



FISH PASSAGE CENTER

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MEMORANDUM

TO: Bill Tweit, WDFW
Guy Norman, WDFW

Michele DeHart

FROM: Michele DeHart

DATE: June 3, 2011

RE: Columbia & Snake Rivers Smolt Monitoring Program Gas Bubble Trauma – June 3, 2011 Update

In response to your request the FPC staff has updated the May 27, 2011 memo titled: Columbia & Snake Rivers Smolt Monitoring Program Gas Bubble Trauma, with data collected over the past week.

On June 2, 2011, the River Forecast Center released the June early-bird run-off volume forecast. Based on this forecast, run-off volume in the Columbia basin above The Dalles Dam is 129% of average, 124% of average above Grand Coulee, and 154% of average above Lower Granite Dam. All of these run-off volumes increased from the previous May mid-month forecast. Given the high volume runoff projections the high inflows to reservoirs are expected to continue for several weeks. The river system continues to be managed for flood control, by targeting a flow of 480 Kcfs at The Dalles Dam.

The present spill and flow levels continue to be the result of the high run-off volume. Due to these very high flows, the spill levels are in excess of the Court Ordered spill for fish passage requirements at all FCRPS projects and very high at the Mid Columbia River projects.

The TDG at the Grand Coulee tailrace has exceeded 140%. This is moderated somewhat downstream at Chief Joseph, with the tailrace TDG readings being above 120%, but less than 125%. However, the high flows in the Mid Columbia have resulted in high spill levels at the

Mid Columbia projects and caused TDG levels that often exceeded 130% in the forebays and tailraces at the Mid Columbia projects.

In addition, there was a full powerhouse outage at Little Goose Dam from May 24 to June 1st resulting in nearly 100% of the river flow being spilled this past week. Total dissolved gas levels exceeded 135% (12 hour average) on four of those days when the powerhouse was shut down. Total dissolved gas levels began to decrease to the high 120's as flow levels began to decrease over the past week. TDG decreased to near 120% in the tailrace once the powerhouse became operational.

We have summarized our conclusions from the review in the following points:

- At the present time gas levels have increased greatly over the levels observed last week and exceed the 115/120% at all projects in the Mid Columbia, Snake and lower Columbia rivers, with the exception of Lower Granite forebay.
- By week's end the TDG had also decreased at the Lower Granite tailrace and the Little Goose forebay.
- Levels of gas bubble trauma have increased substantially at most of the SMP GBT monitoring sites over the past week. The highest level of GBT incidence was observed at Rock Island Dam on June 2nd, at 60% fin GBT (2% severe signs).
- The GBT monitoring action criteria was established by NOAA on the basis of literature and research. To date, the 15% fin GBT action criterion has been met at two GBT monitoring sites: Lower Monumental Dam on May 28th and Rock Island Dam on May 31st and June 2nd. The 5% severe fin GBT action criterion has not been met at any of the GBT monitoring sites.
- Despite meeting the 15% fin GBT action criterion, all Snake and Columbia River projects are operating under uncontrolled spill and, thus, specific actions to curtail spill are not available.
- The water quality agencies of the states have established a 7Q10 flow above which it is recognized that there are no available actions to reduce uncontrolled flow and uncontrolled spill. The 480 Kcfs flood control target at The Dalles Dam exceeds the 7Q10 flow.

GBT Monitoring:

As part of the state TDG waivers, biological monitoring for Gas Bubble Trauma (GBT) is conducted throughout the Mid-Columbia, Snake, and Lower Columbia rivers. There are two action criteria for the curtailment of voluntary spill under this biological monitoring. First, spill can be curtailed if 15% of the examined fish show signs of fin GBT, regardless of their rank. Second, spill can be curtailed if 5% of the examined fish show severe signs ($\geq 26\%$ fin occlusion) of GBT. GBT monitoring at each of the sites typically takes place once or twice a week.

Rock Island Dam is the only site in the Mid-Columbia River where GBT examinations are conducted as part of the GBT monitoring program. These examinations are typically conducted

twice a week. To date, the 12-hour average TDG levels (based on Oregon methodology) in the Rock Island Dam forebay have ranged from 104.9 to 129.6%. These 12-hour average TDG levels in the Rocky Reach Dam tailrace and downstream of Grand Coulee Dam have ranged from 104.9 to 133.7% and 103.6 and 144.2%, respectively. GBT incidences at Rock Island Dam have increased substantially over the past week. On May 31st, the GBT incidence level was 37%, followed by 60% incidence on June 2nd (Figure 1). Both of these levels of GBT exceed the 15% GBT criterion for the curtailment of spill. While these two dates had high levels of GBT, the levels of severe fin GBT were below the 5% criterion (3% severe fin GBT on May 31st and 2% severe fin GBT on June 2nd).

