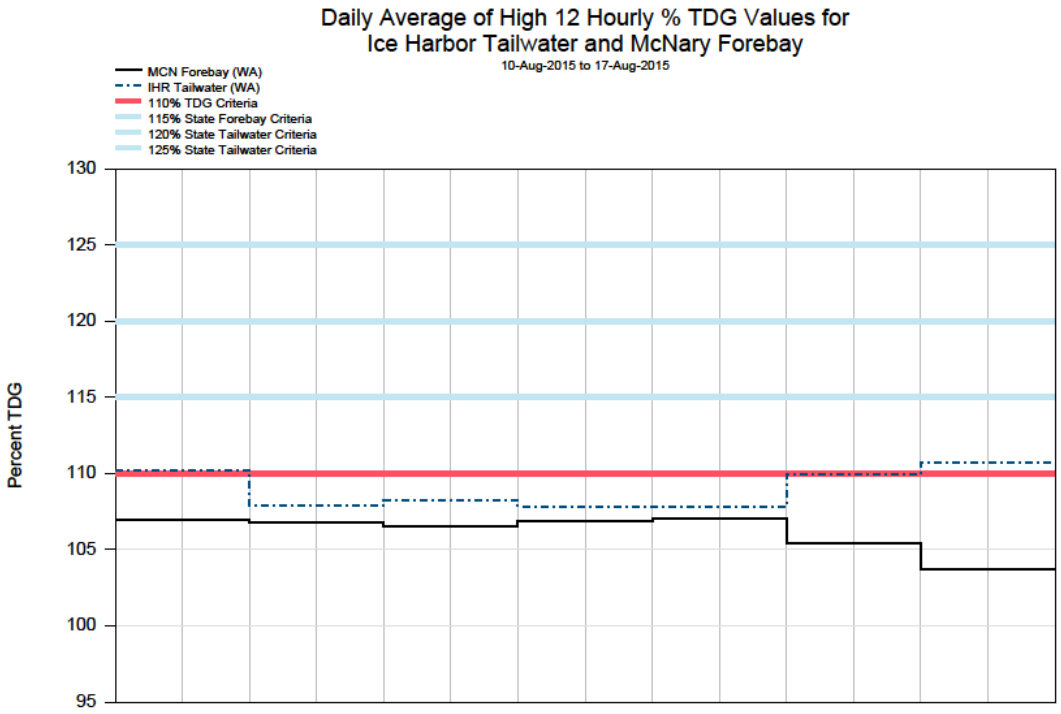

Lower Monumental Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/10/15 01:00
08/10/15 13:00
08/11/15 01:00
08/11/15 13:00
08/12/15 01:00
08/12/15 13:00
08/13/15 01:00
08/13/15 13:00
08/14/15 01:00
08/14/15 13:00
08/15/15 01:00
08/15/15 13:00
08/16/15 01:00
08/16/15 13:00
08/17/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 12


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
10-Aug-2015 to 17-Aug-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

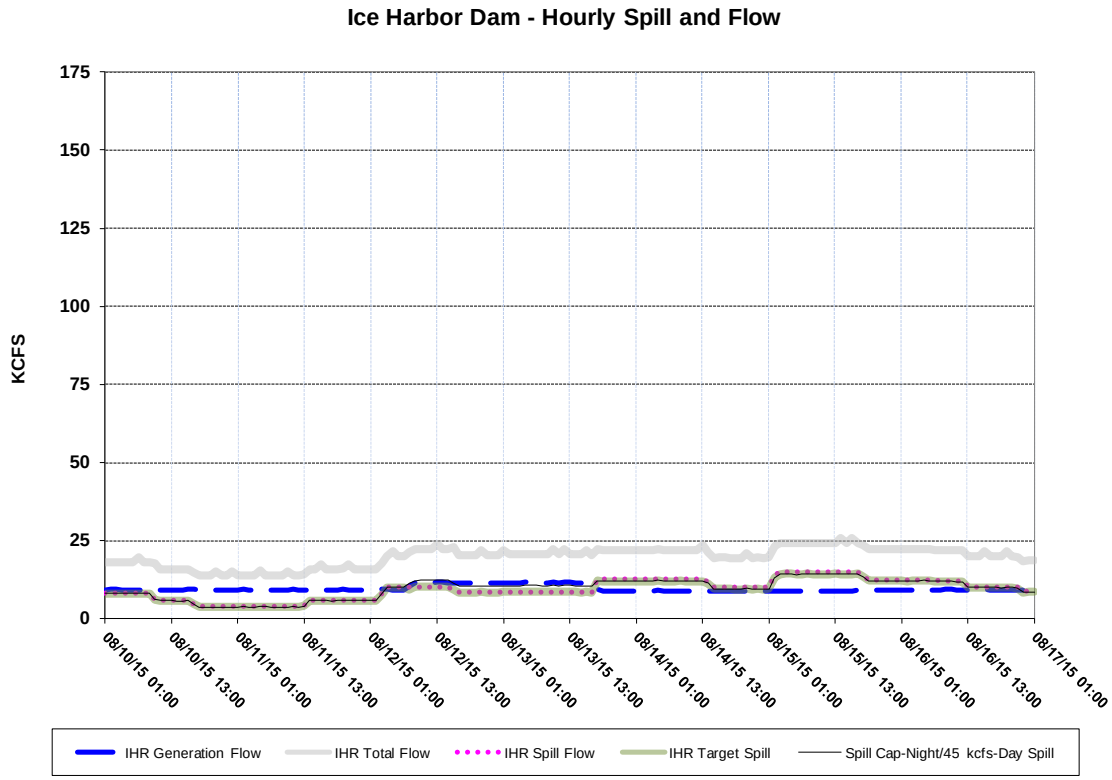
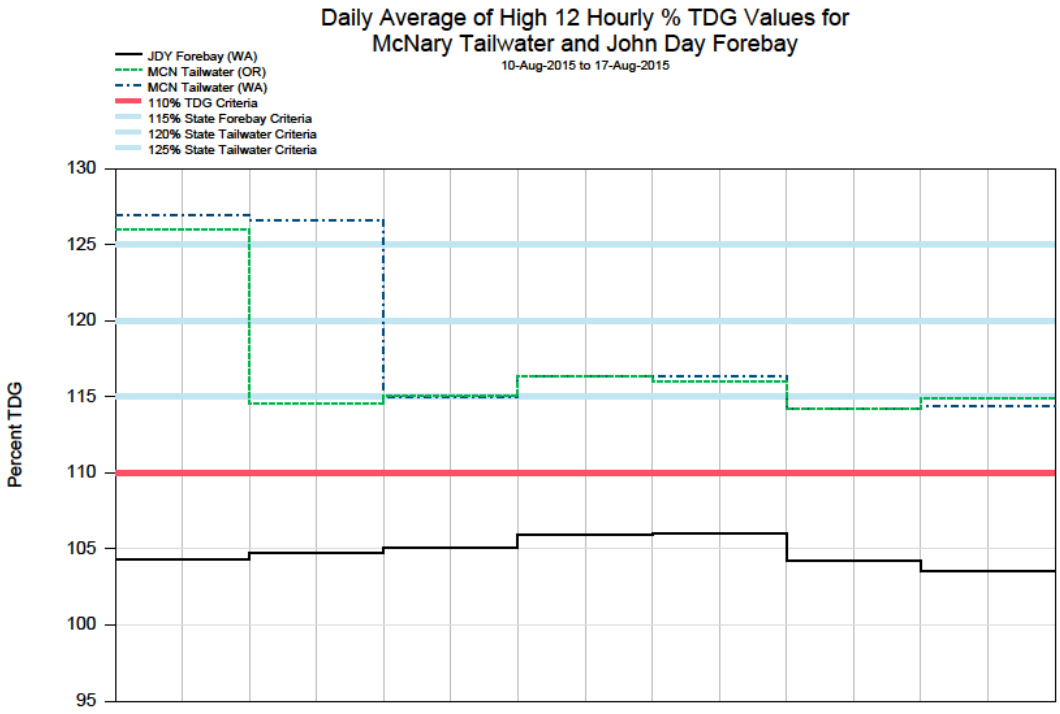

Ice Harbor Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/10/15 01:00
08/10/15 13:00
08/11/15 01:00
08/11/15 13:00
08/12/15 01:00
08/12/15 13:00
08/13/15 01:00
08/13/15 13:00
08/14/15 01:00
08/14/15 13:00
08/15/15 01:00
08/15/15 13:00
08/16/15 01:00
08/16/15 13:00
08/17/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 13


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
10-Aug-2015 to 17-Aug-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

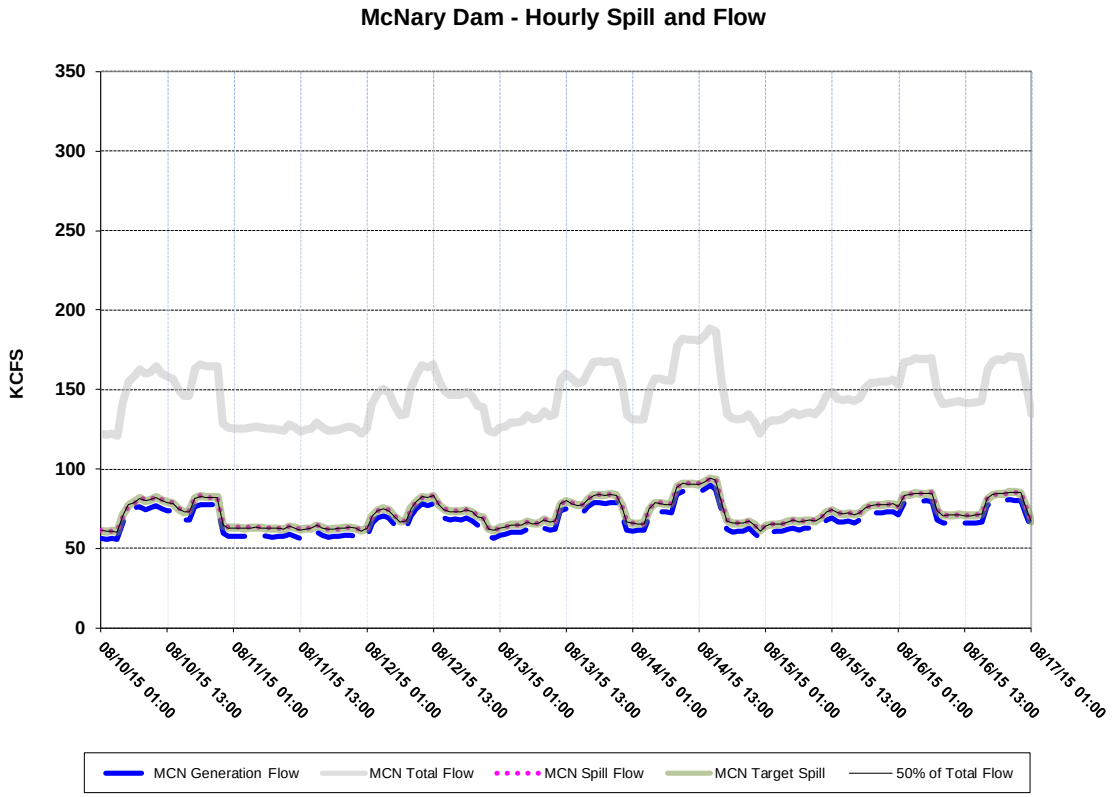
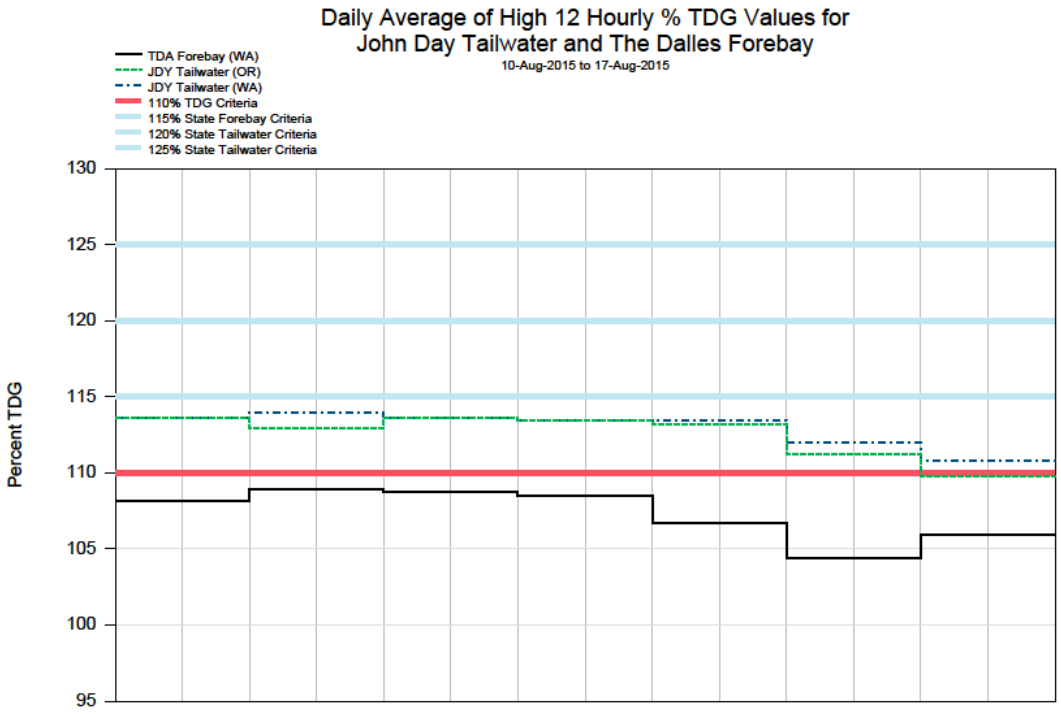

McNary Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/10/15 01:00
08/10/15 13:00
08/11/15 01:00
08/11/15 13:00
08/12/15 01:00
08/12/15 13:00
08/13/15 01:00
08/13/15 13:00
08/14/15 01:00
08/14/15 13:00
08/15/15 01:00
08/15/15 13:00
08/16/15 01:00
08/16/15 13:00
08/17/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 14


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
10-Aug-2015 to 17-Aug-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

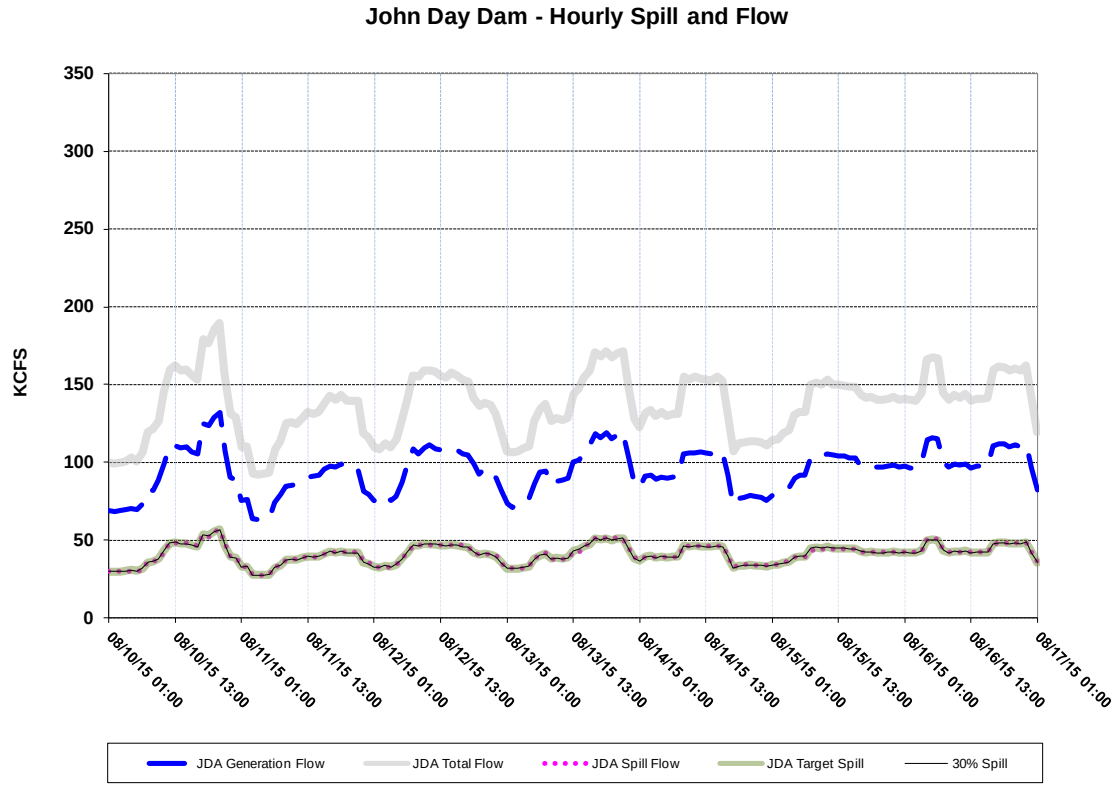
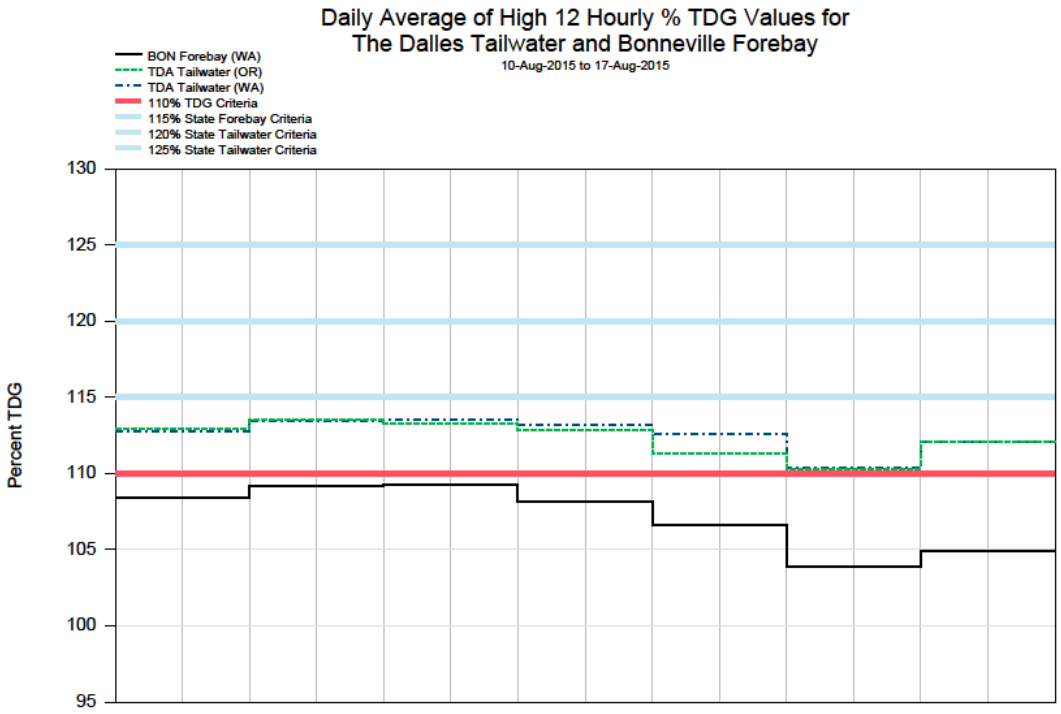

John Day Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/10/15 01:00
08/10/15 13:00
08/11/15 01:00
08/11/15 13:00
08/12/15 01:00
08/12/15 13:00
08/13/15 01:00
08/13/15 13:00
08/14/15 01:00
08/14/15 13:00
08/15/15 01:00
08/15/15 13:00
08/16/15 01:00
08/16/15 13:00
08/17/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 15


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
10-Aug-2015 to 17-Aug-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