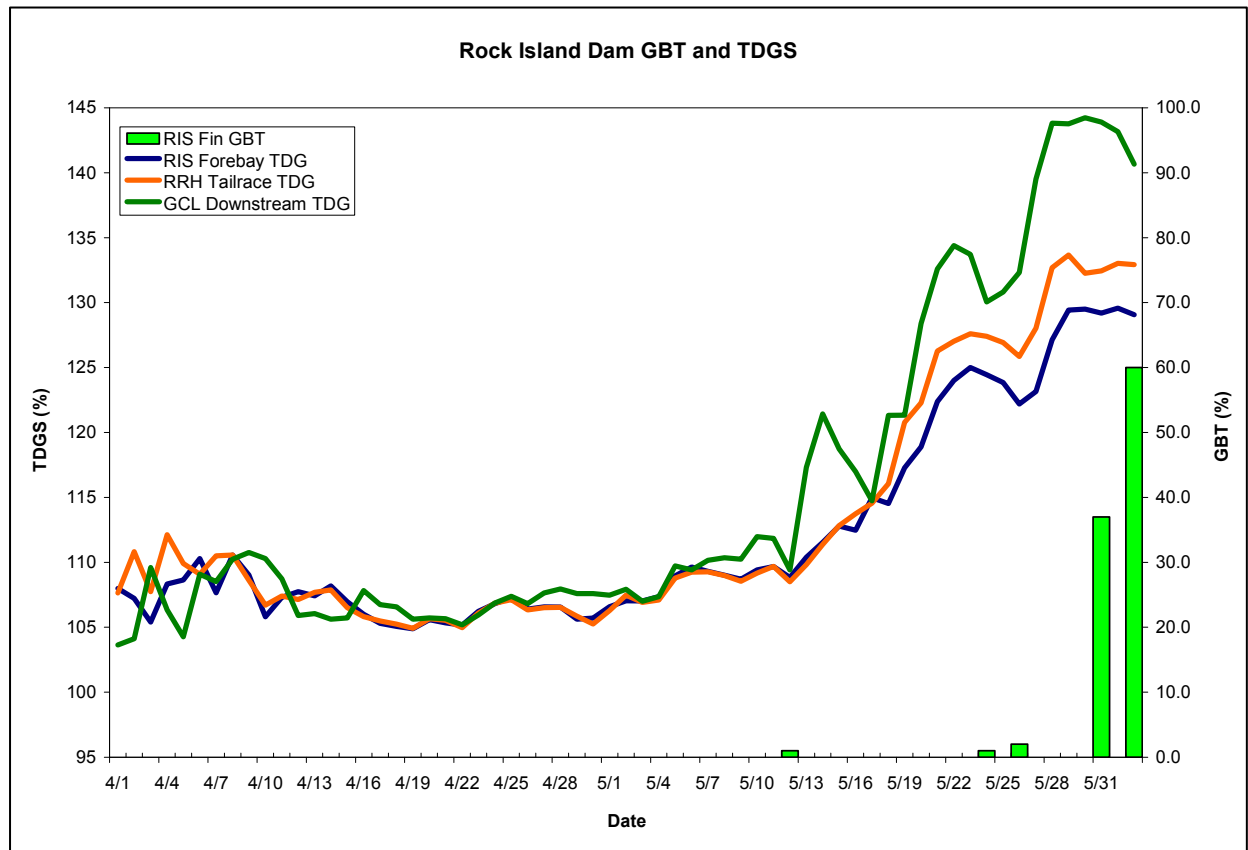


Figure 1. Percent of fish examined at Rock Island Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Rock Island Dam forebay, the Rocky Reach Dam tailrace, and downstream of Grand Coulee Dam.

Gas Bubble Trauma monitoring takes place at three sites in the Snake River: Lower Granite, Little Goose, and Lower Monumental dams. These examinations are typically conducted once a week at each site. GBT monitoring at Lower Granite Dam can be considered a baseline estimate, as there is little TDG production from the projects above LGR. To date, the 12-hour average TDG levels (based on Oregon methodology) in the Lower Granite Dam forebay have ranged from 103.2 to 107.7%, while the 12-hour average TDG levels in Dworshak Dam tailrace have ranged from 98.1 to 121.9%. To date, GBT monitoring at Lower Granite Dam has revealed no incidences of GBT (Figure 2).

To date, the 12-hour average TDG levels (based on Oregon methodology) in the Little Goose Dam forebay have ranged from 105.9 to 125.5%, while the 12-hour average TDG levels in Lower Granite Dam tailrace have ranged from 108.7 to 132.2%. Gas Bubble Trauma monitoring at Little Goose Dam has revealed low incidence of GBT, with a maximum incidence level of 1% of the examined fish on April 18th and April 23rd (Figure 3). However, it is important to note that, due to full powerhouse outage from May 24th to June 1st, GBT monitoring at Little Goose has not occurred since May 21st. The powerhouse at LGS was restored to operation on June 1st, which means that GBT exams should be resumed next week.

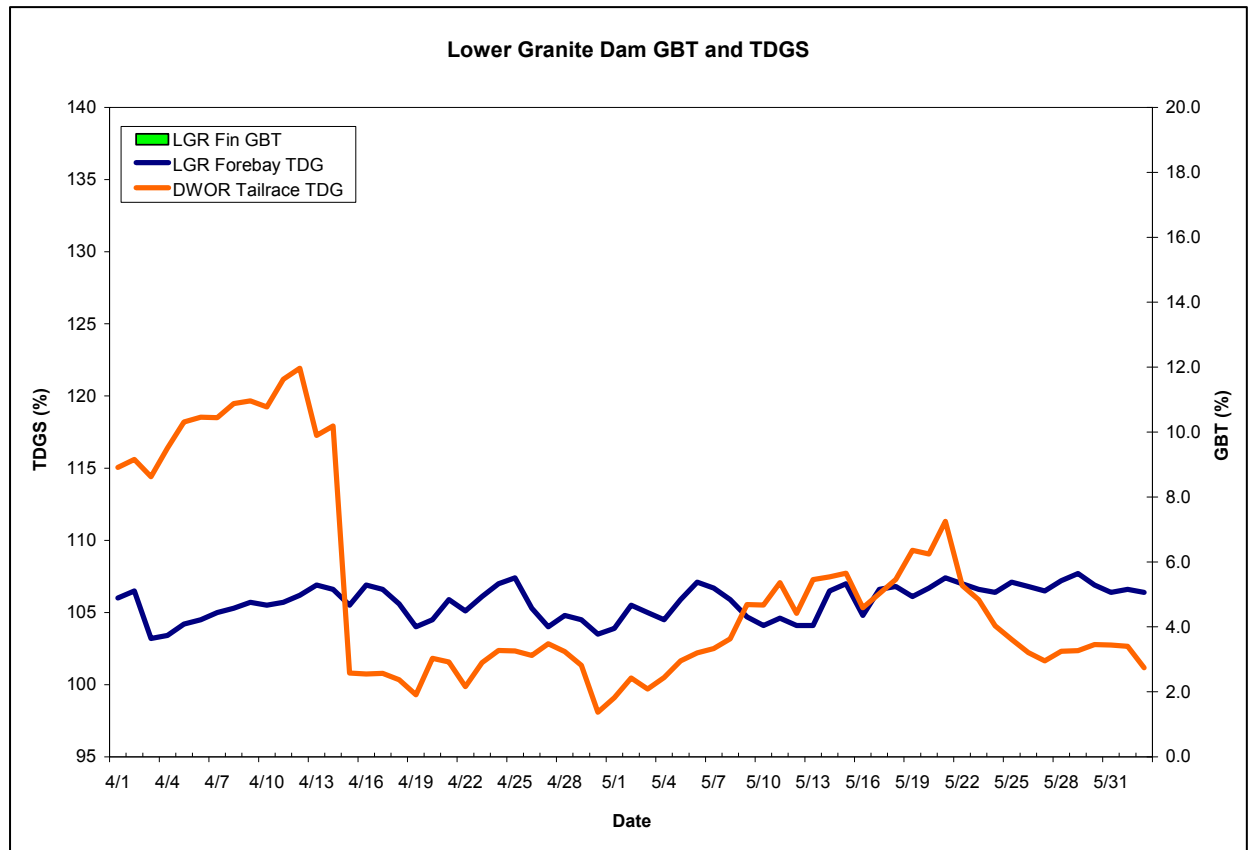


Figure 2. Percent of fish examined at Lower Granite Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Lower Granite Dam forebay and the Dworshak Dam tailrace.