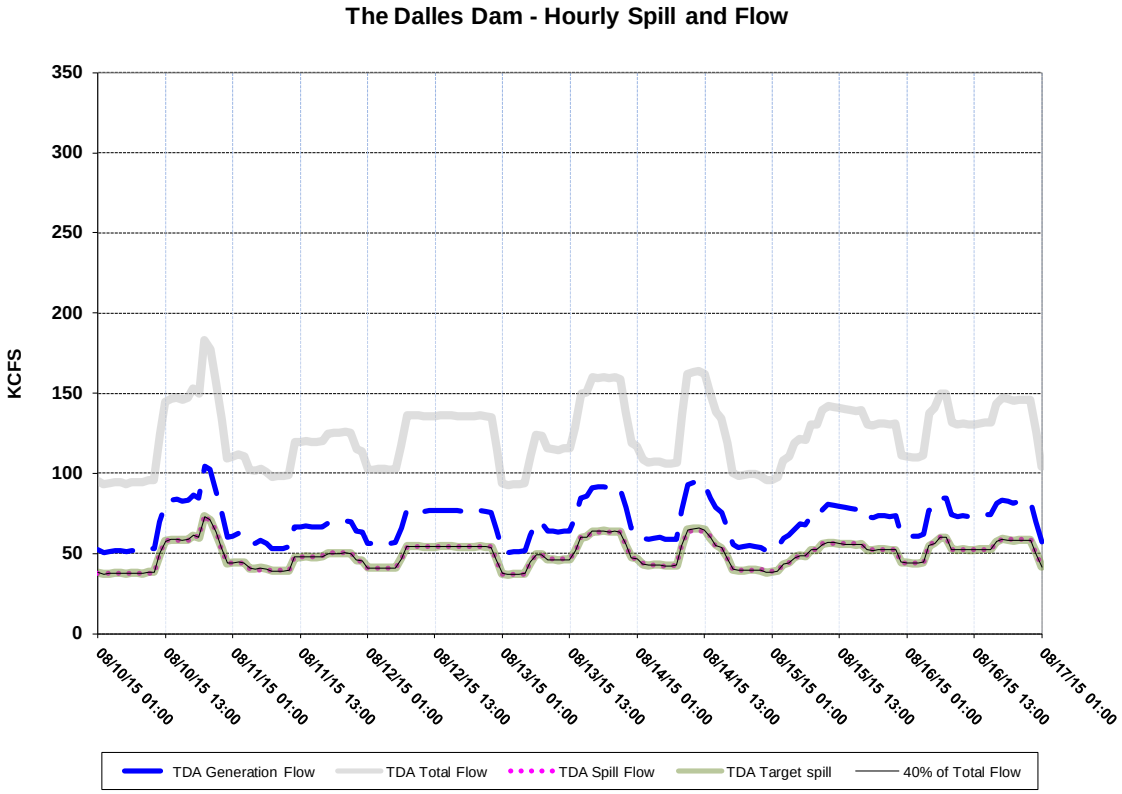
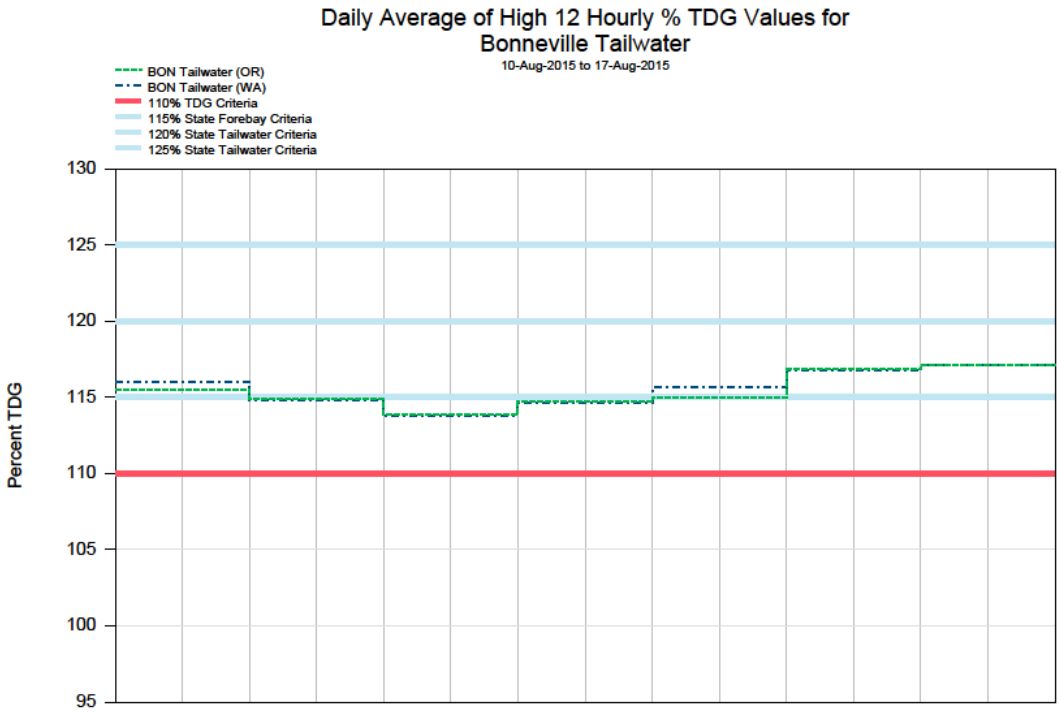

The Dalles Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/10/15 01:00
08/10/15 13:00
08/11/15 01:00
08/11/15 13:00
08/12/15 01:00
08/12/15 13:00
08/13/15 01:00
08/13/15 13:00
08/14/15 01:00
08/14/15 13:00
08/15/15 01:00
08/15/15 13:00
08/16/15 01:00
08/16/15 13:00
08/17/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 16


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
10-Aug-2015 to 17-Aug-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

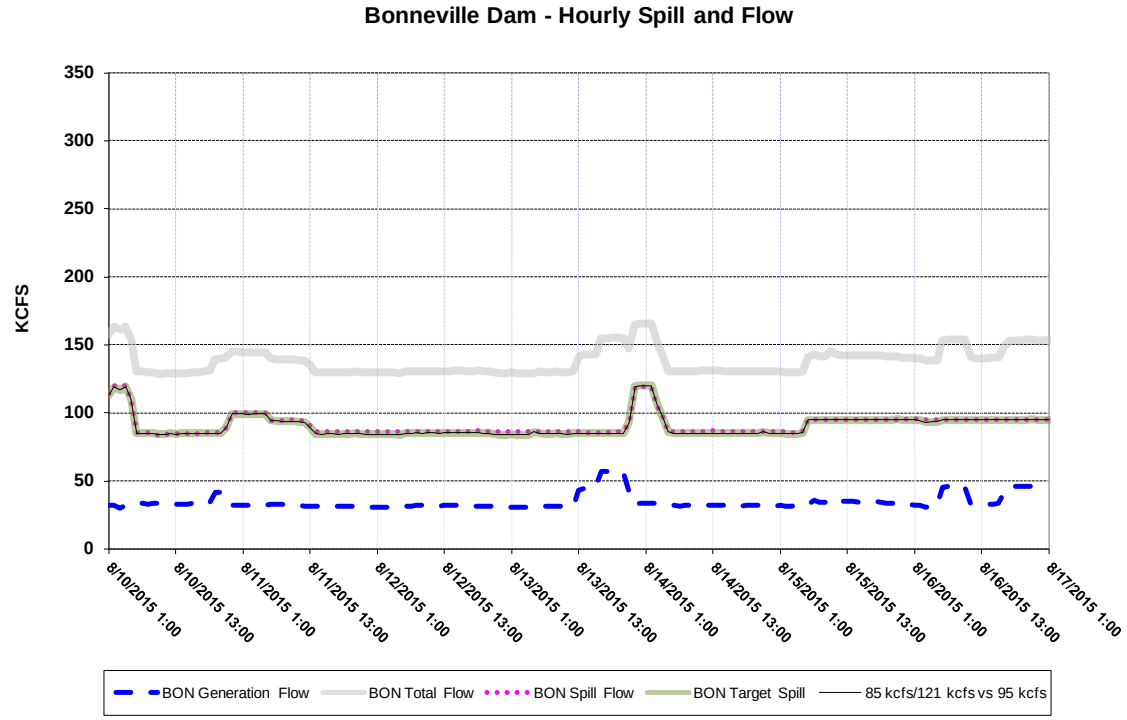
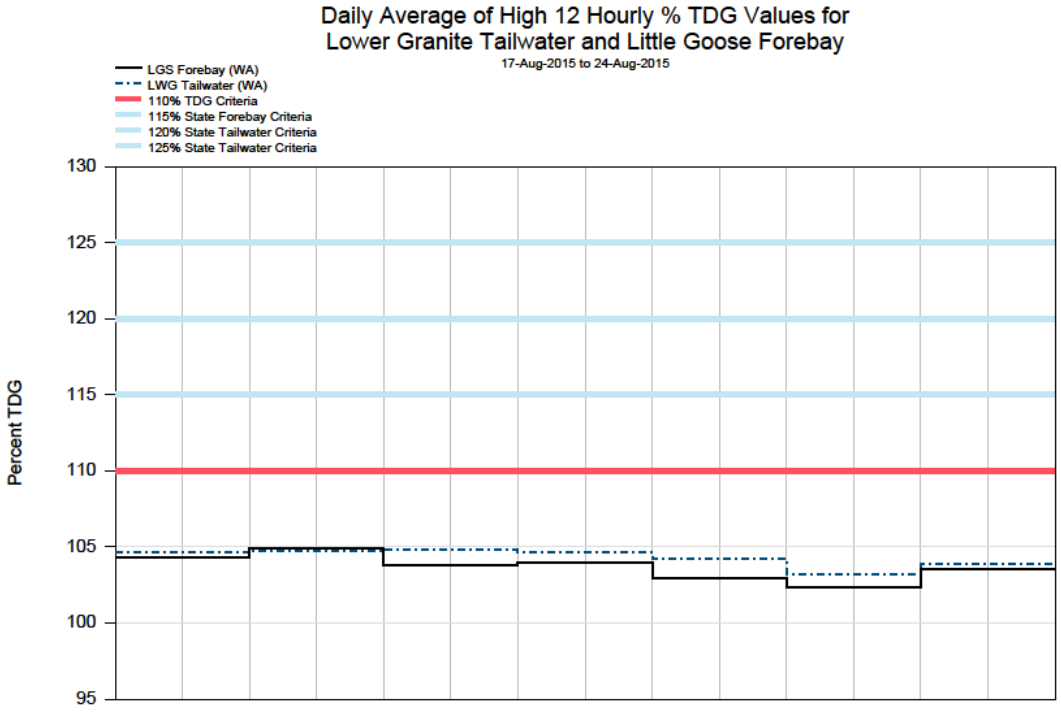

Bonneville Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
8/10/2015 1:00
8/10/2015 13:00
8/11/2015 1:00
8/11/2015 13:00
8/12/2015 1:00
8/12/2015 13:00
8/13/2015 1:00
8/13/2015 13:00
8/14/2015 1:00
8/14/2015 13:00
8/15/2015 1:00
8/15/2015 13:00
8/16/2015 1:00
8/16/2015 13:00
8/17/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/121 kcfs vs 95 kcfs

Figure 17


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
17-Aug-2015 to 24-Aug-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

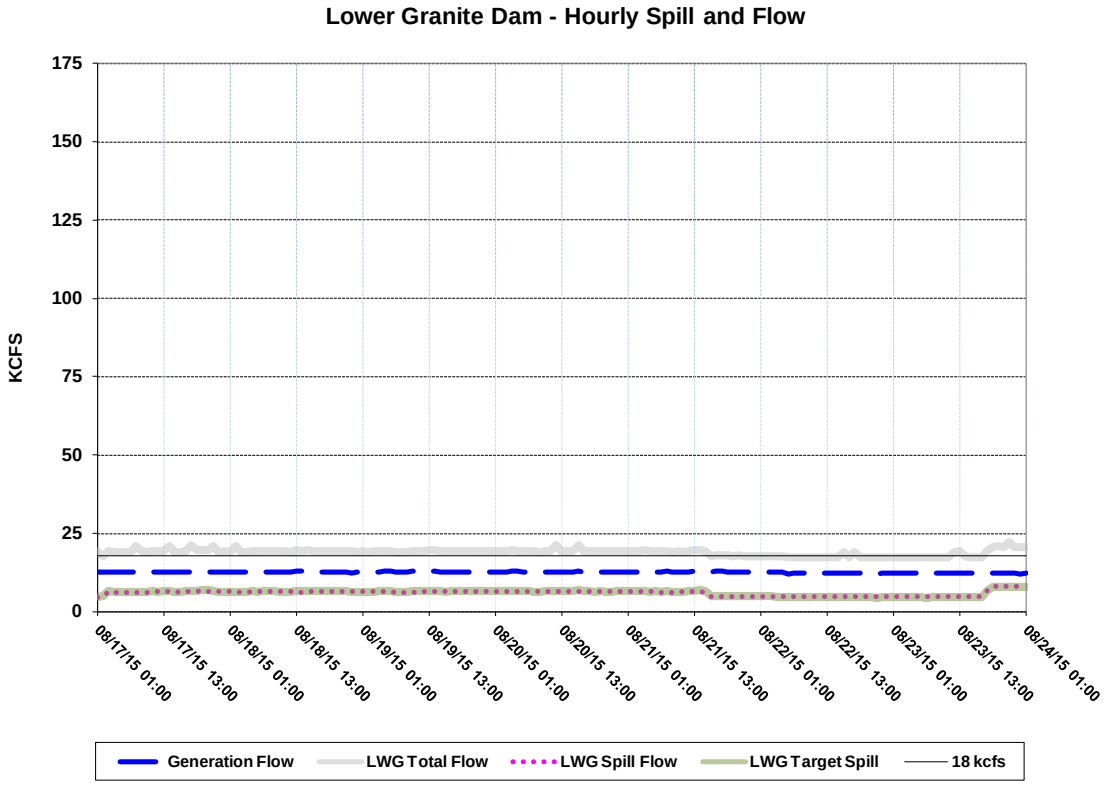
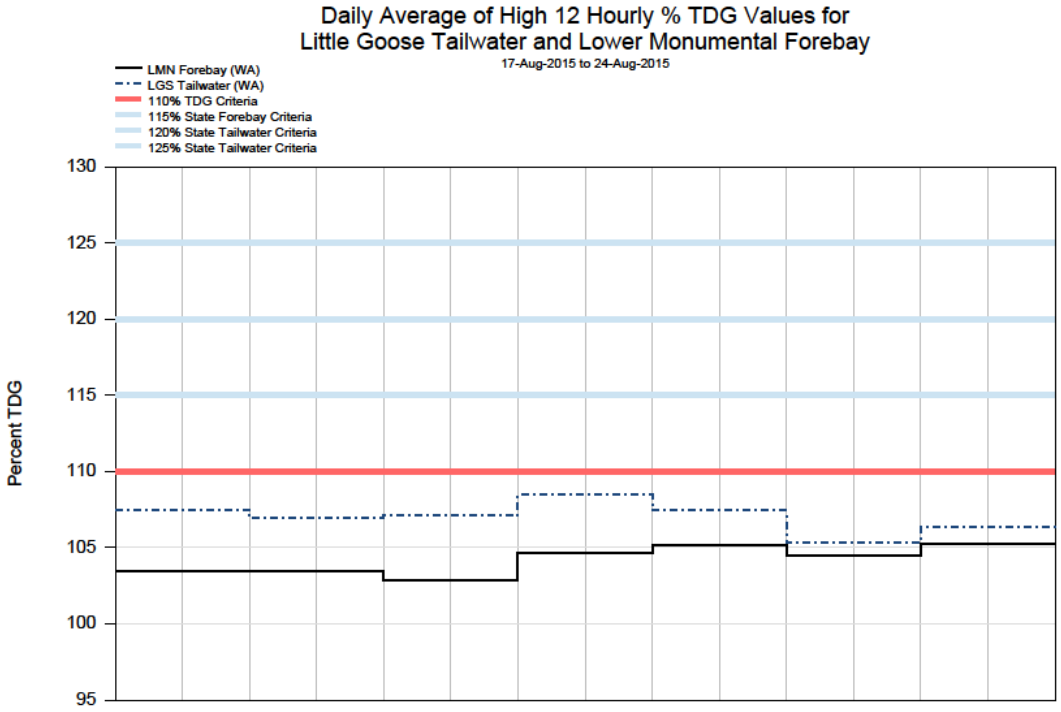

Lower Granite Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/17/15 01:00
08/17/15 13:00
08/18/15 01:00
08/18/15 13:00
08/19/15 01:00
08/19/15 13:00
08/20/15 01:00
08/20/15 13:00
08/21/15 01:00
08/21/15 13:00
08/22/15 01:00
08/22/15 13:00
08/23/15 01:00
08/23/15 13:00
08/24/15 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 18


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
17-Aug-2015 to 24-Aug-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

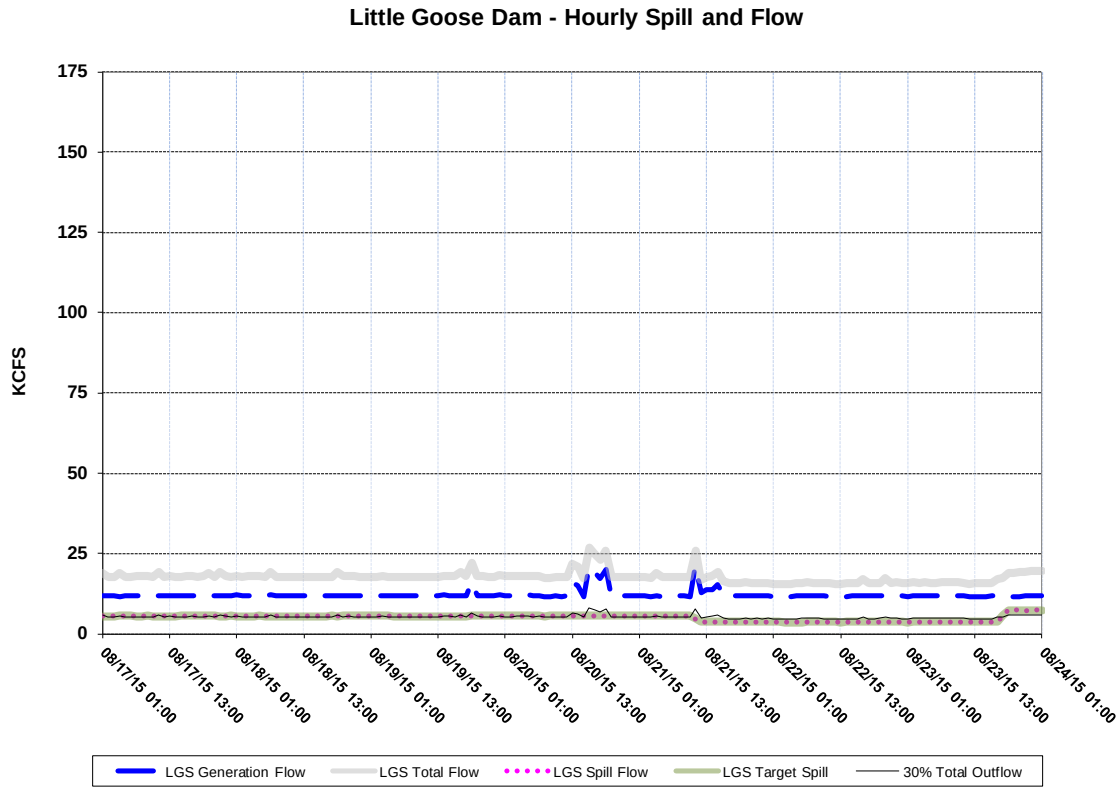
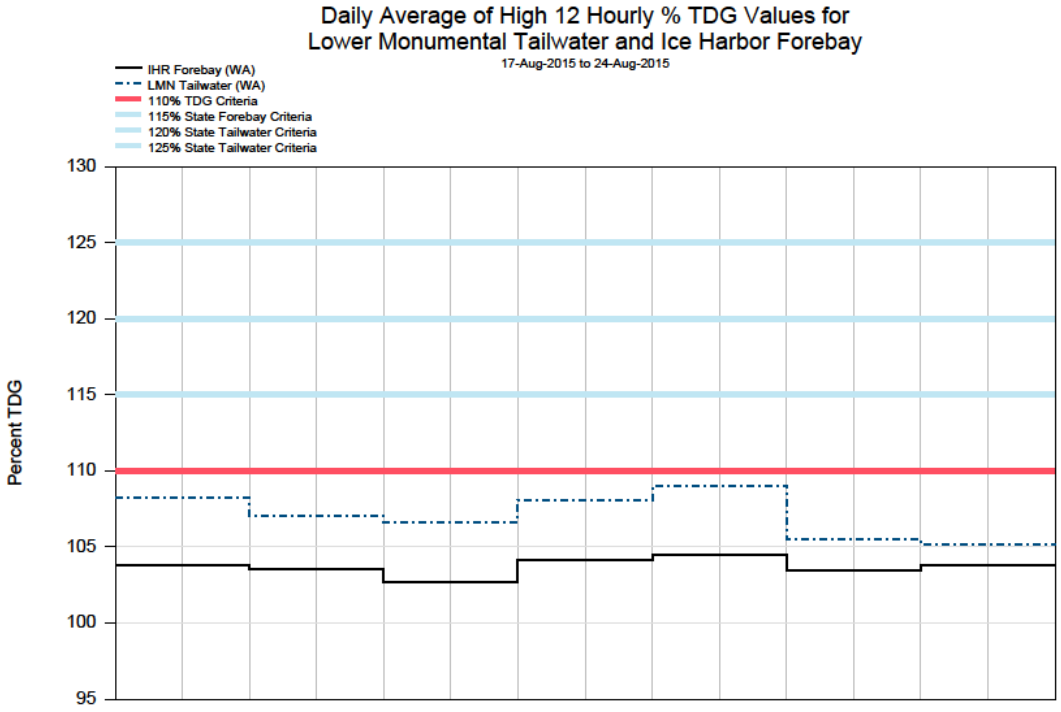

Little Goose Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/17/15 01:00
08/17/15 13:00
08/18/15 01:00
08/18/15 13:00
08/19/15 01:00
08/19/15 13:00
08/20/15 01:00
08/20/15 13:00
08/21/15 01:00
08/21/15 13:00
08/22/15 01:00
08/22/15 13:00
08/23/15 01:00
08/23/15 13:00
08/24/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 19


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
17-Aug-2015 to 24-Aug-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