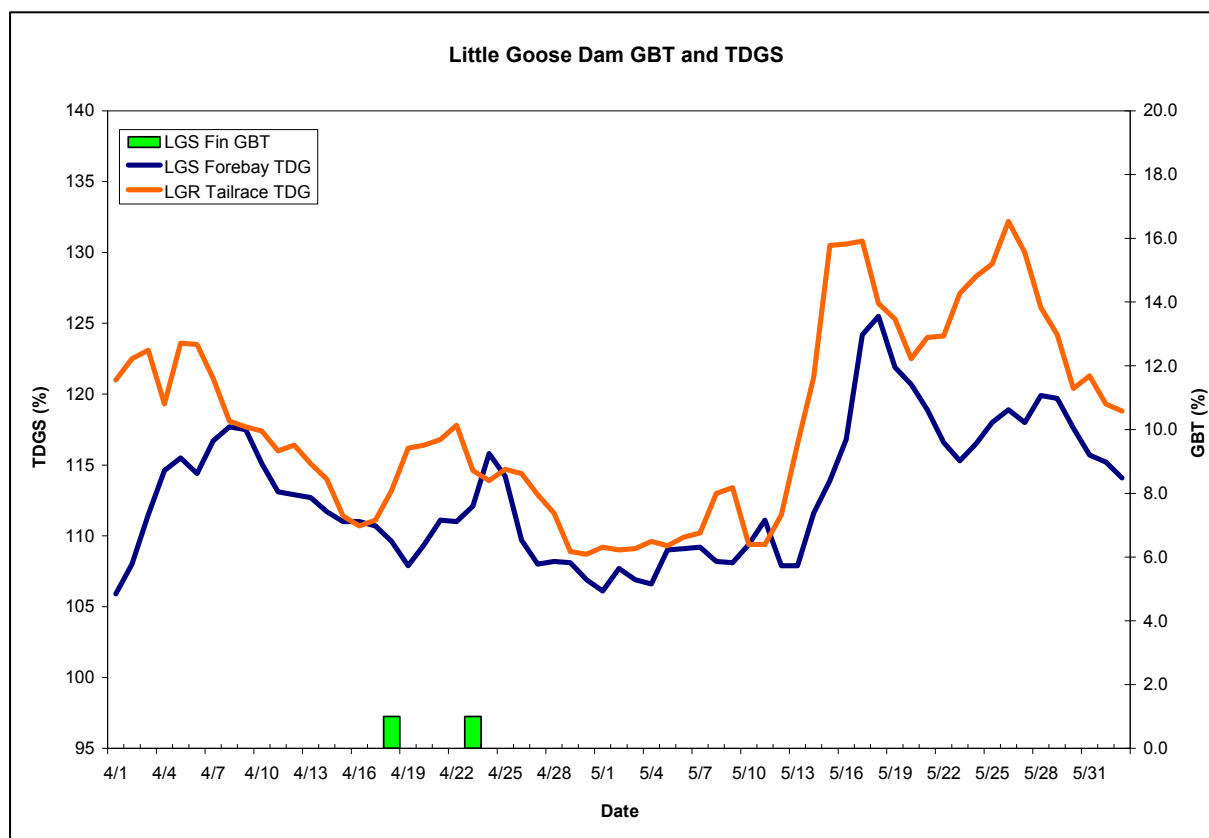


Figure 3. Percent of fish examined at Little Goose Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Little Goose Dam forebay and the Lower Granite Dam tailrace.

To date, the 12-hour average TDG levels (based on Oregon methodology) in the Lower Monumental Dam forebay have ranged from 105.0 to 139.3%, while the 12-hour average TDG levels in Little Goose Dam tailrace have ranged from 110.6 to 138.6%. From May 16th to June 1st, the 12-hour average TDG in the Lower Monumental forebay and Little Goose tailrace were both above 125%. As mentioned above, Little Goose Dam has had a full powerhouse outage from May 24th to June 1st. During this period of full powerhouse outage, spill at LGS was close to 100%. Also, transportation from LMN was terminated on two separate occasions, from May 17-19 and from May 23-29. When transportation from LMN was not occurring, there were no full samples for the SMP or GBT monitoring program and bypassed fish were returned to the river without being sampled. However, a small condition sample was taken on May 25th, in conjunction with that a GBT sample. Lower Monumental resumed full sampling on May 28th. The May 28th GBT sample revealed a 23% incidence level of fin GBT. This exceeds the 15% action criterion for the curtailment of spill. However, the June 1st GBT sample at LMN revealed only a 5% incidence of fin GBT. Even with the action criterion being met on May 28th, there was no action that could be taken at this time. All Snake River projects were operating under uncontrolled spill and, thus, spill could not be reduced. Furthermore, with the LGS powerhouse being restored on June 1st, the TDG levels in the LGS tailrace and LMN forebay are expected to decrease over the next few days.

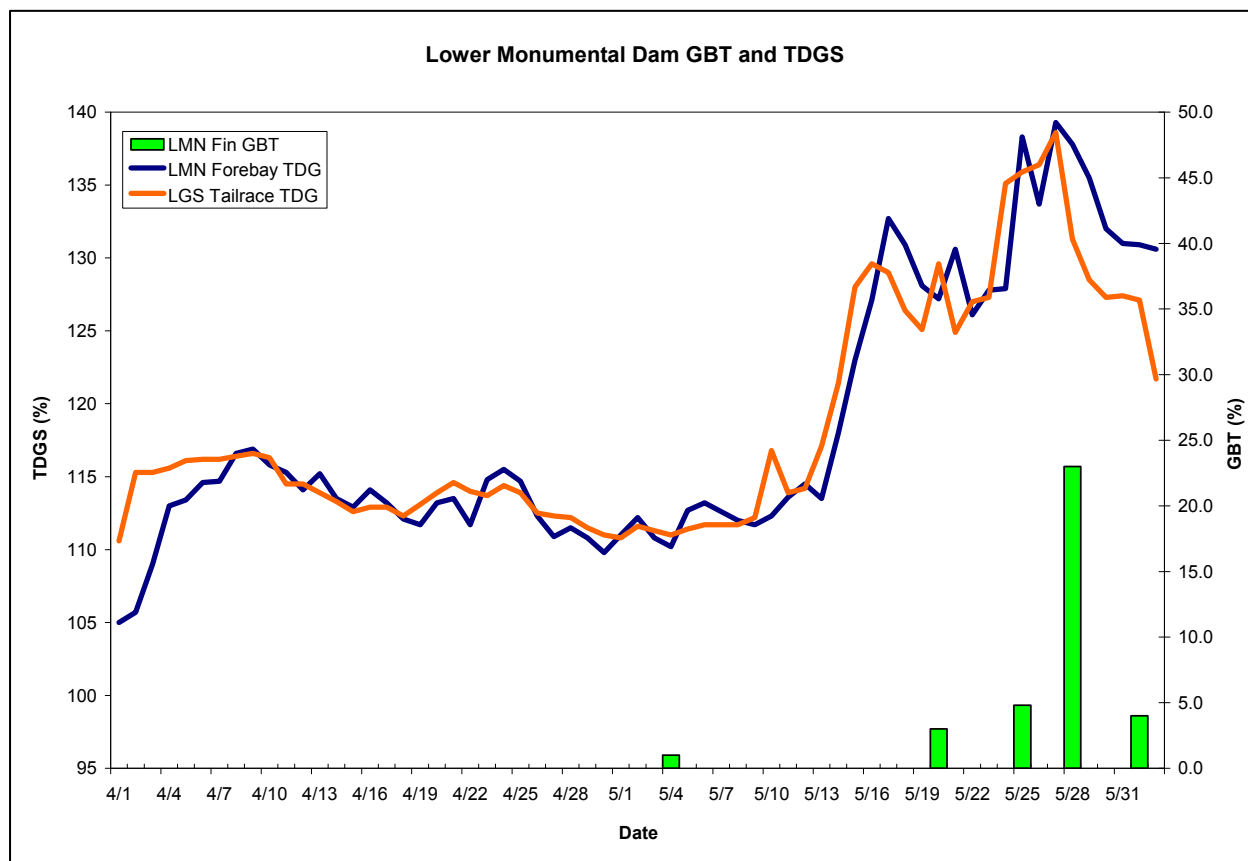


Figure 4. Percent of fish examined at Lower Monumental Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Lower Monumental Dam forebay and the Little Goose Dam tailrace.