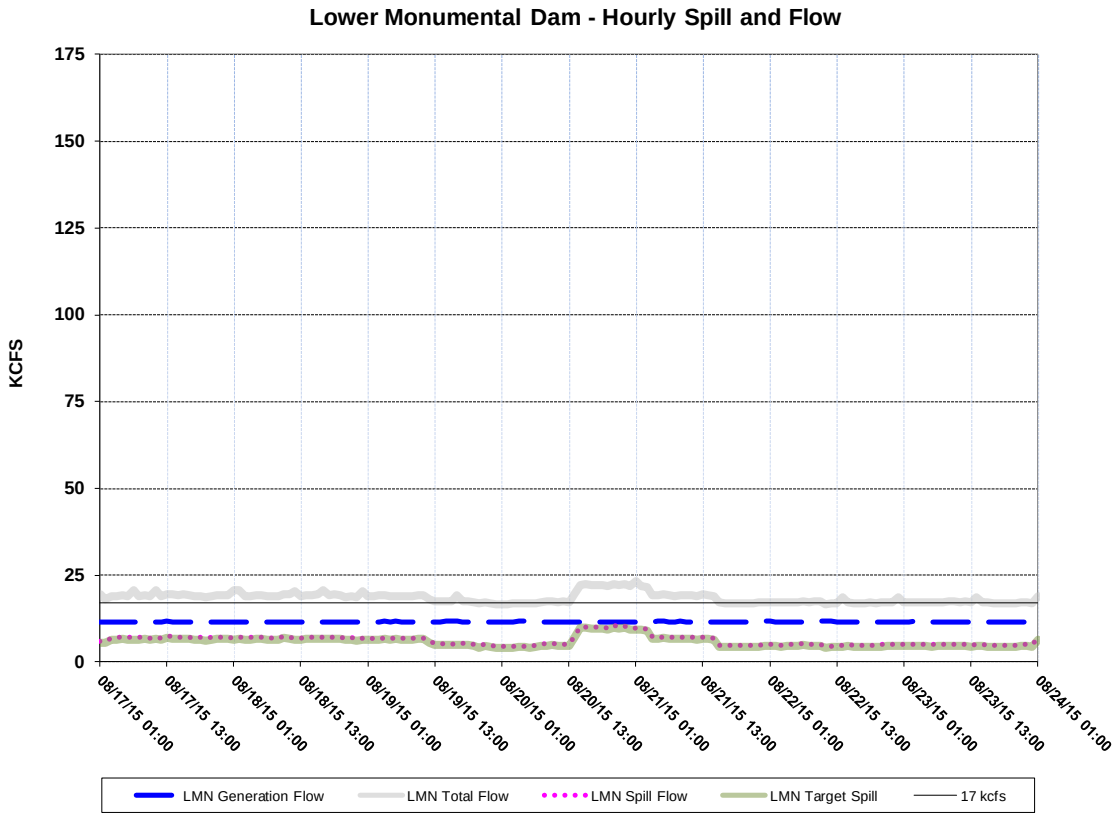
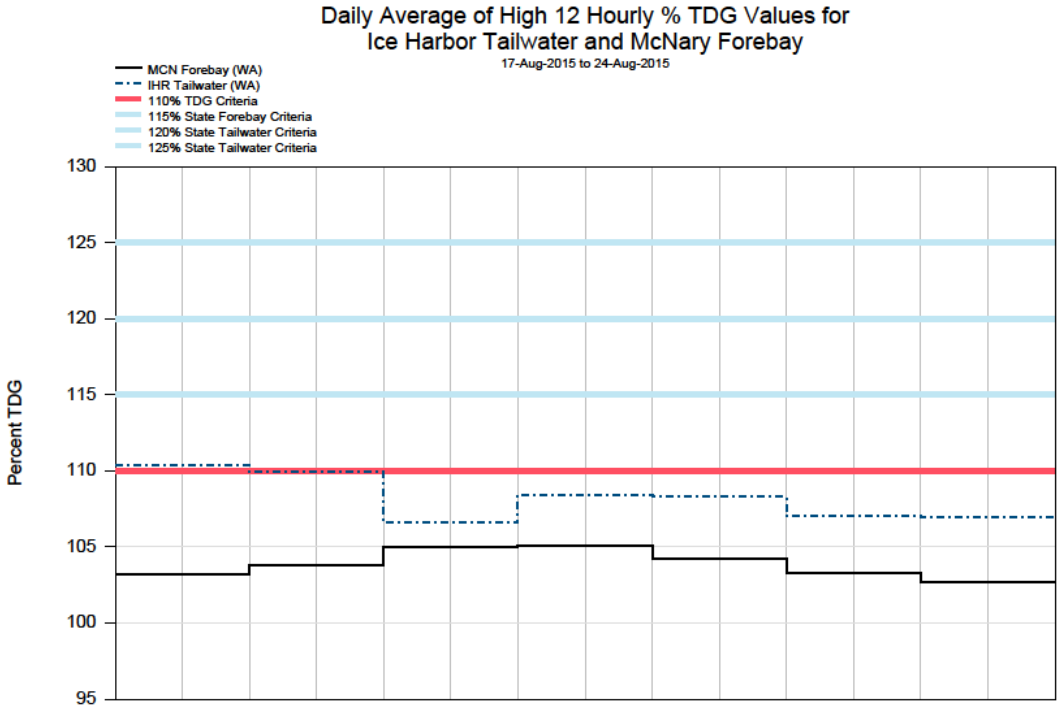

Lower Monumental Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/17/15 01:00
08/17/15 13:00
08/18/15 01:00
08/18/15 13:00
08/19/15 01:00
08/19/15 13:00
08/20/15 01:00
08/20/15 13:00
08/21/15 01:00
08/21/15 13:00
08/22/15 01:00
08/22/15 13:00
08/23/15 01:00
08/23/15 13:00
08/24/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 20


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
17-Aug-2015 to 24-Aug-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

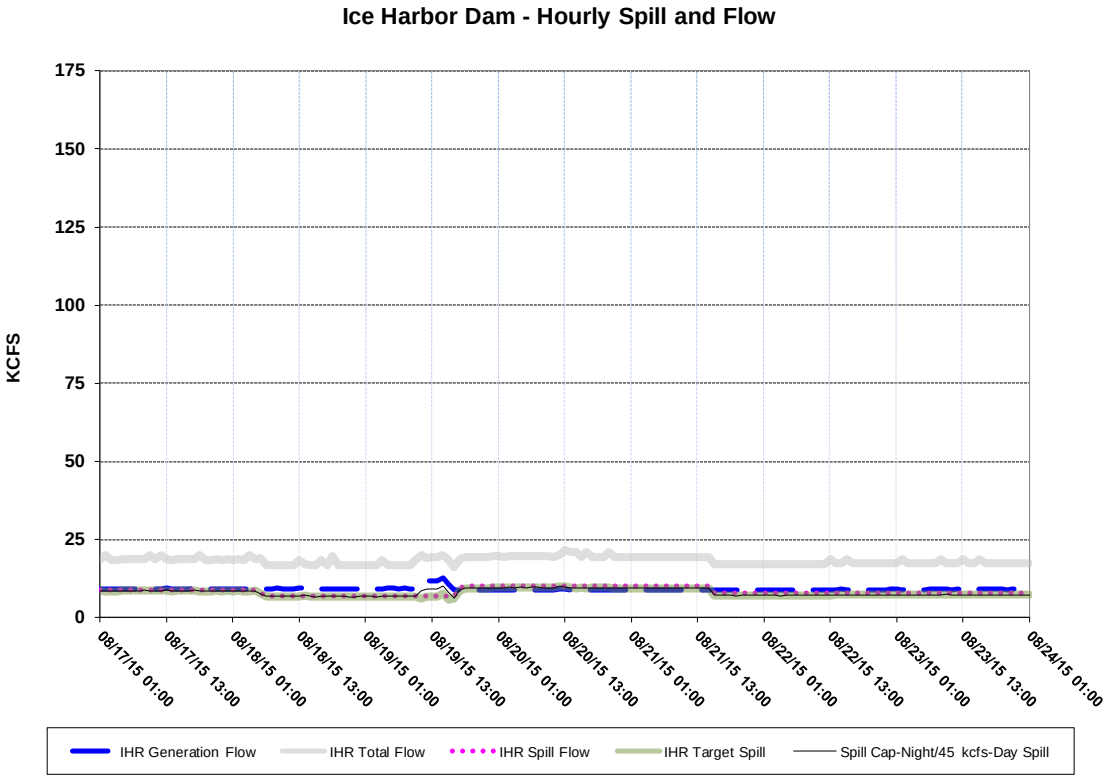
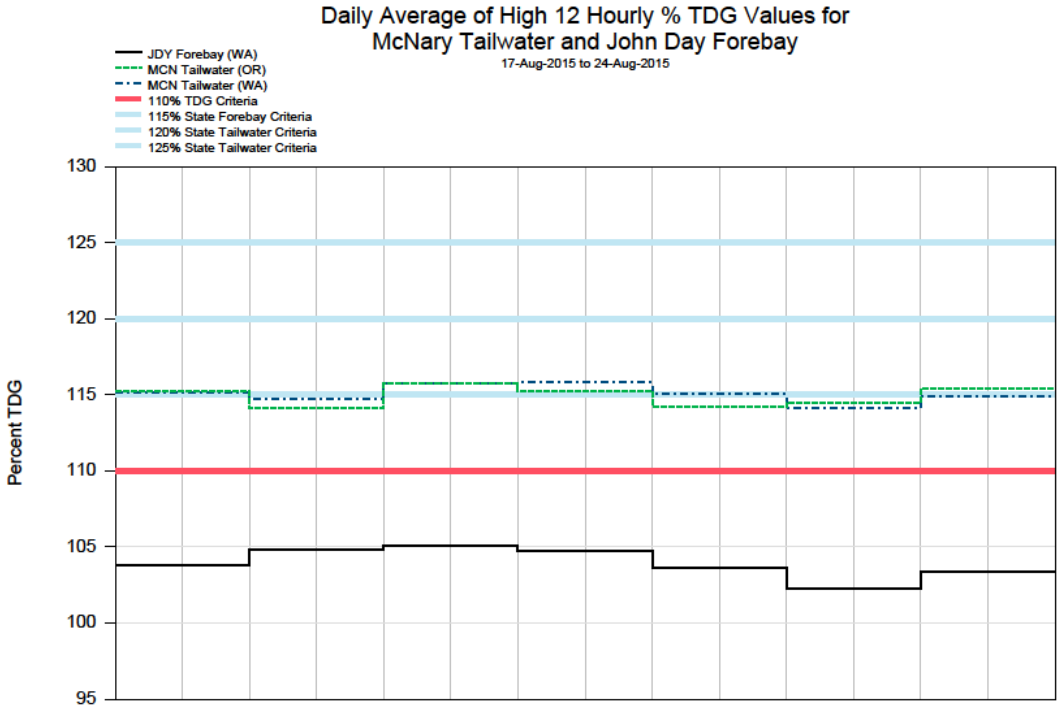

Ice Harbor Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/17/15 01:00
08/17/15 13:00
08/18/15 01:00
08/18/15 13:00
08/19/15 01:00
08/19/15 13:00
08/20/15 01:00
08/20/15 13:00
08/21/15 01:00
08/21/15 13:00
08/22/15 01:00
08/22/15 13:00
08/23/15 01:00
08/23/15 13:00
08/24/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 21


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
17-Aug-2015 to 24-Aug-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

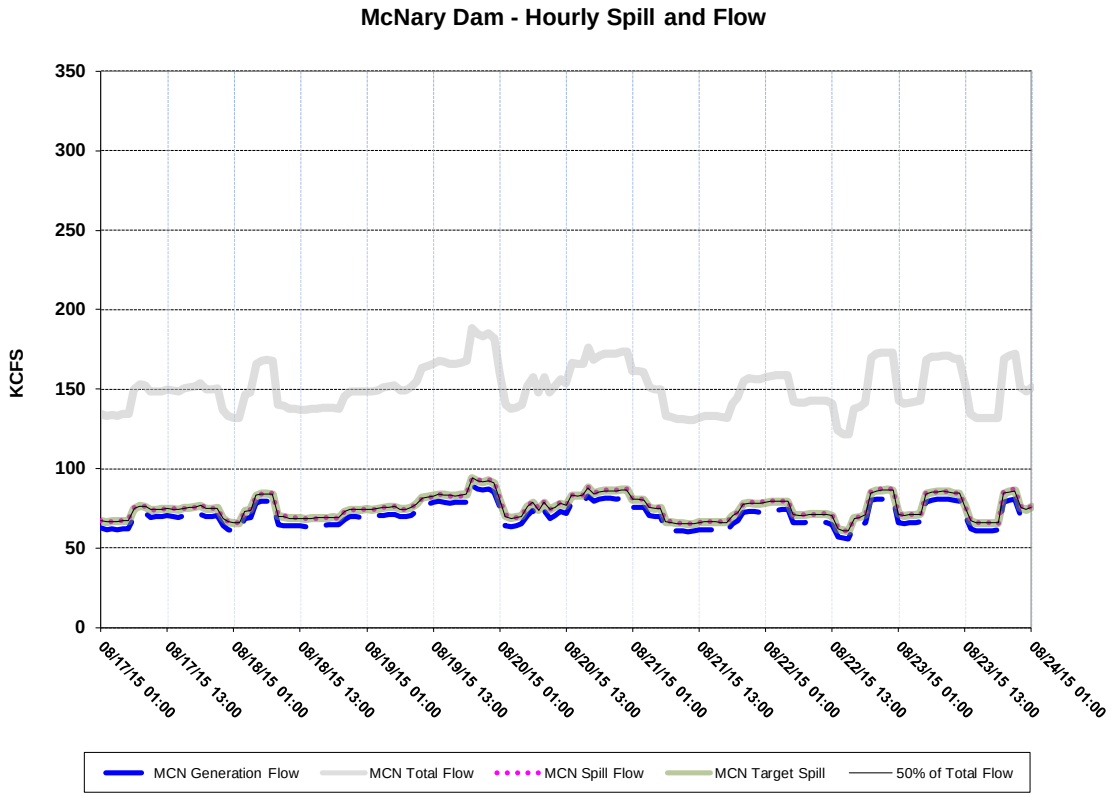
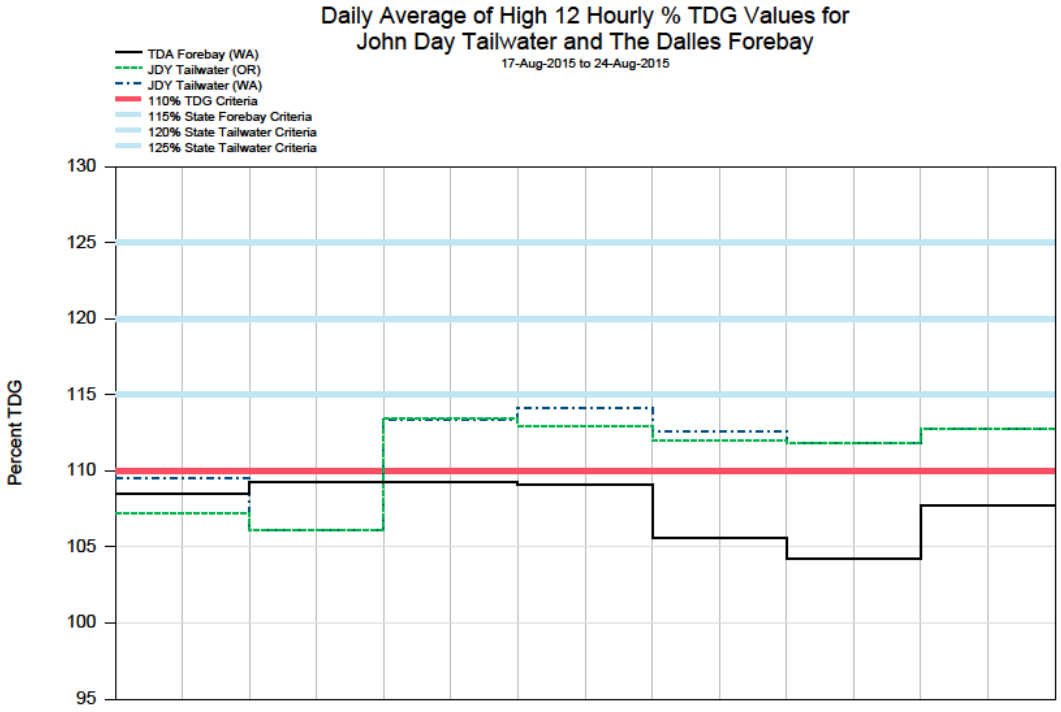

McNary Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/17/15 01:00
08/17/15 13:00
08/18/15 01:00
08/18/15 13:00
08/19/15 01:00
08/19/15 13:00
08/20/15 01:00
08/20/15 13:00
08/21/15 01:00
08/21/15 13:00
08/22/15 01:00
08/22/15 13:00
08/23/15 01:00
08/23/15 13:00
08/24/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 22


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
17-Aug-2015 to 24-Aug-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

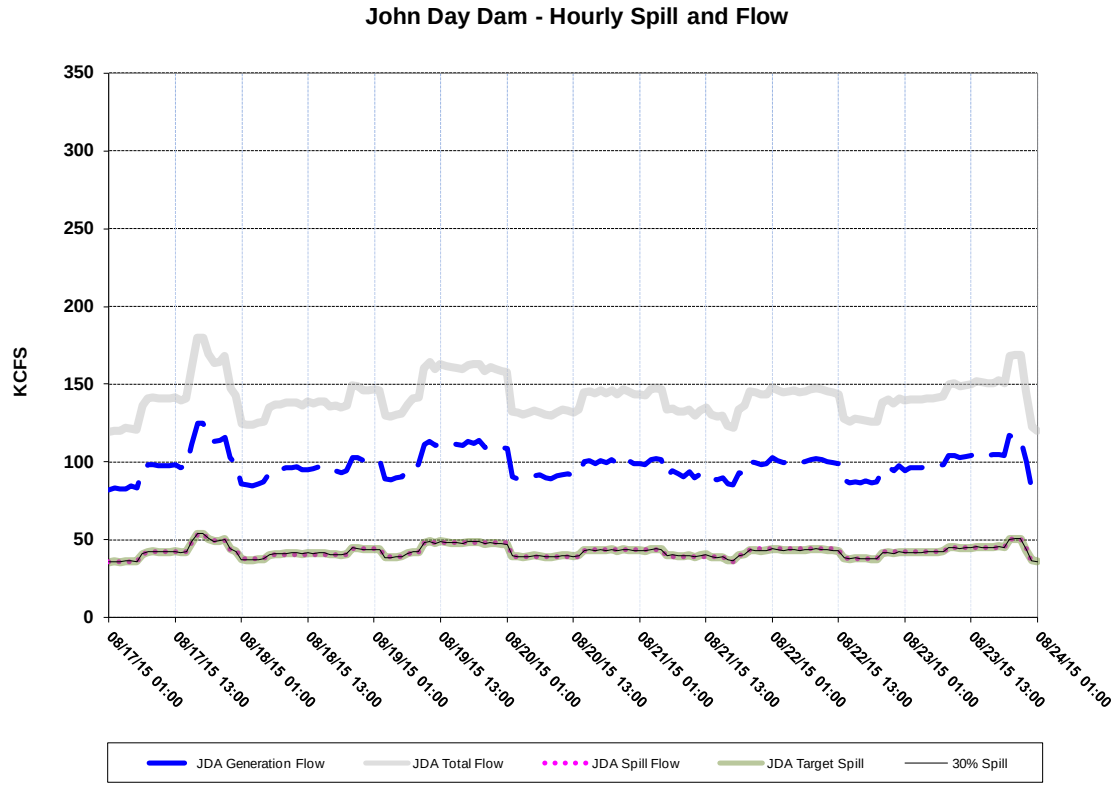
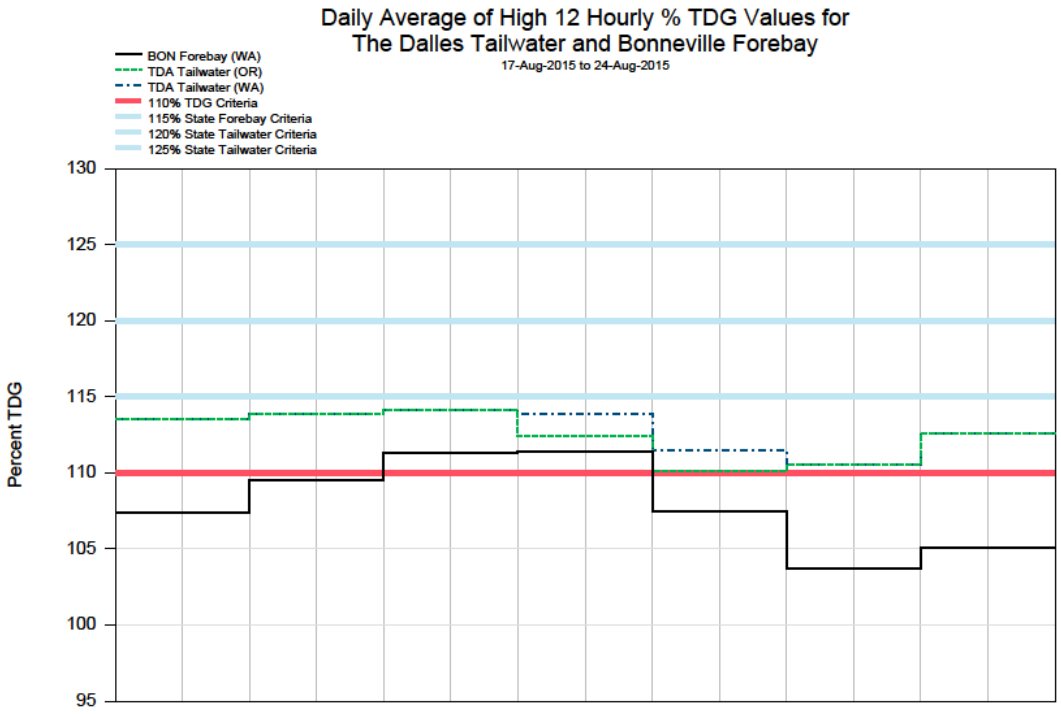