Gas Bubble Trauma monitoring takes place at two sites in the Lower Columbia River: McNary and Bonneville dams. These examinations are typically conducted twice a week at each site. To date, the 12-hour average TDG levels (based on Oregon methodology) in the McNary Dam forebay have ranged from 106 to 120.6%, while the 12-hour average TDG levels in the Ice Harbor Dam tailrace have ranged from 115.1 to 129.7%. GBT incidence at McNary Dam has increased over the past week, with a 5% fin GBT incidence on June 1st (Figure 5). However, this incidence level is below the two action criteria.

To date, the 12-hour average TDG levels (based on Oregon methodology) in the Bonneville Dam forebay have ranged from 106.9 to 122.7%, while the 12-hour average TDG levels in The Dalles Dam tailrace have ranged from 109.4 to 124.7%. GBT incidence at Bonneville Dam has also increased over the past week, with 3.2% fin GBT on May 28th (Figure 6). However, the May 31st sample revealed no GBT.

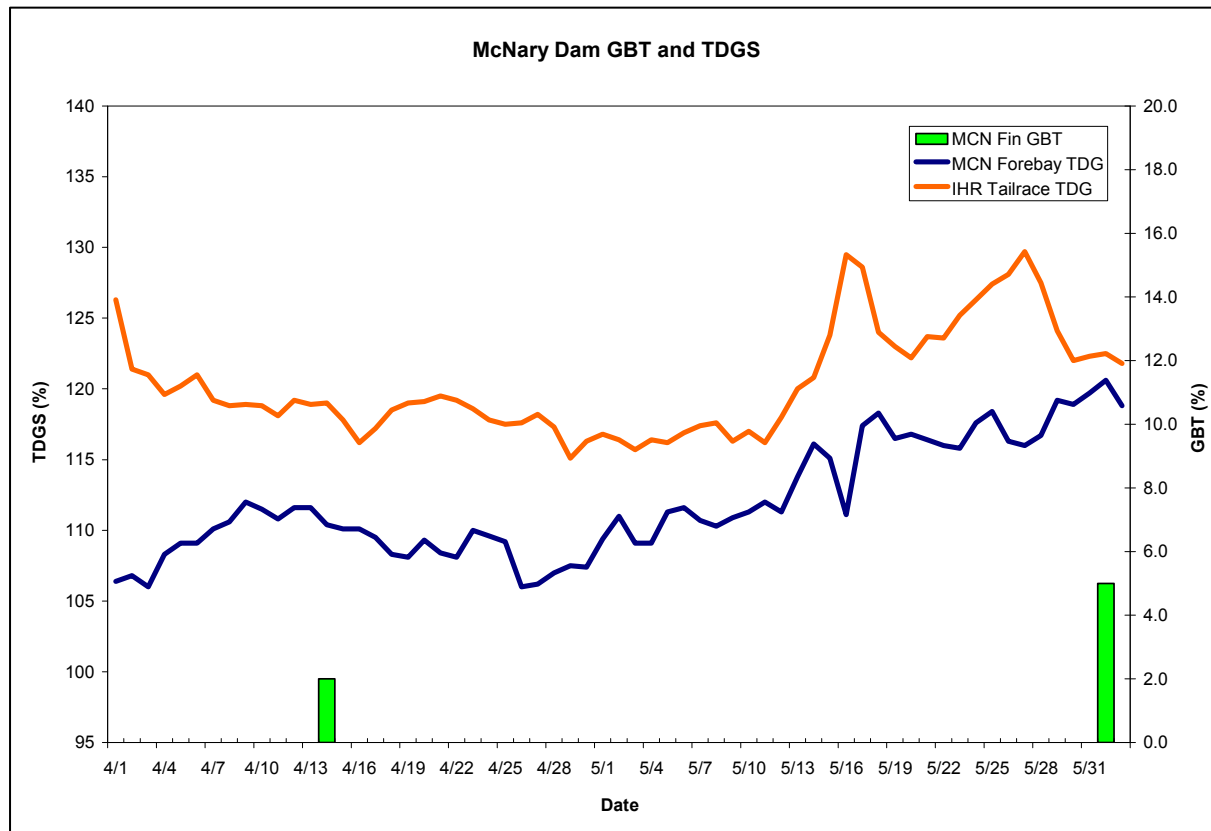


Figure 5. Percent of fish examined at McNary Dam showing signs of fin GBT with associated dissolved gas saturation levels in the McNary Dam forebay and the Ice Harbor Dam tailrace.