John Day Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/17/15 01:00
08/17/15 13:00
08/18/15 01:00
08/18/15 13:00
08/19/15 01:00
08/19/15 13:00
08/20/15 01:00
08/20/15 13:00
08/21/15 01:00
08/21/15 13:00
08/22/15 01:00
08/22/15 13:00
08/23/15 01:00
08/23/15 13:00
08/24/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 23


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
17-Aug-2015 to 24-Aug-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

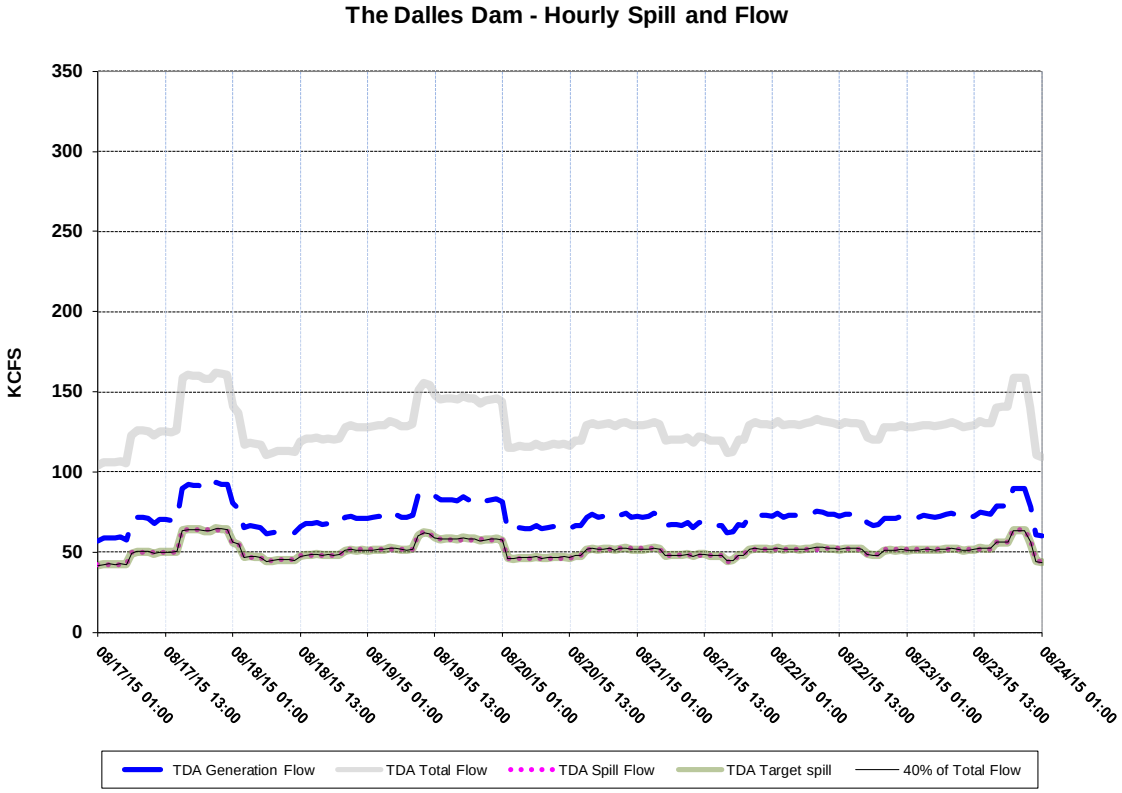
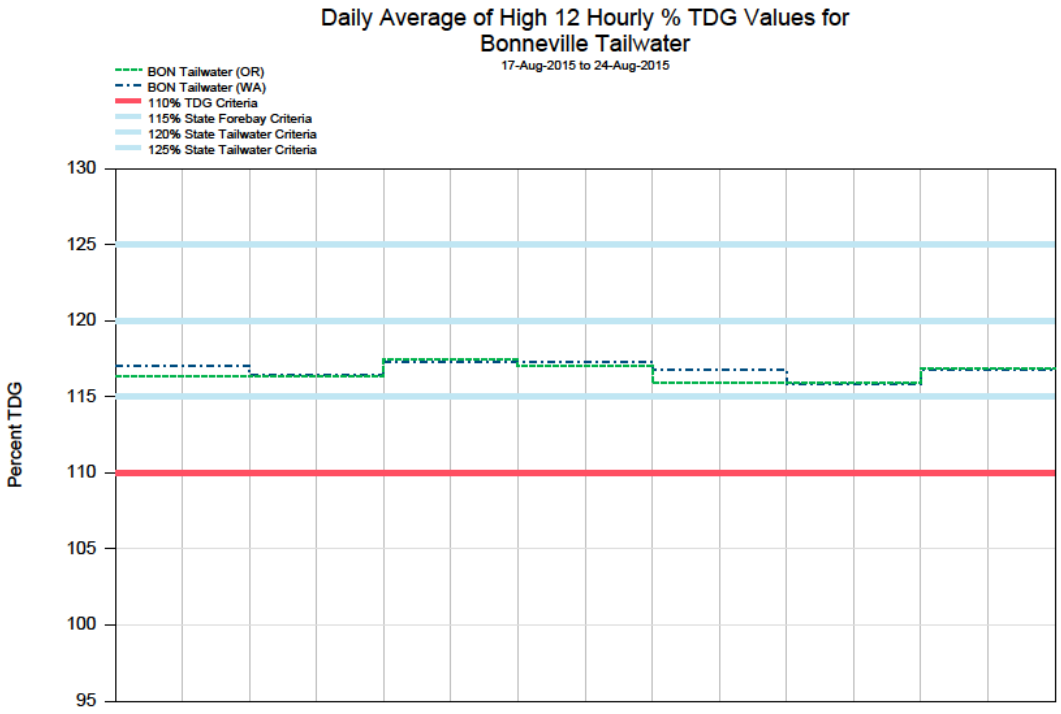

The Dalles Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/17/15 01:00
08/17/15 13:00
08/18/15 01:00
08/18/15 13:00
08/19/15 01:00
08/19/15 13:00
08/20/15 01:00
08/20/15 13:00
08/21/15 01:00
08/21/15 13:00
08/22/15 01:00
08/22/15 13:00
08/23/15 01:00
08/23/15 13:00
08/24/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 24


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
17-Aug-2015 to 24-Aug-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

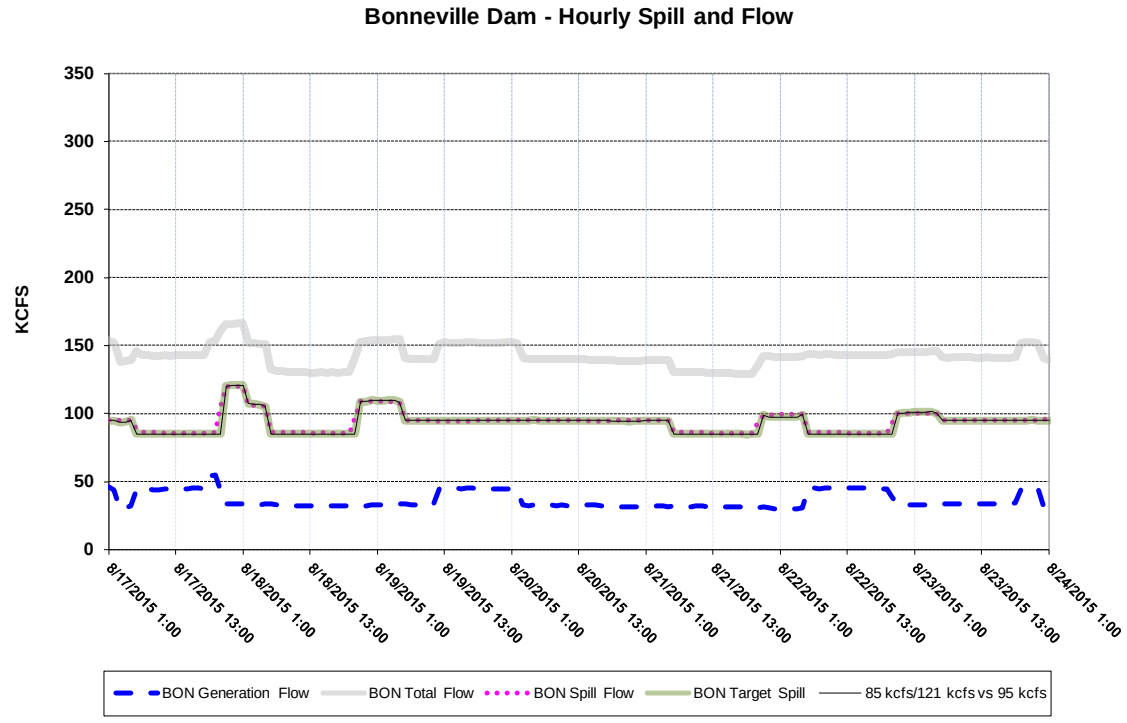
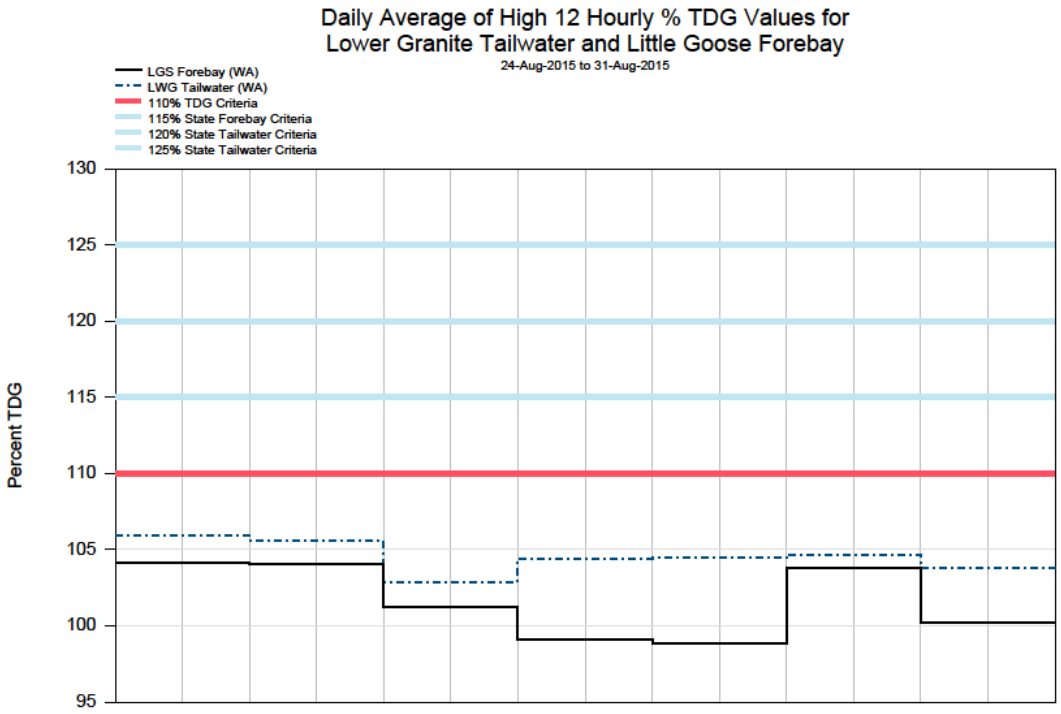

Bonneville Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
8/17/2015 1:00
8/17/2015 13:00
8/18/2015 1:00
8/18/2015 13:00
8/19/2015 1:00
8/19/2015 13:00
8/20/2015 1:00
8/20/2015 13:00
8/21/2015 1:00
8/21/2015 13:00
8/22/2015 1:00
8/22/2015 13:00
8/23/2015 1:00
8/23/2015 13:00
8/24/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/121 kcfs vs 95 kcfs

Figure 25


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
24-Aug-2015 to 31-Aug-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

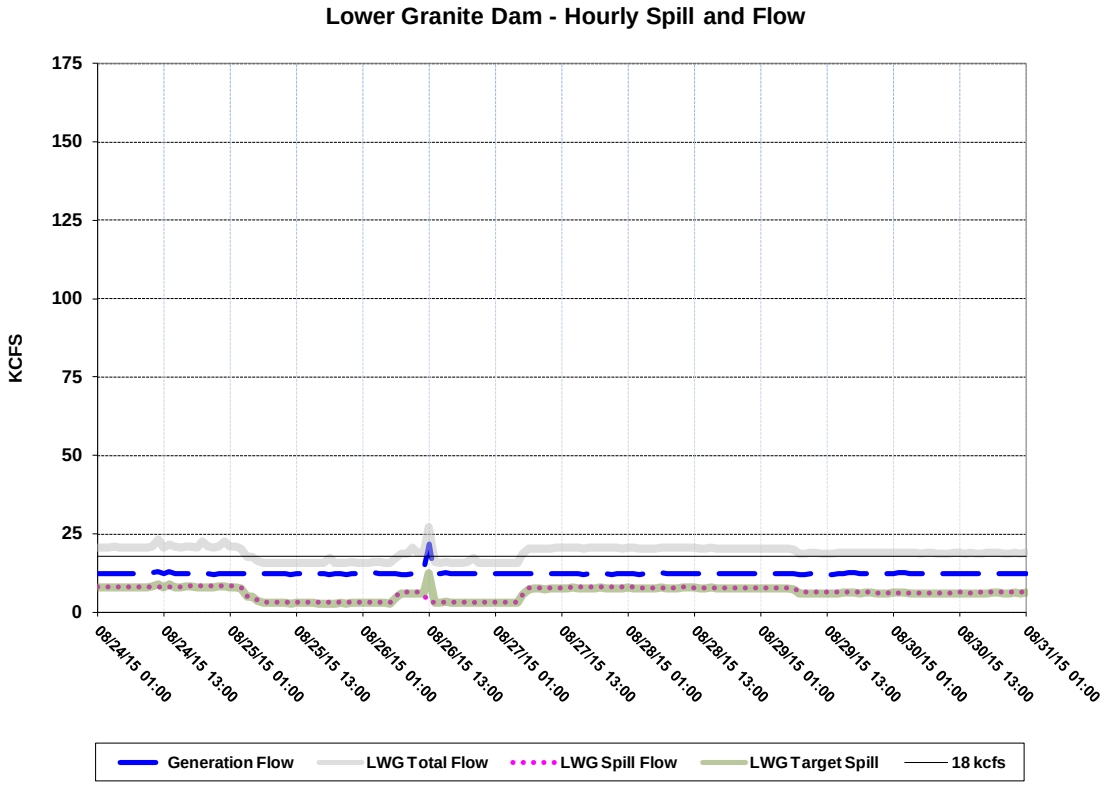
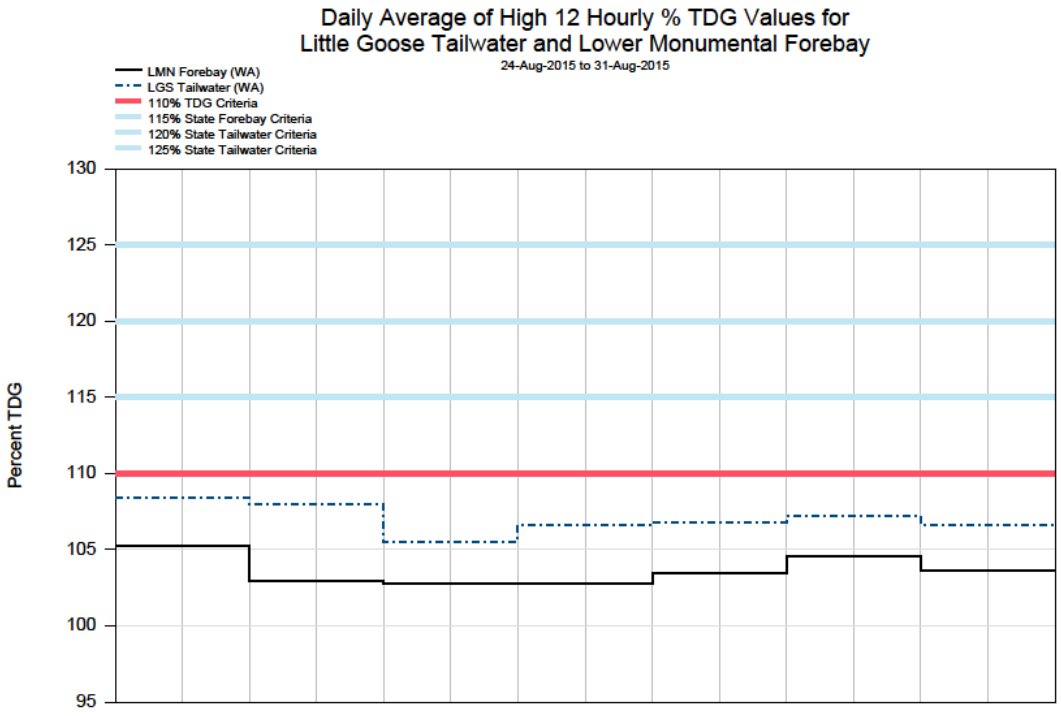

Lower Granite Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/24/15 01:00
08/24/15 13:00
08/25/15 01:00
08/25/15 13:00
08/26/15 01:00
08/26/15 13:00
08/27/15 01:00
08/27/15 13:00
08/28/15 01:00
08/28/15 13:00
08/29/15 01:00
08/29/15 13:00
08/30/15 01:00
08/30/15 13:00
08/31/15 01:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 26


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
24-Aug-2015 to 31-Aug-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

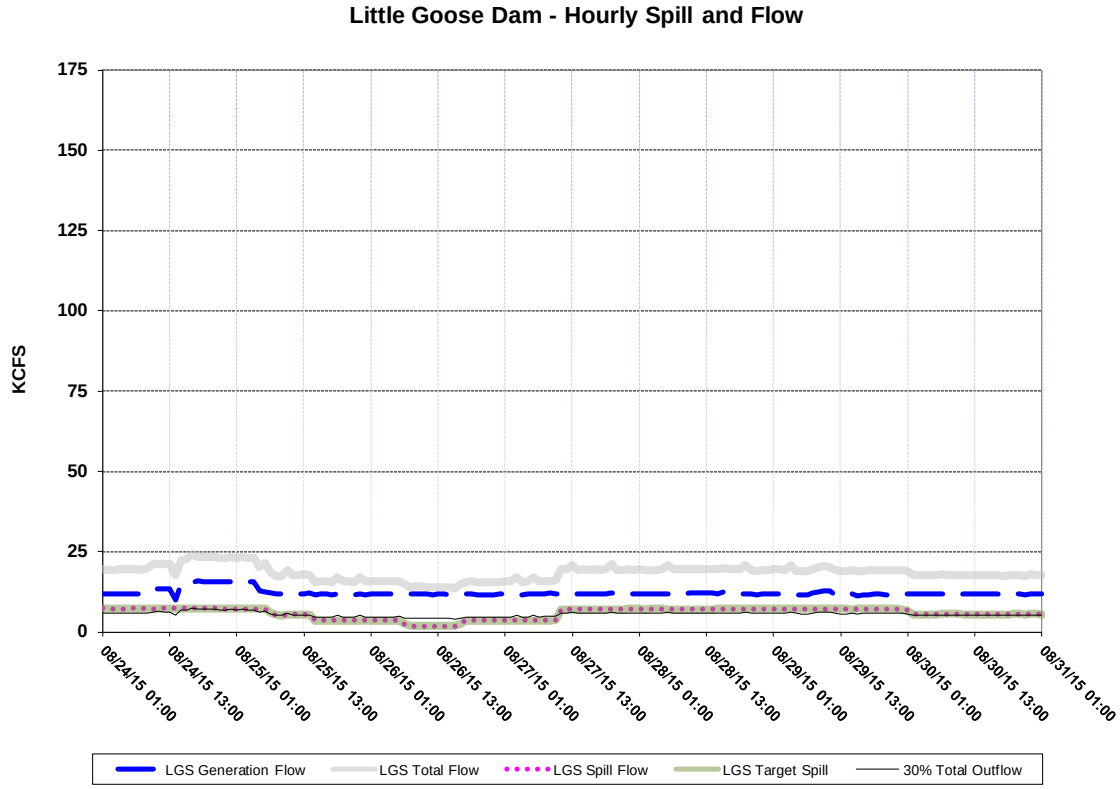
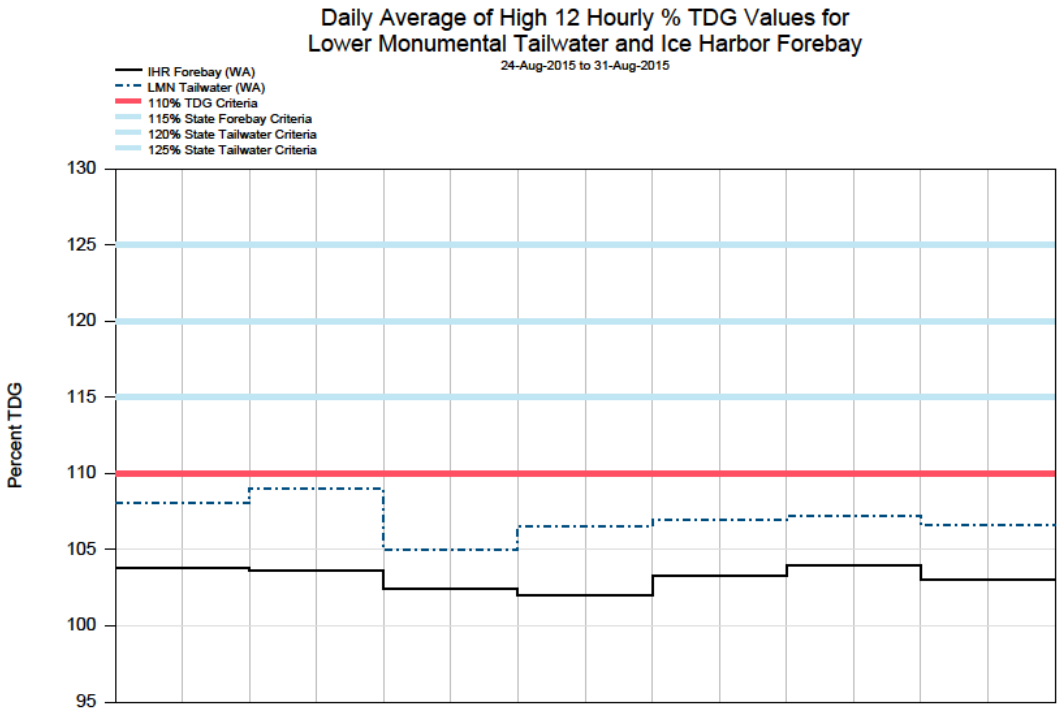

Little Goose Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/24/15 01:00
08/24/15 13:00
08/25/15 01:00
08/25/15 13:00
08/26/15 01:00
08/26/15 13:00
08/27/15 01:00
08/27/15 13:00
08/28/15 01:00
08/28/15 13:00
08/29/15 01:00
08/29/15 13:00
08/30/15 01:00
08/30/15 13:00
08/31/15 01:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 27


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
24-Aug-2015 to 31-Aug-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

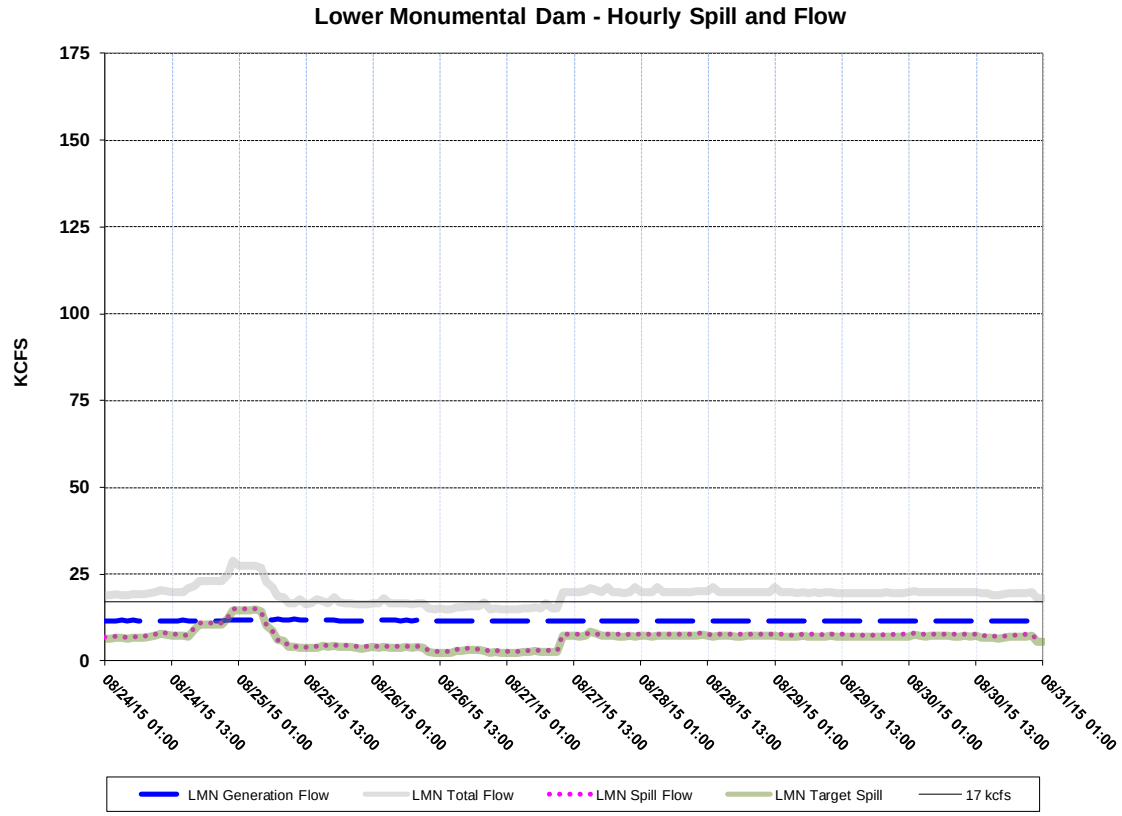
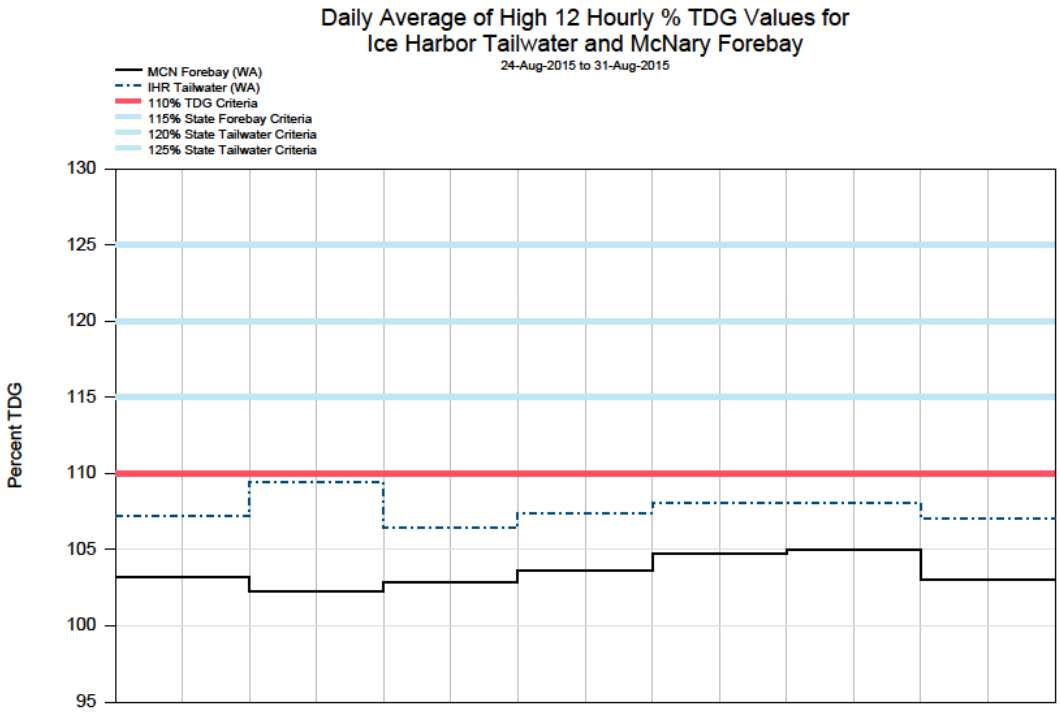

Lower Monumental Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/24/15 01:00
08/24/15 13:00
08/25/15 01:00
08/25/15 13:00
08/26/15 01:00
08/26/15 13:00
08/27/15 01:00
08/27/15 13:00
08/28/15 01:00
08/28/15 13:00
08/29/15 01:00
08/29/15 13:00
08/30/15 01:00
08/30/15 13:00
08/31/15 01:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 28


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
24-Aug-2015 to 31-Aug-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

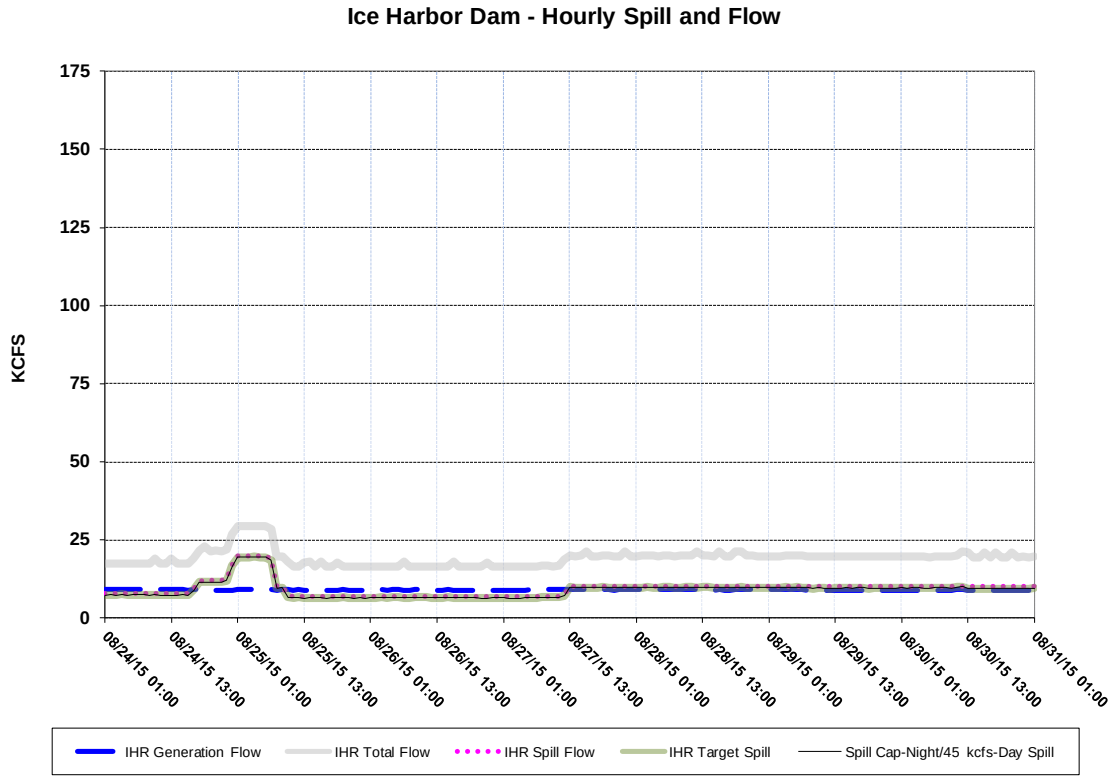
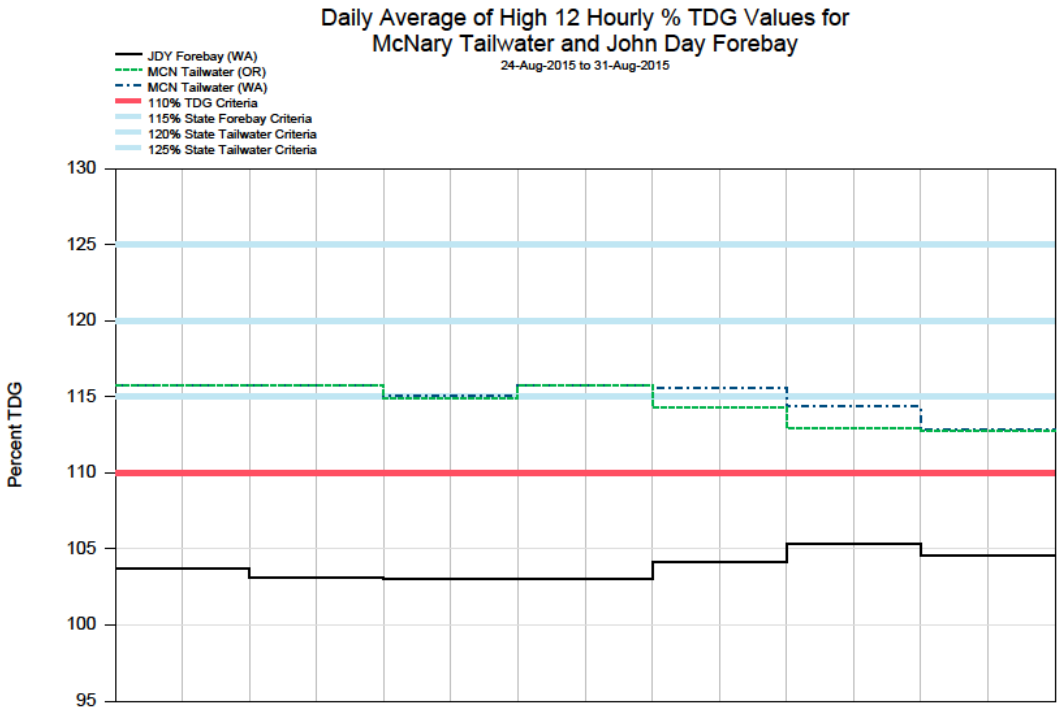

Ice Harbor Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/24/15 01:00
08/24/15 13:00
08/25/15 01:00
08/25/15 13:00
08/26/15 01:00
08/26/15 13:00
08/27/15 01:00
08/27/15 13:00
08/28/15 01:00
08/28/15 13:00
08/29/15 01:00
08/29/15 13:00
08/30/15 01:00
08/30/15 13:00
08/31/15 01:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 29


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
24-Aug-2015 to 31-Aug-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

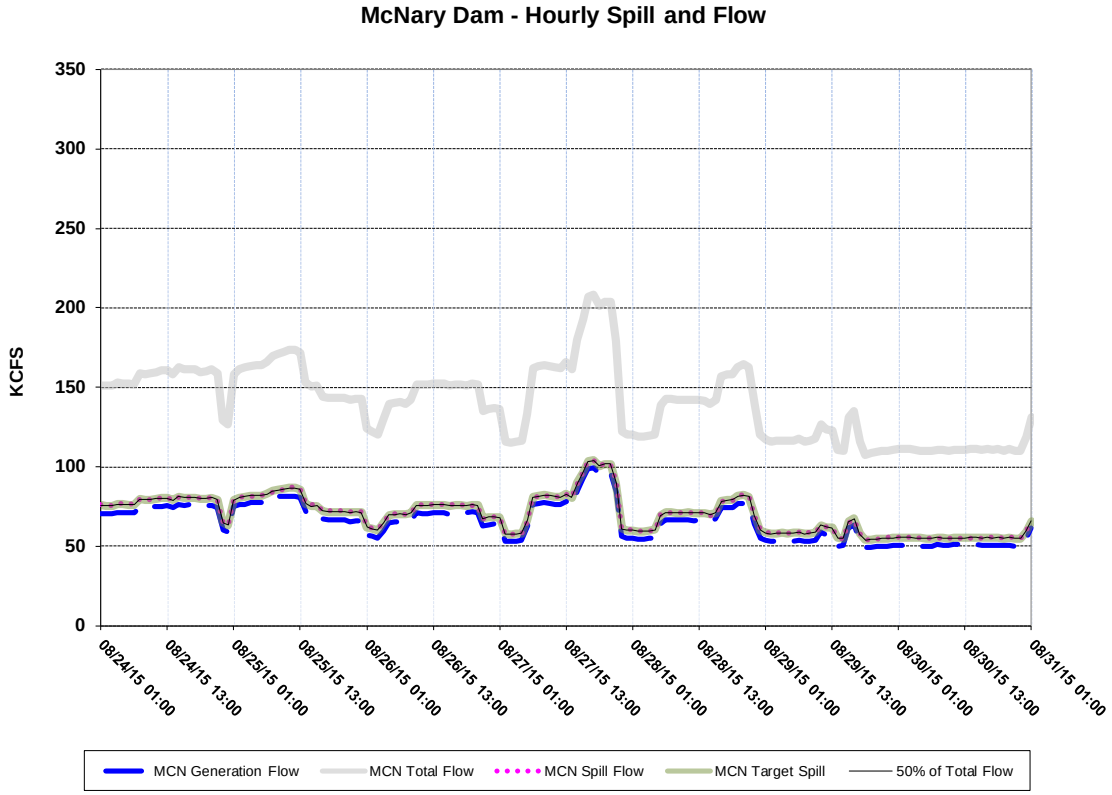
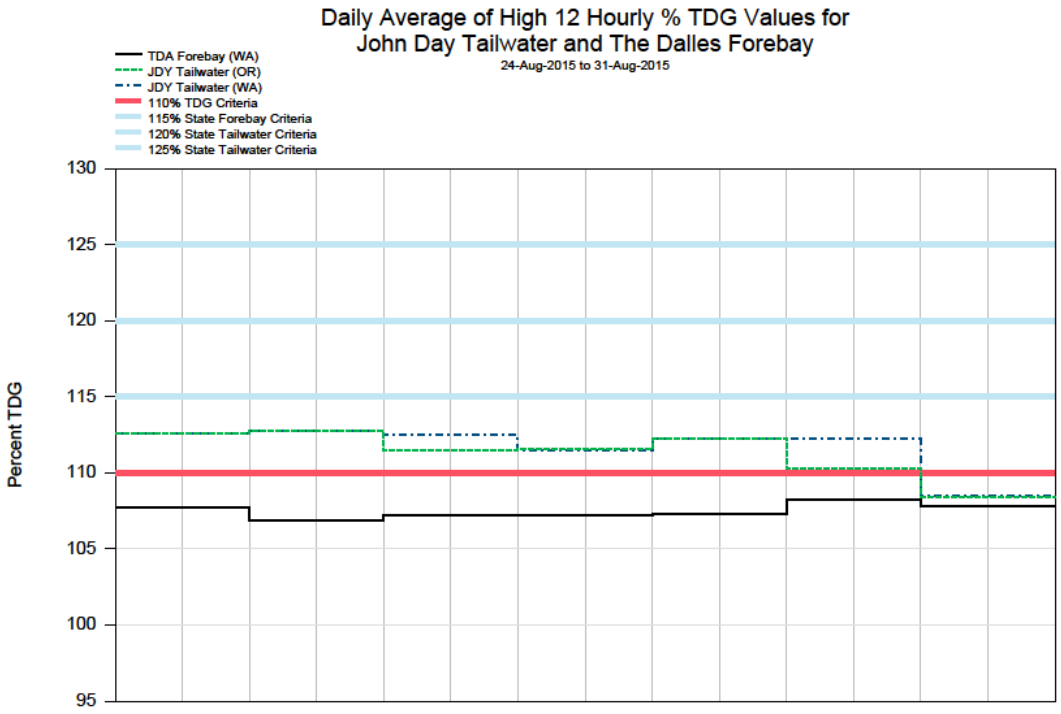

McNary Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/24/15 01:00
08/24/15 13:00
08/25/15 01:00
08/25/15 13:00
08/26/15 01:00
08/26/15 13:00
08/27/15 01:00
08/27/15 13:00
08/28/15 01:00
08/28/15 13:00
08/29/15 01:00
08/29/15 13:00
08/30/15 01:00
08/30/15 13:00
08/31/15 01:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 30


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
24-Aug-2015 to 31-Aug-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

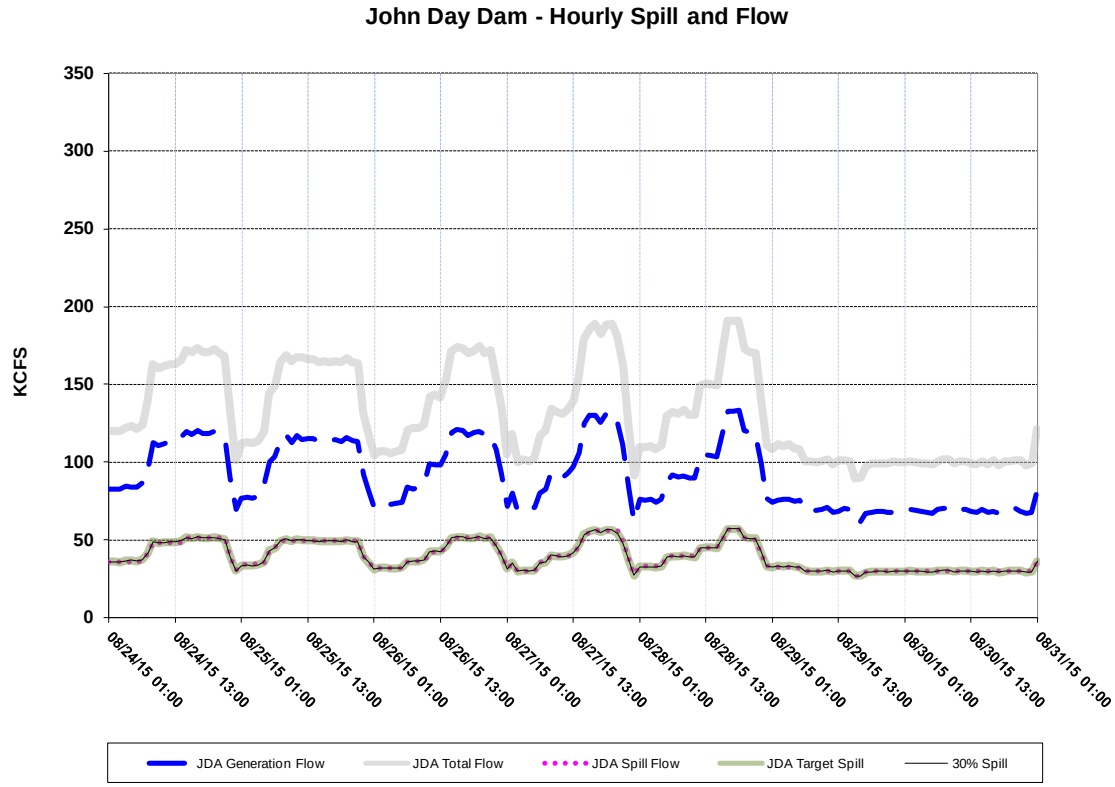
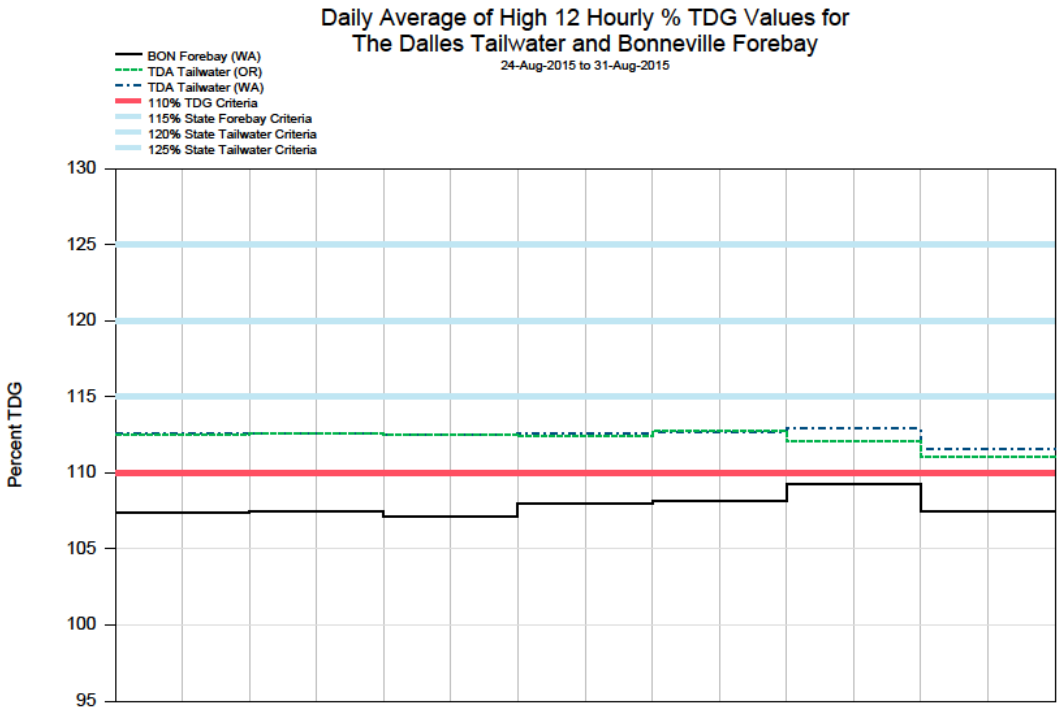