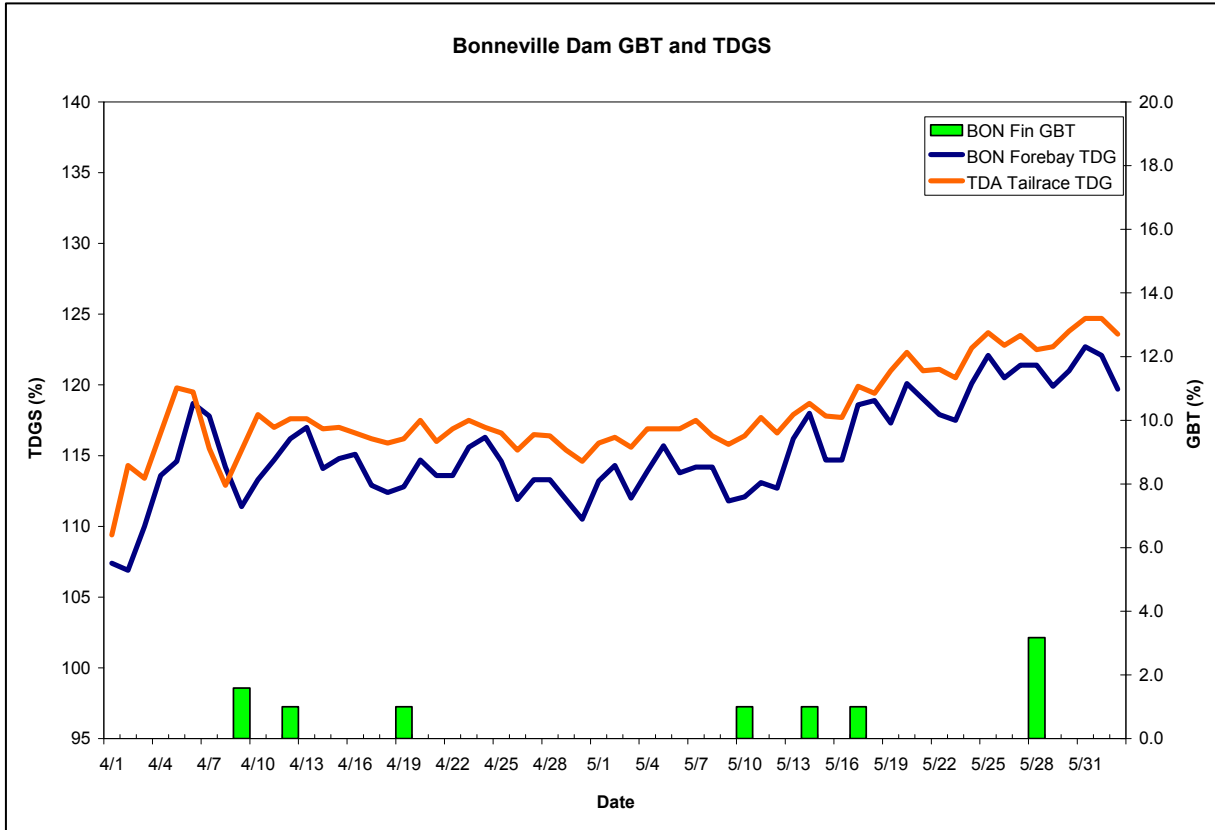


Figure 6. Percent of fish examined at Bonneville Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Bonneville Dam forebay and The Dalles Dam tailrace.

Based on the GBT monitoring to date, the 15% fin GBT action criterion for curtailment of voluntary spill was met at Lower Monumental Dam on May 28th and Rock Island Dam on May 31st and June 2nd. The 5% severe fin GBT action criterion has not been met at any of the GBT monitoring sites.



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DATA REQUEST FORM

Request Taken By: Margaret Flardo Date: 1-June-2011

Data Requested By:

Name: Bill Twit (WDFW) Phone: _____
Address: _____ Fax: _____
_____ Email: _____

Data Requested:

Update May 27, 2011 GBT memo with data
from May 27 - June 2.

Data Format: Hardcopy Text Excel

Delivery: Mail Email Fax Phone

Comments:

Data Compiled By: [Signature] Date: 3-June-2011

Request # 48