John Day Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/24/15 01:00
08/24/15 13:00
08/25/15 01:00
08/25/15 13:00
08/26/15 01:00
08/26/15 13:00
08/27/15 01:00
08/27/15 13:00
08/28/15 01:00
08/28/15 13:00
08/29/15 01:00
08/29/15 13:00
08/30/15 01:00
08/30/15 13:00
08/31/15 01:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 31


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
24-Aug-2015 to 31-Aug-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

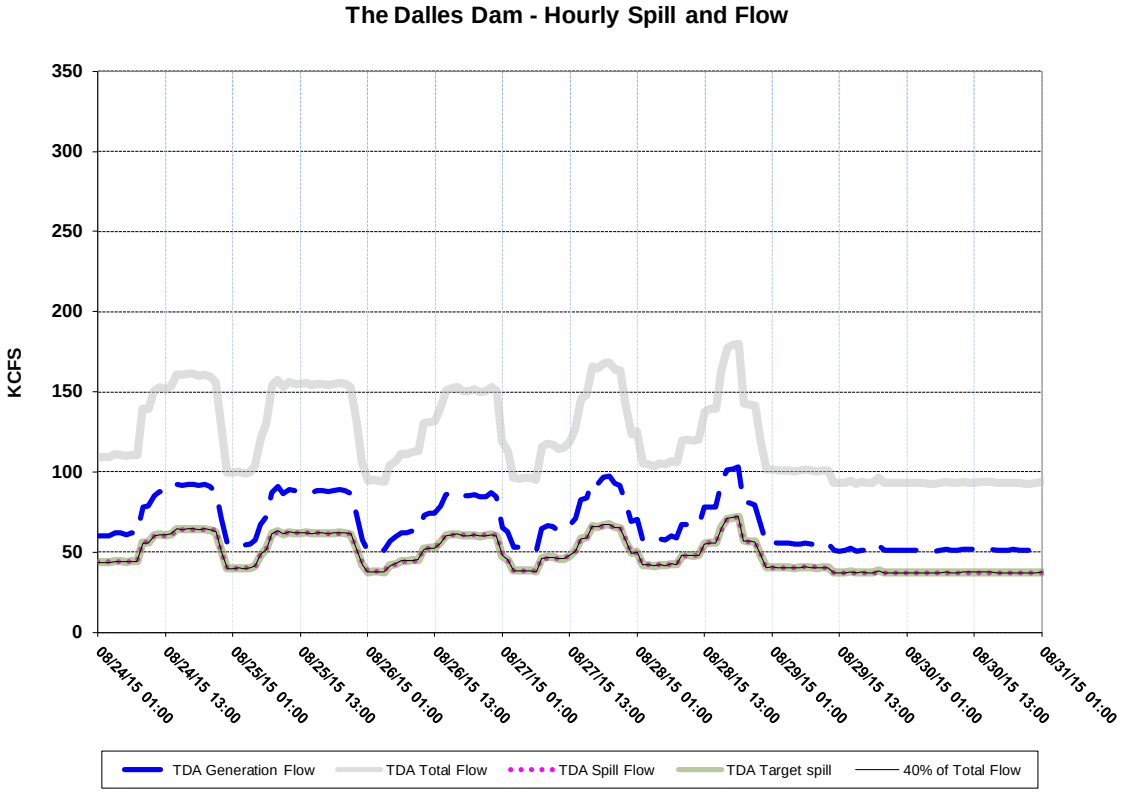
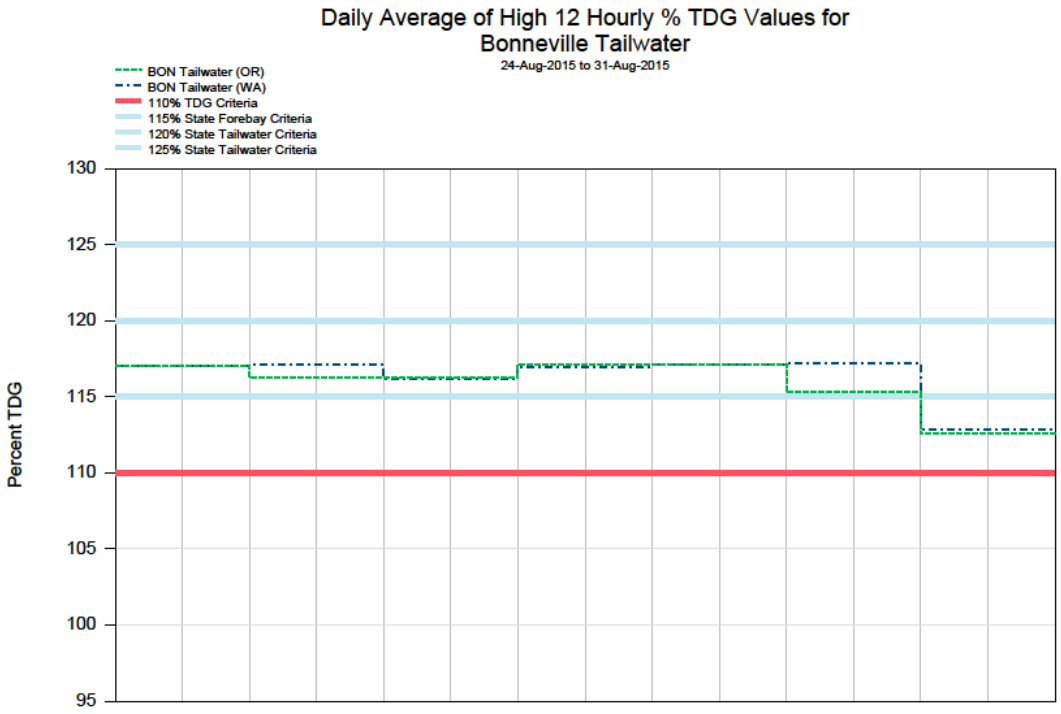

The Dalles Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/24/15 01:00
08/24/15 13:00
08/25/15 01:00
08/25/15 13:00
08/26/15 01:00
08/26/15 13:00
08/27/15 01:00
08/27/15 13:00
08/28/15 01:00
08/28/15 13:00
08/29/15 01:00
08/29/15 13:00
08/30/15 01:00
08/30/15 13:00
08/31/15 01:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 32


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
24-Aug-2015 to 31-Aug-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

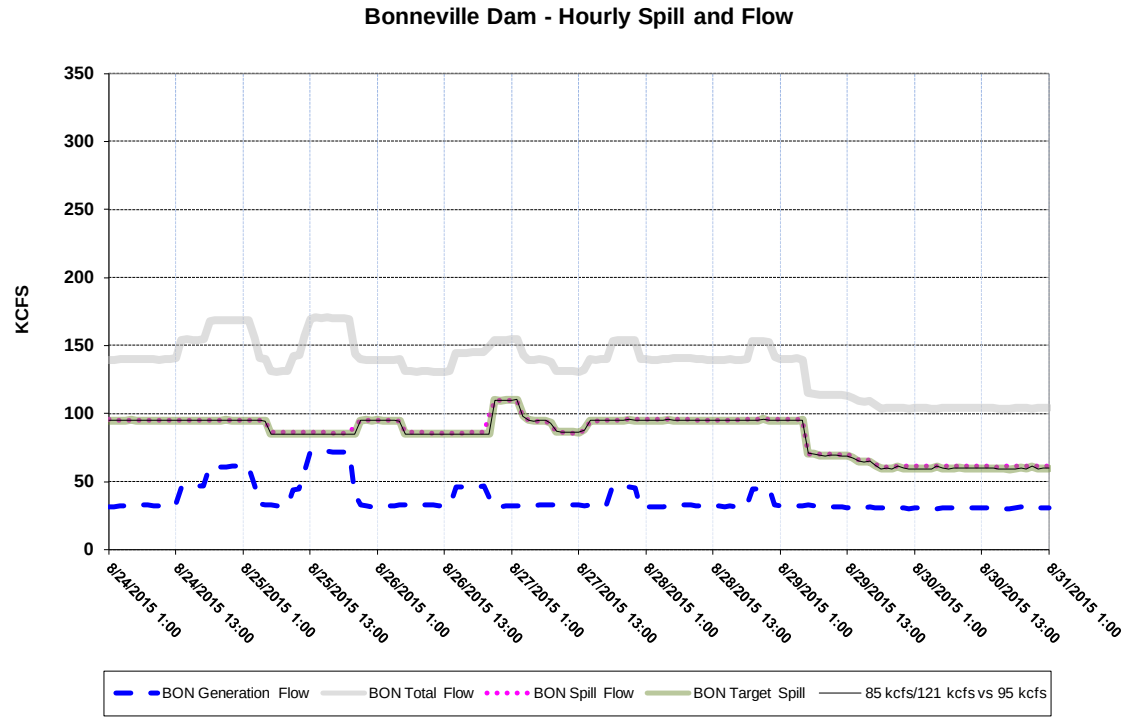
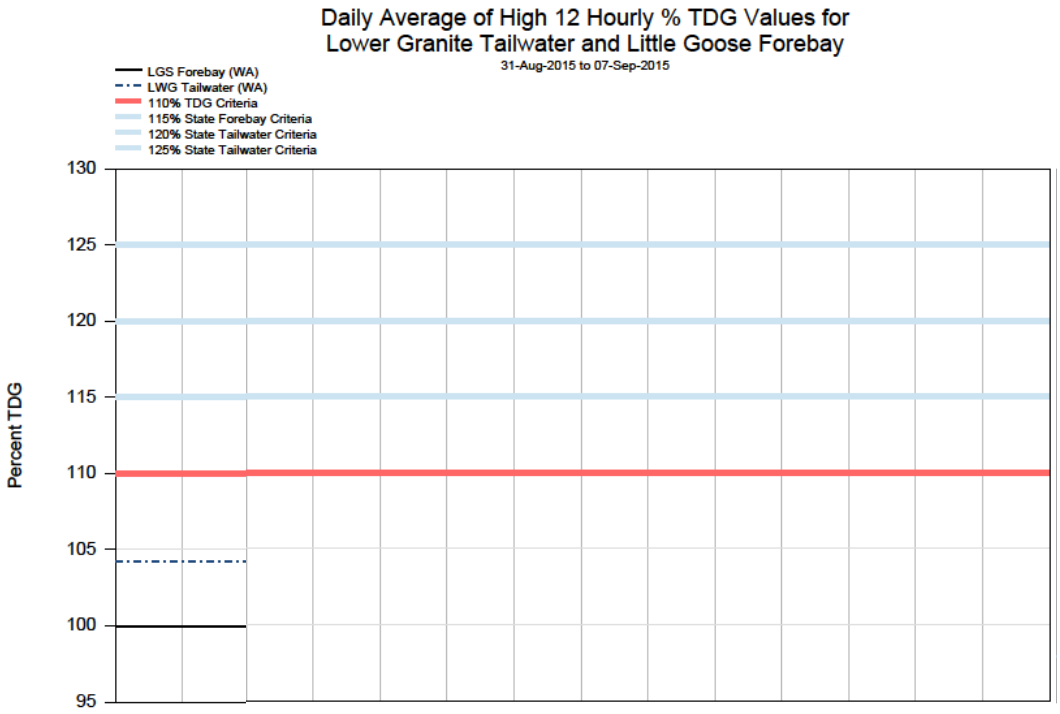

Bonneville Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
8/24/2015 1:00
8/24/2015 13:00
8/25/2015 1:00
8/25/2015 13:00
8/26/2015 1:00
8/26/2015 13:00
8/27/2015 1:00
8/27/2015 13:00
8/28/2015 1:00
8/28/2015 13:00
8/29/2015 1:00
8/29/2015 13:00
8/30/2015 1:00
8/30/2015 13:00
8/31/2015 1:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/121 kcfs vs 95 kcfs

Figure 33


Daily Average of High 12 Hourly % TDG Values for
Lower Granite Tailwater and Little Goose Forebay
31-Aug-2015 to 07-Sep-2015
LGS Forebay (WA)
LWG Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

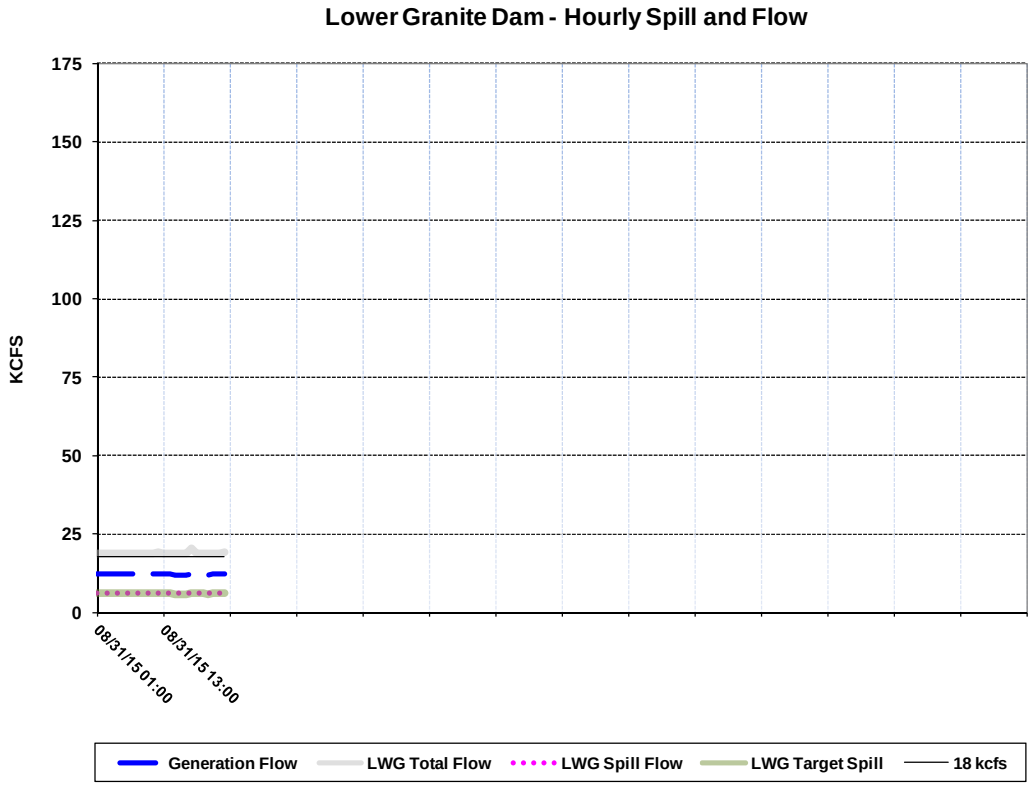
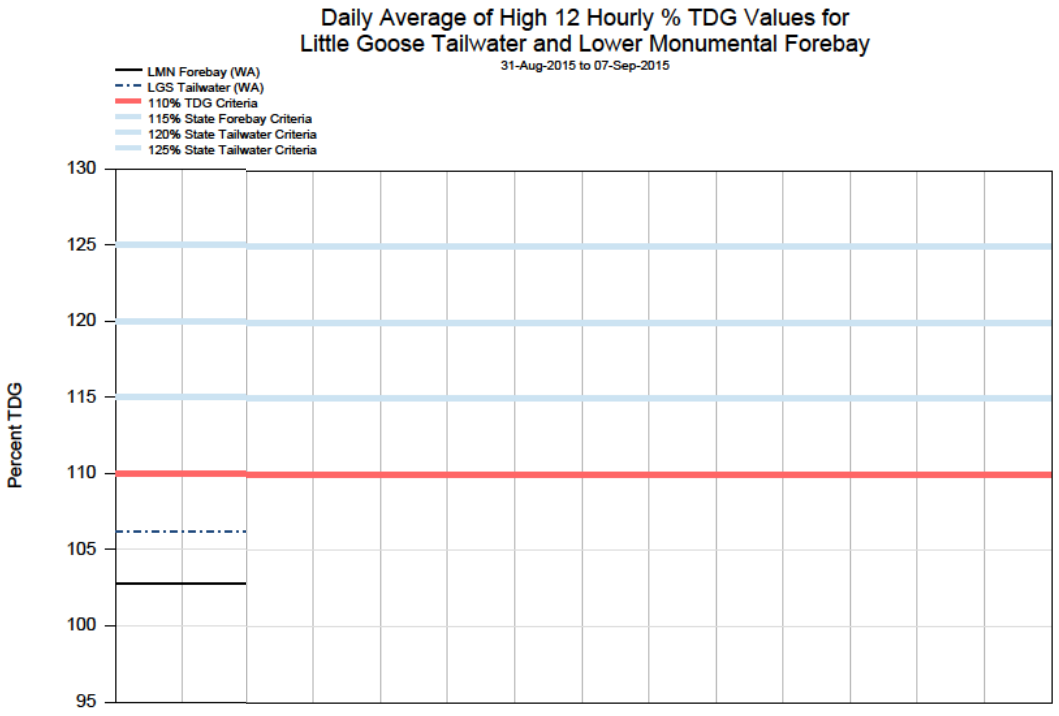

Lower Granite Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/31/15 01:00
08/31/15 13:00
Generation Flow
LWG Total Flow
LWG Spill Flow
LWG Target Spill
18 kcfs

Figure 34


Daily Average of High 12 Hourly % TDG Values for
Little Goose Tailwater and Lower Monumental Forebay
31-Aug-2015 to 07-Sep-2015
LMN Forebay (WA)
LGS Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

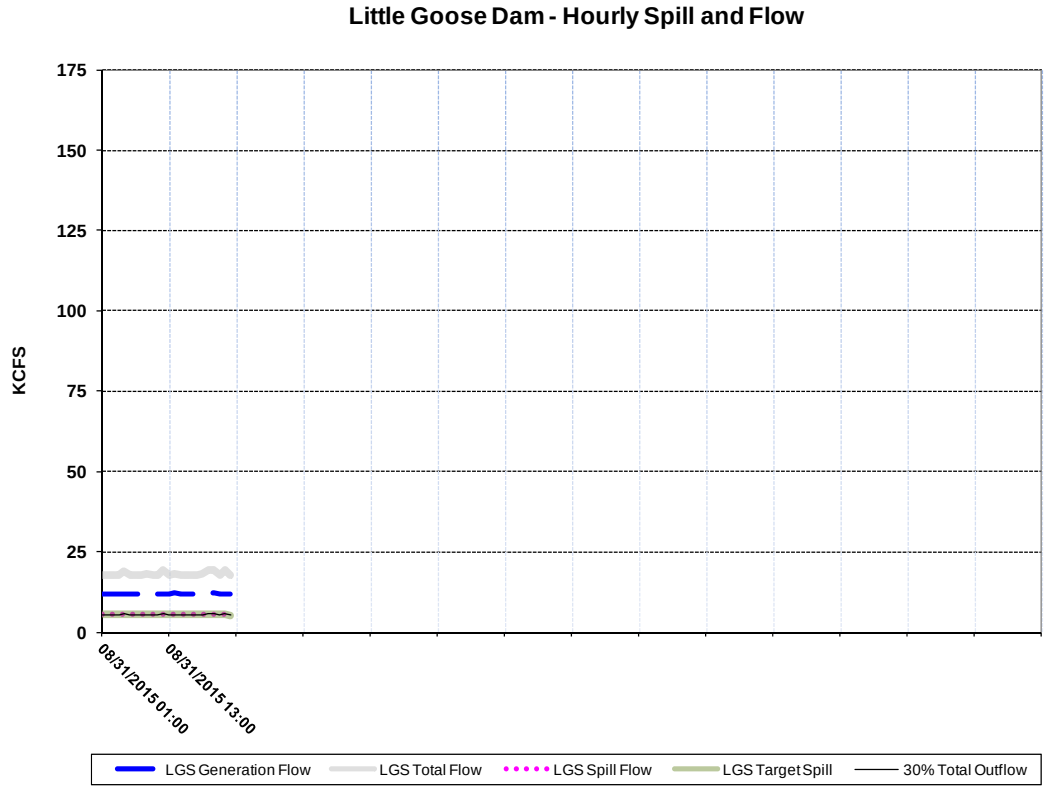
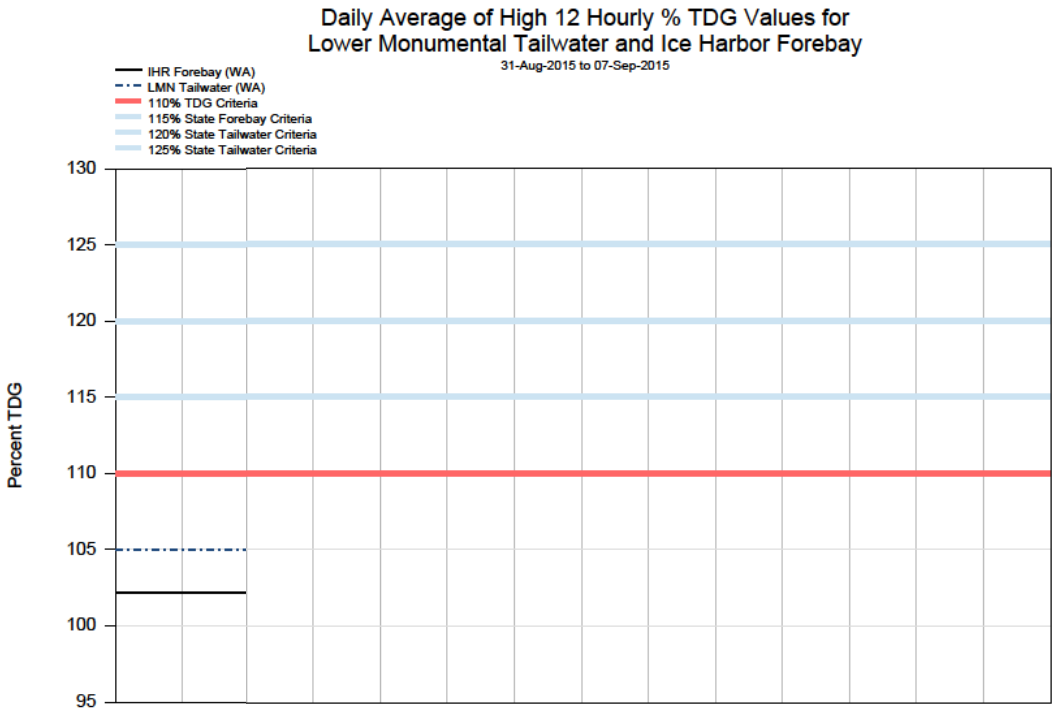

Little Goose Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/31/2015 01:00
08/31/2015 13:00
LGS Generation Flow
LGS Total Flow
LGS Spill Flow
LGS Target Spill
30% Total Outflow

Figure 35


Daily Average of High 12 Hourly % TDG Values for
Lower Monumental Tailwater and Ice Harbor Forebay
31-Aug-2015 to 07-Sep-2015
IHR Forebay (WA)
LMN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

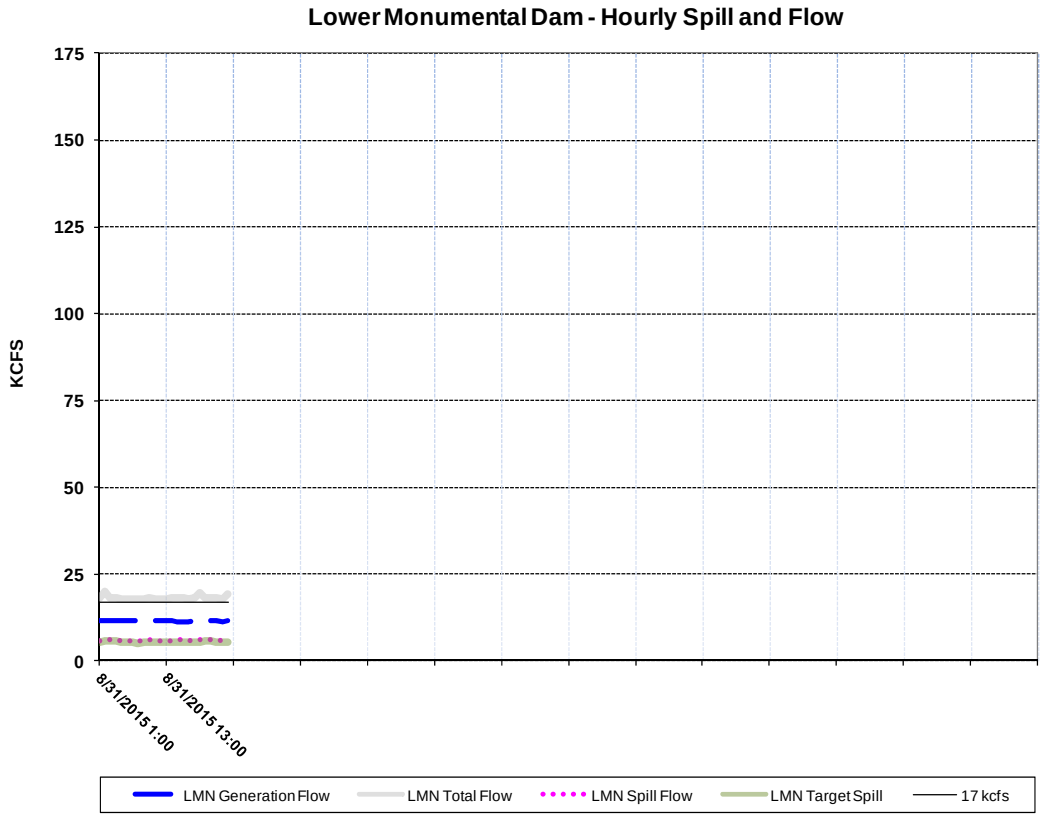
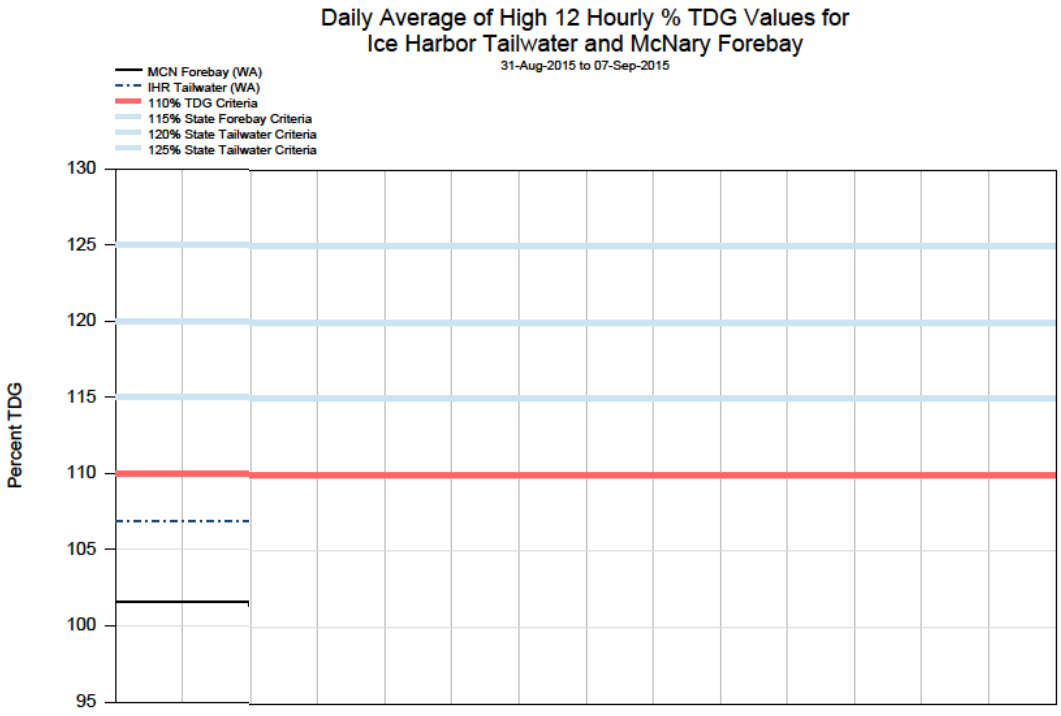

Lower Monumental Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
8/31/2015 1:00
8/31/2015 13:00
LMN Generation Flow
LMN Total Flow
LMN Spill Flow
LMN Target Spill
17 kcfs

Figure 36


Daily Average of High 12 Hourly % TDG Values for
Ice Harbor Tailwater and McNary Forebay
31-Aug-2015 to 07-Sep-2015
MCN Forebay (WA)
IHR Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

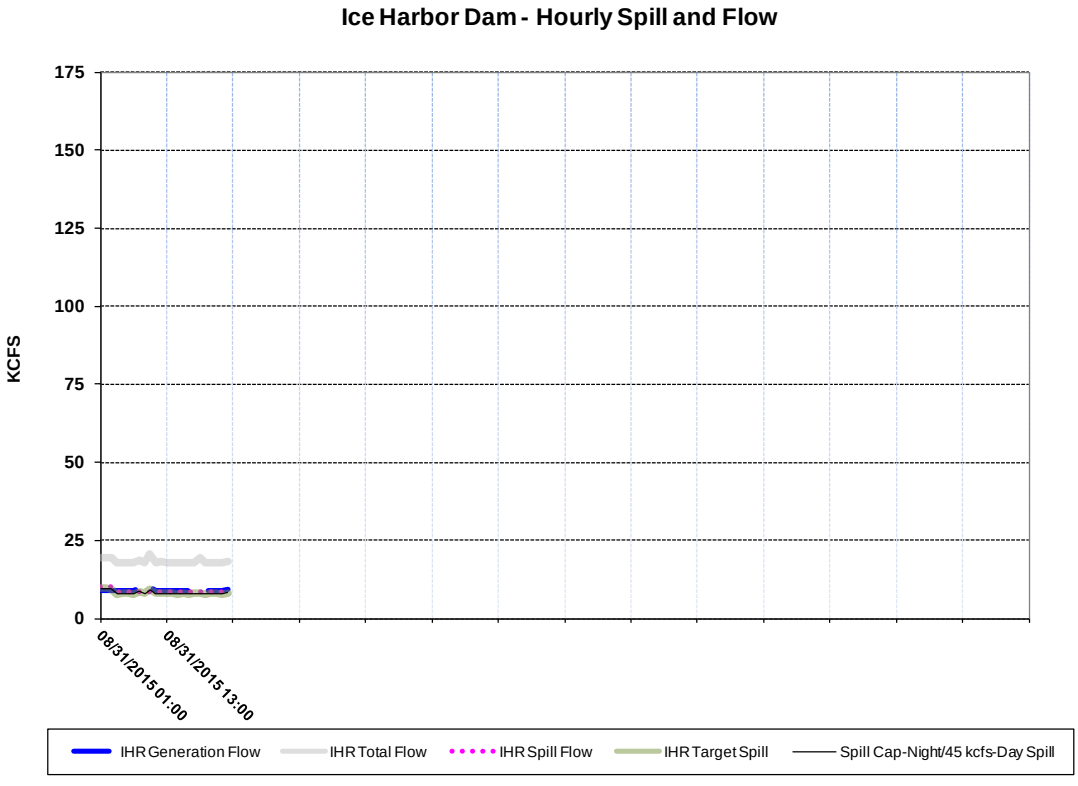
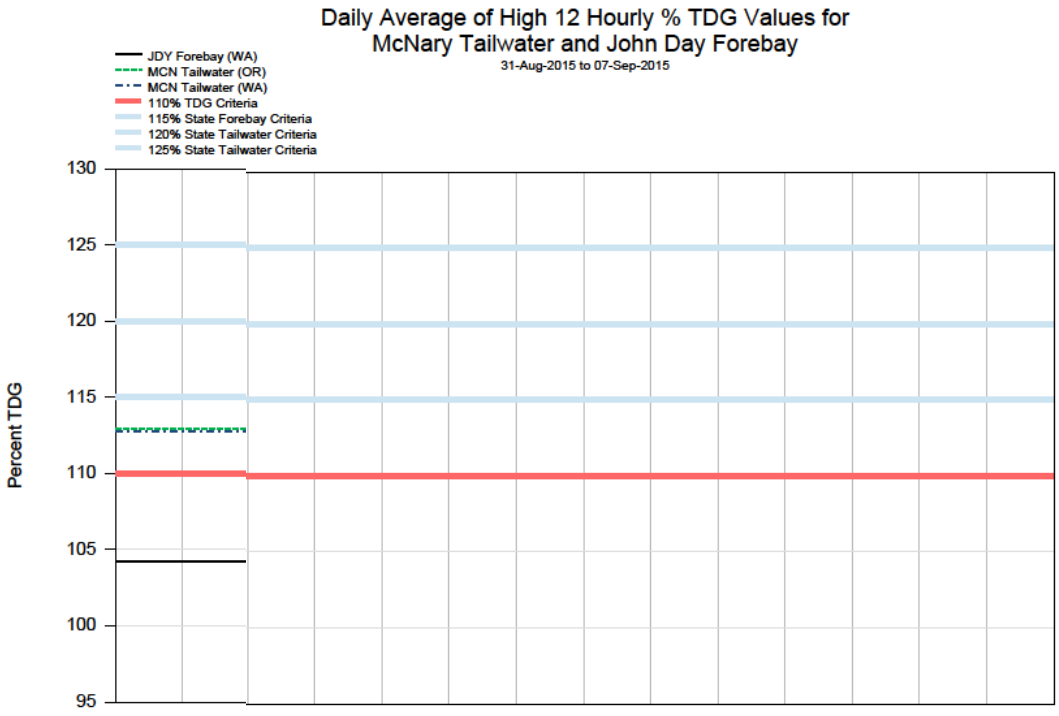

Ice Harbor Dam - Hourly Spill and Flow
KCFS
175
150
125
100
75
50
25
0
08/31/2015 01:00
08/31/2015 13:00
IHR Generation Flow
IHR Total Flow
IHR Spill Flow
IHR Target Spill
Spill Cap-Night/45 kcfs-Day Spill

Figure 37


Daily Average of High 12 Hourly % TDG Values for
McNary Tailwater and John Day Forebay
31-Aug-2015 to 07-Sep-2015
JDY Forebay (WA)
MCN Tailwater (OR)
MCN Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

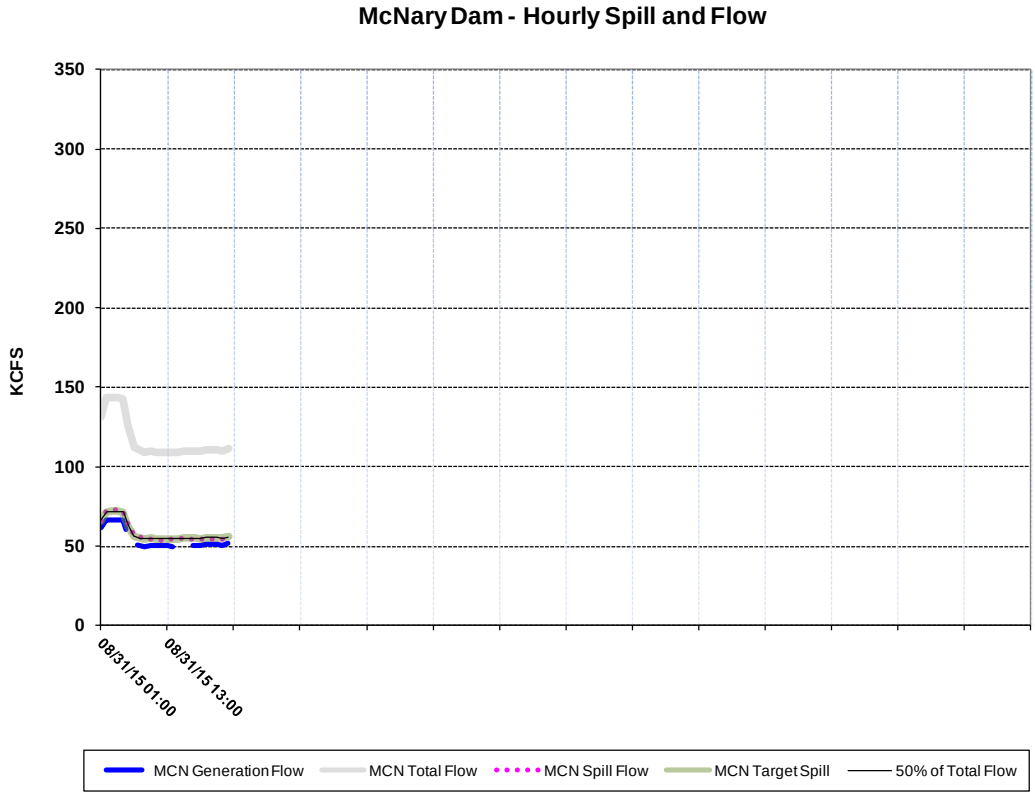
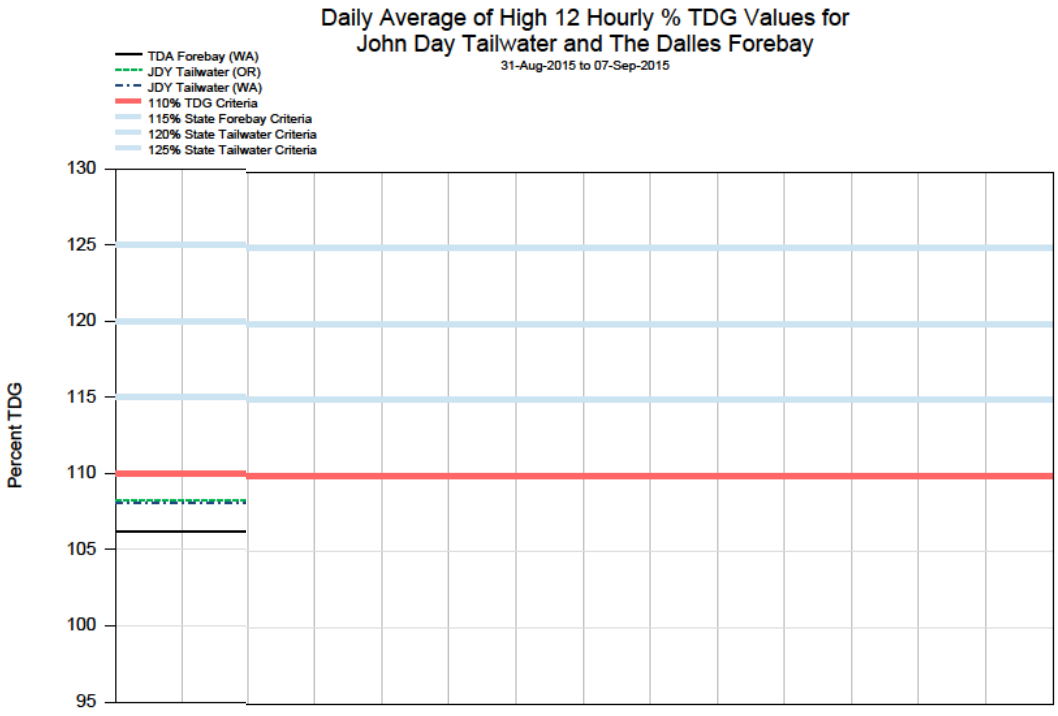

McNary Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/31/15 01:00
08/31/15 13:00
MCN Generation Flow
MCN Total Flow
MCN Spill Flow
MCN Target Spill
50% of Total Flow

Figure 38


Daily Average of High 12 Hourly % TDG Values for
John Day Tailwater and The Dalles Forebay
31-Aug-2015 to 07-Sep-2015
TDA Forebay (WA)
JDY Tailwater (OR)
JDY Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

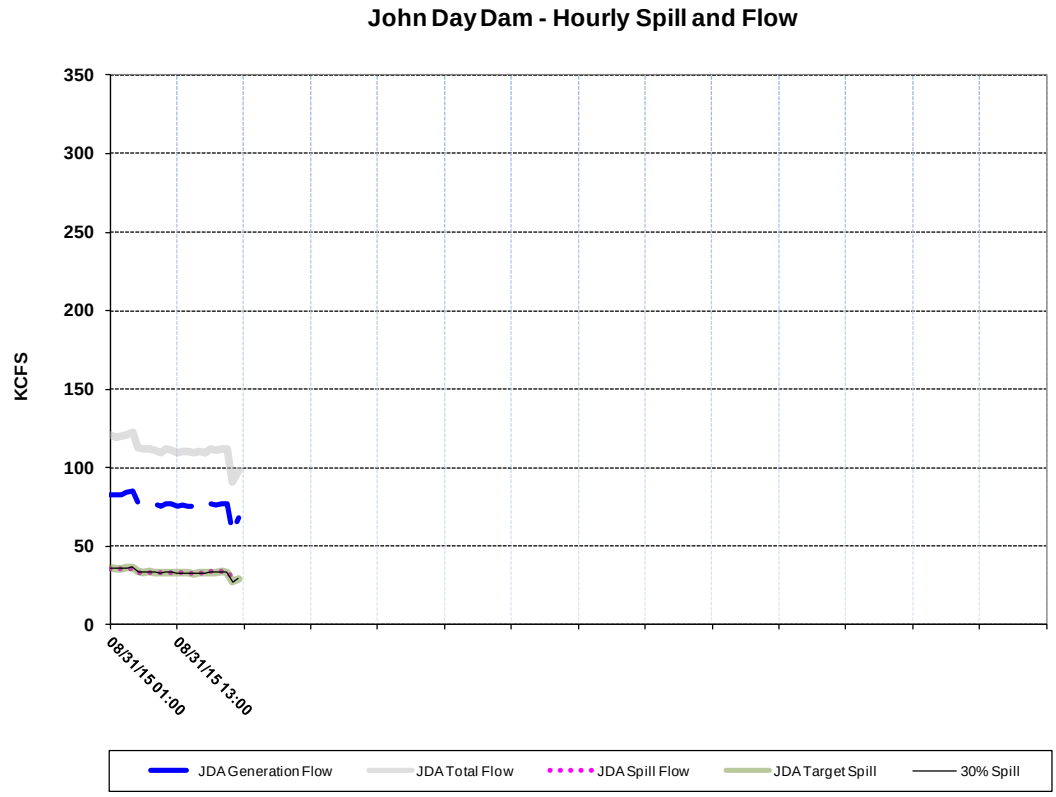
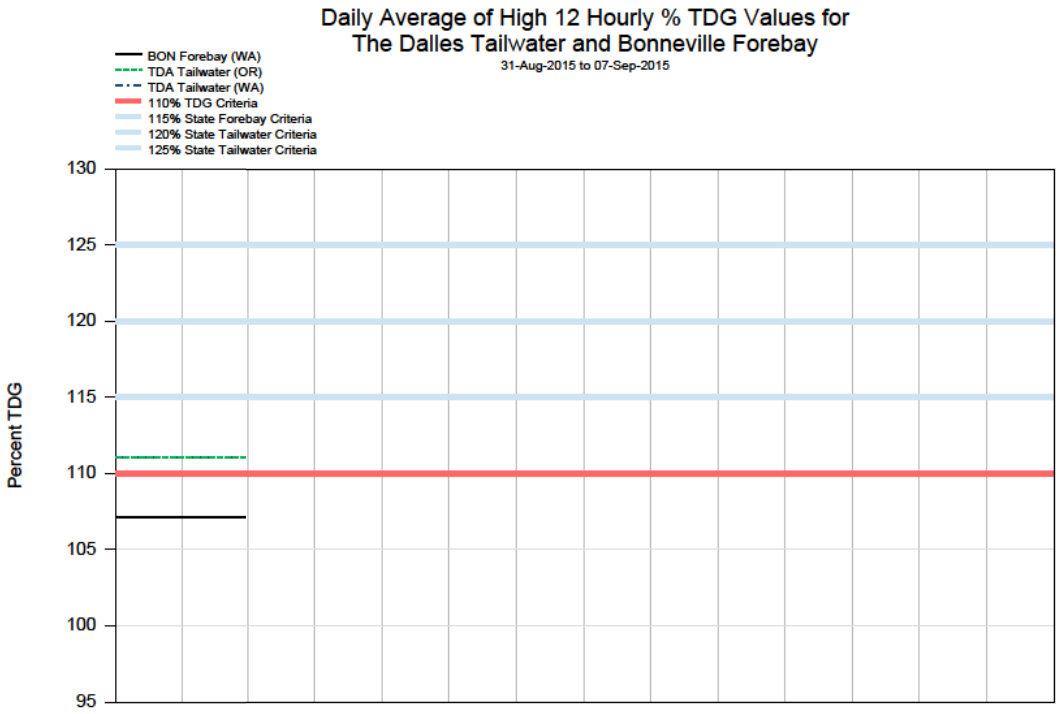

John Day Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/31/15 01:00
08/31/15 13:00
JDA Generation Flow
JDA Total Flow
JDA Spill Flow
JDA Target Spill
30% Spill

Figure 39


Daily Average of High 12 Hourly % TDG Values for
The Dalles Tailwater and Bonneville Forebay
31-Aug-2015 to 07-Sep-2015
BON Forebay (WA)
TDA Tailwater (OR)
TDA Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

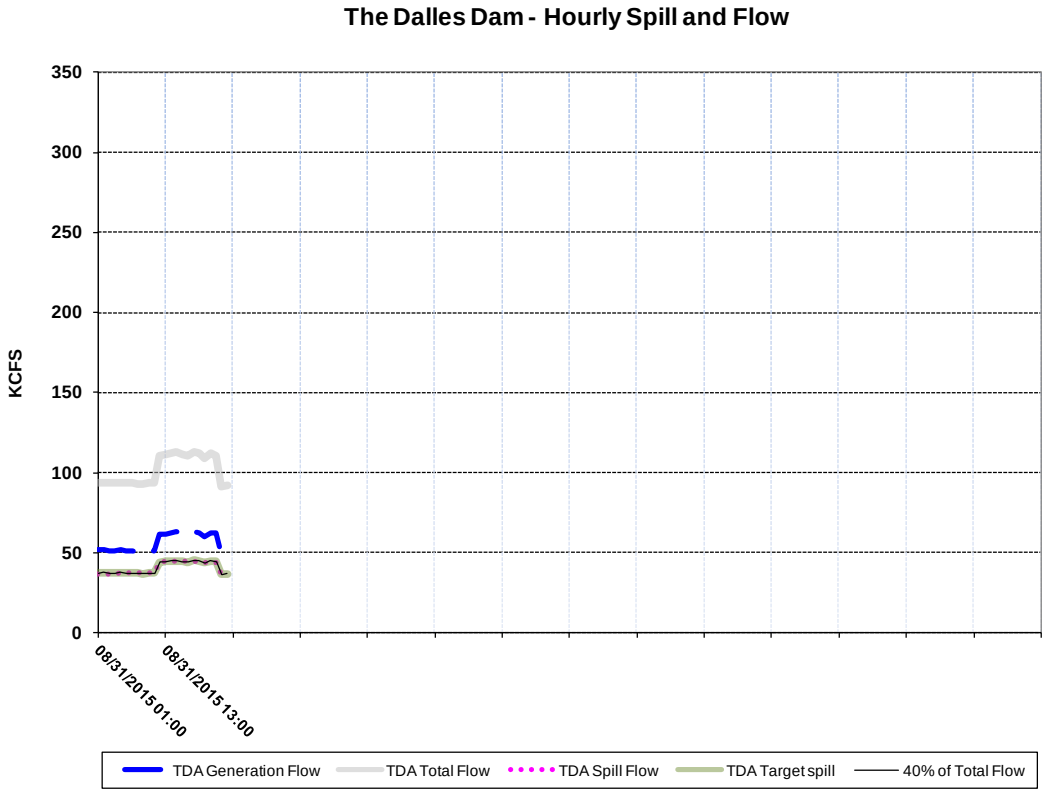
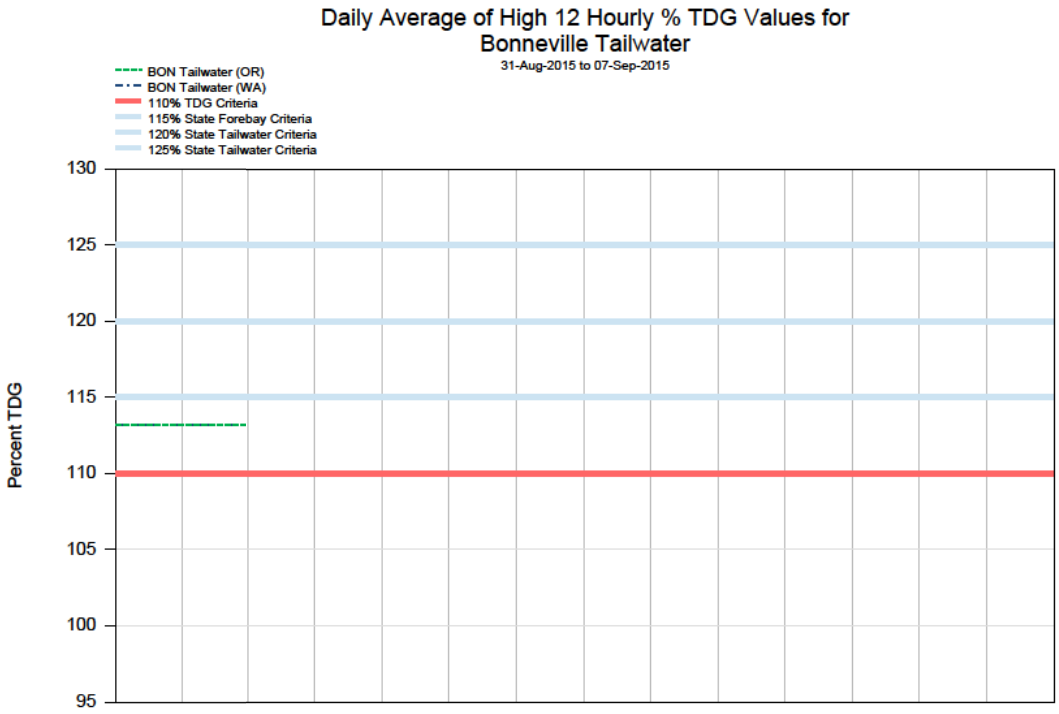

The Dalles Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/31/2015 01:00
08/31/2015 13:00
TDA Generation Flow
TDA Total Flow
TDA Spill Flow
TDA Target spill
40% of Total Flow

Figure 40


Daily Average of High 12 Hourly % TDG Values for
Bonneville Tailwater
31-Aug-2015 to 07-Sep-2015
BON Tailwater (OR)
BON Tailwater (WA)
110% TDG Criteria
115% State Forebay Criteria
120% State Tailwater Criteria
125% State Tailwater Criteria
Percent TDG
130
125
120
115
110
105
100
95

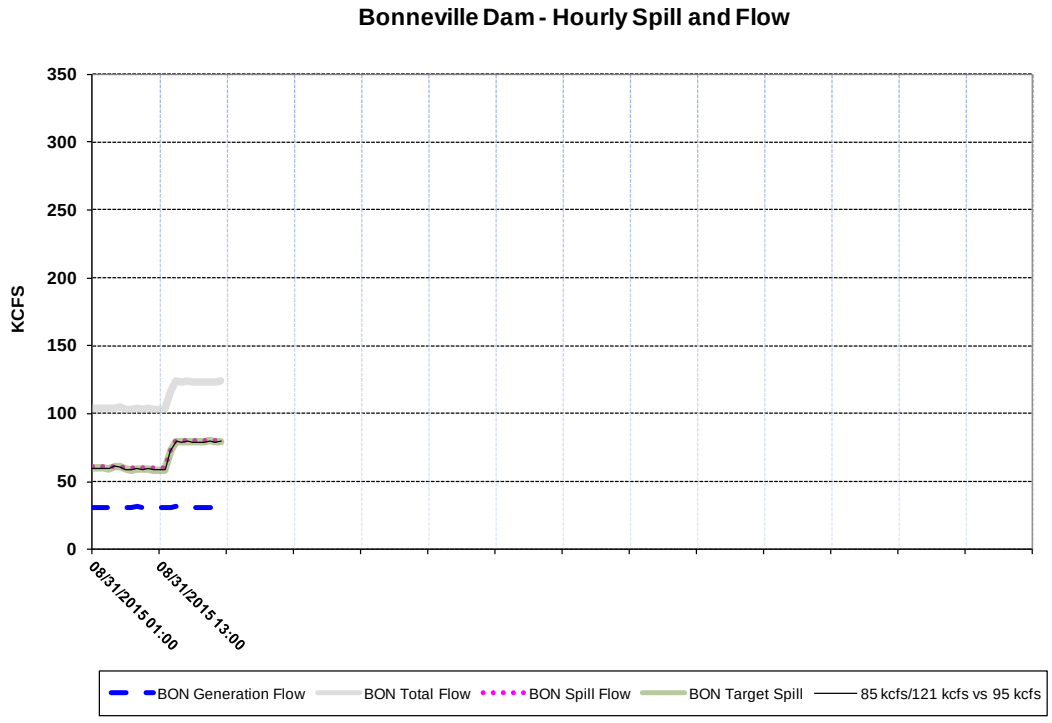

Bonneville Dam - Hourly Spill and Flow
KCFS
350
300
250
200
150
100
50
0
08/31/2015 01:00
08/31/2015 13:00
BON Generation Flow
BON Total Flow
BON Spill Flow
BON Target Spill
85 kcfs/121 kcfs vs 95 kcfs

Table 2
Average Percent TDG Values For August 3 – August 31

Date	FIXED MONITORING STATIONS																			
	LWG	LGNW	LGSA	LGSW	LMNA	LMNW	IHRA	IDSW	MCNA	MCPW		JDY	JHAW		TDA	TDDO		BON	CCIW	
Method:	WA	WA	WA	WA	WA	WA	WA	WA	WA	OR	WA	WA	OR	WA	WA	OR	WA	WA	OR	WA
Gas Cap %	115	120	115	120	115	120	115	120	115	120	120	115	120	120	115	120	120	115	120	120
8/3/2015	103.6	111.6	104	106.1	104.7	115	113.6	113.3	111.1	~~112.7~~	113.2	105.6	~~107.8~~	108.3	107.3	~~111.4~~	112.3	108.5	~~113.5~~	113.6
8/4/2015	103	110.5	104.5	105.2	105.4	114.2	113.1	112.6	109.9	113.6	~~113.6~~	106	109.7	~~109.7~~	105.8	111.7	~~111.6~~	105.7	~~113.4~~	113.4
8/5/2015	102.5	110.6	103.6	103.7	105.6	113.1	112.4	112	109.2	114.8	~~114.8~~	106	~~108.3~~	109.5	105.6	~~111.3~~	111.6	104	113.8	~~113.7~~
8/6/2015	102	110	104.2	103.1	105.1	112.6	111.7	112	106.5	~~114.9~~	114.9	105.4	~~109~~	109	105.4	~~111.8~~	111.8	103.8	114.1	~~114.1~~
8/7/2015	102.7	109.7	105.6	103.1	106.6	112.9	111.2	110.7	106.2	115	~~114.9~~	105.8	110	~~109.9~~	109.3	114	~~114~~	106.1	117.1	~~117.1~~
8/8/2015	102.6	106.9	105.6	101.5	106	112.9	111	110.5	106.7	115.2	~~114.8~~	105.8	~~108.9~~	109.8	109.2	~~113.3~~	113.9	107.2	117.1	~~117.1~~
8/9/2015	102	105.6	104.4	100.2	104.7	109.7	109.7	110.4	106.2	~~113.2~~	114.5	104.9	~~107~~	108.2	107.1	~~112.2~~	112.7	107.5	~~115.9~~	117.1
8/10/2015	101.1	112.8	104.8	107.6	105.5	111.3	108.1	110.1	106.9	~~115.3~~	115.7	104.3	~~113.6~~	114.1	108.2	113	~~112.9~~	108.5	~~115.3~~	116.1
8/11/2015	100.7	113.9	104.8	106.6	105.9	105.8	108.7	107.5	106.7	~~114.5~~	114.9	104.8	~~112.9~~	114	108.9	113.5	~~113.5~~	109.2	115	~~114.9~~
8/12/2015	100.7	112.9	104.5	108.7	106	107.5	108.9	108.2	106.5	115	~~115~~	105.1	~~113.6~~	113.6	108.8	~~113.3~~	113.5	109.3	114	~~114~~
8/13/2015	99.8	113.4	104.3	108.7	105.9	109.8	108.9	107.8	106.9	116.4	~~116.4~~	106	113.5	~~113.5~~	108.3	~~112.8~~	113.1	108.1	115.1	~~115.1~~
8/14/2015	99.5	111.1	104.7	108.4	105.7	109.3	108.1	107.7	107	~~116~~	116.3	106	~~113.2~~	113.4	106.6	~~111.2~~	112.5	106.6	~~114.9~~	115.8
8/15/2015	99.3	109.6	103.7	107.2	103.3	109.3	104.8	110	105.2	114.2	~~114.2~~	104.2	~~111.2~~	111.7	104.2	110.3	~~110.3~~	103.8	117	~~116.9~~
8/16/2015	99.2	108.2	103.3	108.1	103.5	109.6	104.1	110.7	103.7	114.9	~~114.5~~	103.5	~~109.8~~	110.6	106	112.1	~~112.1~~	105.1	117.2	~~117.2~~
8/17/2015	99.1	104.6	104.4	107.4	103.5	107.7	103.8	110.2	103.2	115.2	~~115.2~~	103.9	~~107.1~~	109.4	108.5	113.5	~~113.5~~	107.5	~~116.4~~	117.2
8/18/2015	99.4	104.7	104.9	106.8	103.4	106.9	103.4	109.7	103.9	~~114.1~~	114.6	104.8	106.3	~~106.3~~	109.2	113.9	~~113.9~~	109.6	~~116.6~~	116.6
8/19/2015	99.9	104.8	103.9	107.1	103	106.6	102.7	106.6	105	115.8	~~115.8~~	105	114.1	~~114.1~~	109.3	114.1	~~114.1~~	111.4	117.5	~~117.5~~
8/20/2015	99.9	104.6	104	**136.8**	104.8	108.4	104.2	108.4	105.1	~~115.2~~	115.8	104.6	~~112.9~~	114.1	108.9	~~112.3~~	113.7	111.3	~~117.2~~	117.5
8/21/2015	99.7	104.2	102.8	111	105.2	109	104.5	108.2	104.3	~~114.1~~	115.1	103.6	~~112~~	112.6	105.4	~~110.1~~	111.4	107.3	~~116~~	117
8/22/2015	99.6	103.1	102.4	105.4	104.4	105.2	103.3	107	103.2	114.5	~~114.1~~	102.4	111.8	~~111.8~~	104.4	110.6	~~110.6~~	103.7	116	~~115.9~~
8/23/2015	103.7	104	103.6	106.5	105.2	105.2	103.8	106.9	102.8	115.4	~~114.9~~	103.5	112.7	~~112.7~~	107.7	~~112.6~~	112.6	105.2	116.9	~~116.9~~
8/24/2015	103.8	105.9	104.2	108.4	105.2	108.1	103.8	107.2	103.2	115.7	~~115.7~~	103.7	112.6	~~112.6~~	107.7	~~112.5~~	112.6	107.4	117.2	~~117.2~~
8/25/2015	99.5	105.5	103.9	107.9	102.9	109	103.6	109.4	102.3	115.8	~~115.8~~	103.1	112.8	~~112.8~~	106.7	112.6	~~112.6~~	107.4	~~116.4~~	117.2
8/26/2015	99.2	102.9	101.2	105.2	102.8	105	102.4	106.3	102.9	114.9	~~114.9~~	103	~~111.5~~	112.2	107.2	112.6	~~112.5~~	107.1	116.4	~~116.3~~
8/27/2015	---	104.4	98.9	106.8	102.7	106.6	102	107.5	103.7	115.7	~~115.7~~	103	~~111.5~~	111.5	107.2	~~112.4~~	112.5	108	117.2	~~117~~
8/28/2015	98.7	104.5	99	106.8	103.6	106.9	103.4	108	104.7	~~114.4~~	115.4	104.3	112.2	~~112.2~~	107.3	112.8	~~112.8~~	108.2	117.3	~~117.2~~
8/29/2015	99.3	104.7	103.8	107.2	104.6	107.2	104	108	105	~~112.8~~	114.3	105.4	~~110.1~~	112.1	108.3	~~112~~	112.9	109.3	~~115.1~~	117.3
8/30/2015	98.7	103.8	100	106.6	103.6	106.5	103	107	102.9	~~112.7~~	112.9	104.6	108.4	~~108.4~~	107.6	~~111~~	111.6	107.4	~~112.7~~	112.9
8/31/2015	99.3	104.3	100	106.2	102.7	105	102.2	106.9	101.5	112.9	~~112.8~~	104.2	108.2	~~108.1~~	106.3	111.1	~~111.1~~	107.2	~~113.4~~	113.4

--- denotes missing data due to gauge malfunctioning.

Note: The Oregon TDG standard modification (OR) and the Washington TDG criteria adjustments (WA) have different methodologies for calculating TDG. When the standards vary or conflict, the Corps applies the more stringent standard. TDG values are presented in Table 1 by displaying the highest value %TDG (more stringent), and the lower value is displayed with a strikethrough.

Total Dissolved Gas Monitoring Stations

Code	Station Name
LWG	Lower Granite Forebay
LGNW	Lower Granite Tailwater
LGSA	Little Goose Forebay
LGSW	Little Goose Tailwater
LMNA	Lower Monumental Forebay
LMNW	Lower Monumental Tailwater
IHRA	Ice Harbor Forebay
IDSW	Ice Harbor Tailwater
MCNA	McNary Forebay
MCPW	McNary Tailwater
JDY	John Day Forebay
JHAW	John Day Tailwater
TDA	The Dalles Forebay
TDDO	The Dalles Tailwater
BON	Bonneville Forebay
CCIW	Bonneville Tailwater (Cascade Island)
CWMW	Camas / Washougal