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MEMORANDUM

TO: Bill Tweit, WDFW
Guy Norman, WDFW

Michele DeHart

FROM: Michele DeHart

DATE: June 17, 2011

RE: Columbia & Snake Rivers Smolt Monitoring Program Gas Bubble Trauma –
June 17, 2011 Update

In response to your request the FPC staff has updated the Columbia & Snake Rivers Smolt Monitoring Program Gas Bubble Trauma memo with data collected over the past week. Below is a list of the results from the GBT monitoring over the past week (June 10-16, 2011), followed by data for GBT monitoring for the 2011 season so far.

- The present spill and flow levels continue to be the result of the high run-off volume.
- The river system continues to be managed for flood control, with a target flow of 480 Kcfs at The Dalles Dam. The 480 Kcfs flood control target at The Dalles Dam exceeds the 7Q10 flow.
- Over the past week, total dissolved gas levels continued to exceed the 115/120% at all projects in the Mid Columbia, Snake and lower Columbia rivers.
- Compared to last week, levels of gas bubble trauma at the Mid-Columbia River project decreased, while GBT at some of the Snake River projects increased. GBT monitoring results over the past week are as follows:
 - LGR – There continue to be no signs of GBT
 - LGS – GBT incidence increased to nearly 14% on June 13th
 - LMN – GBT incidence increased to 8% on June 15th
 - MCN – 1% GBT incidence on June 13th
 - BON – 0% GBT incidence on June 11th and 1.4% incidence on June 14th
 - RIS – 21% GBT incidence on June 14th and 10% incidence on June 16th

- The only project with GBT incidence above the criteria for the curtailment of spill this week was RIS on June 14th. However, 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. Furthermore, the GBT sample on June 16th had an incidence level that was below the 15% criterion. The 5% severe fin GBT action criterion has not been met at any of the GBT monitoring sites.
- The high levels of GBT at RIS are likely due to the high levels of TDG from spill at Wells and Rocky Reach dams.

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 (RIS) have ranged from 104.9 to 131.4%. Moving up stream of Rock Island Dam, the 12-hour average TDG levels in the Rocky Reach Dam tailrace (RRTW) have ranged from 104.9 to 135.4%, TDG in the Wells Dam (WEL) tailrace has ranged from 105.4% to 137.8%, TDG in the Chief Joseph Dam (CHJ) tailrace has ranged from 103.4 to 123.6%, and TDG downstream of Grand Coulee Dam (GCL) has ranged from 103.7 and 144.2% (Figure 1). It is worth noting that the Wells Dam Tailrace monitor was out of order from June 11th to June 13th.

GBT incidences at Rock Island Dam have continued to decrease over the past week. On June 14th the GBT incidence level was 21%, followed by 10% incidence on June 16th (Figure 1). These levels of incidence are much lower than the 60%, 40%, and 31% incidence levels that were seen in the past two weeks. However, the June 14th sample did exceed the 15% GBT criterion for the curtailment of spill. The next sample, June 16th, did not exceed the 15% GBT criterion. The levels of severe fin GBT continue remain below the 5% criterion (0% severe fin GBT on June 14th and 1% severe fin GBT on June 16th).

The 12-hr average TDG downstream of GCL has remained above 120% since May 18th, and has been as high as 144%. However, it appears that CHJ has done a fair job at decreasing this excess TDG from GCL over the past month. Therefore, it appears that the high incidence of GBT at RIS is likely due to high levels of TDG being generated from the spill at Wells and Rocky Reach dams.

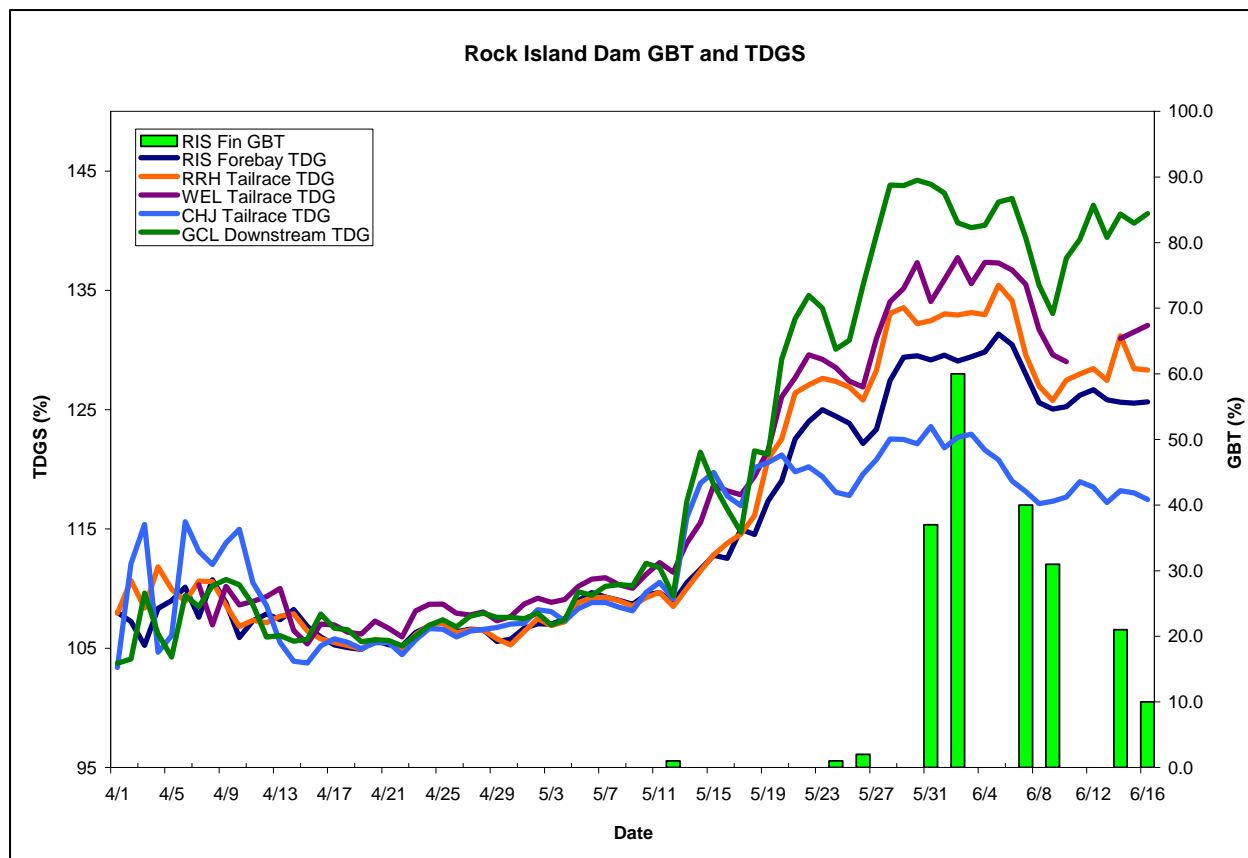


Figure 1. Percent of fish examined at Rock Island Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Rock Island Dam forebay, the Rocky Reach Dam tailrace, and downstream of Grand Coulee Dam.

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 109.17%, 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).

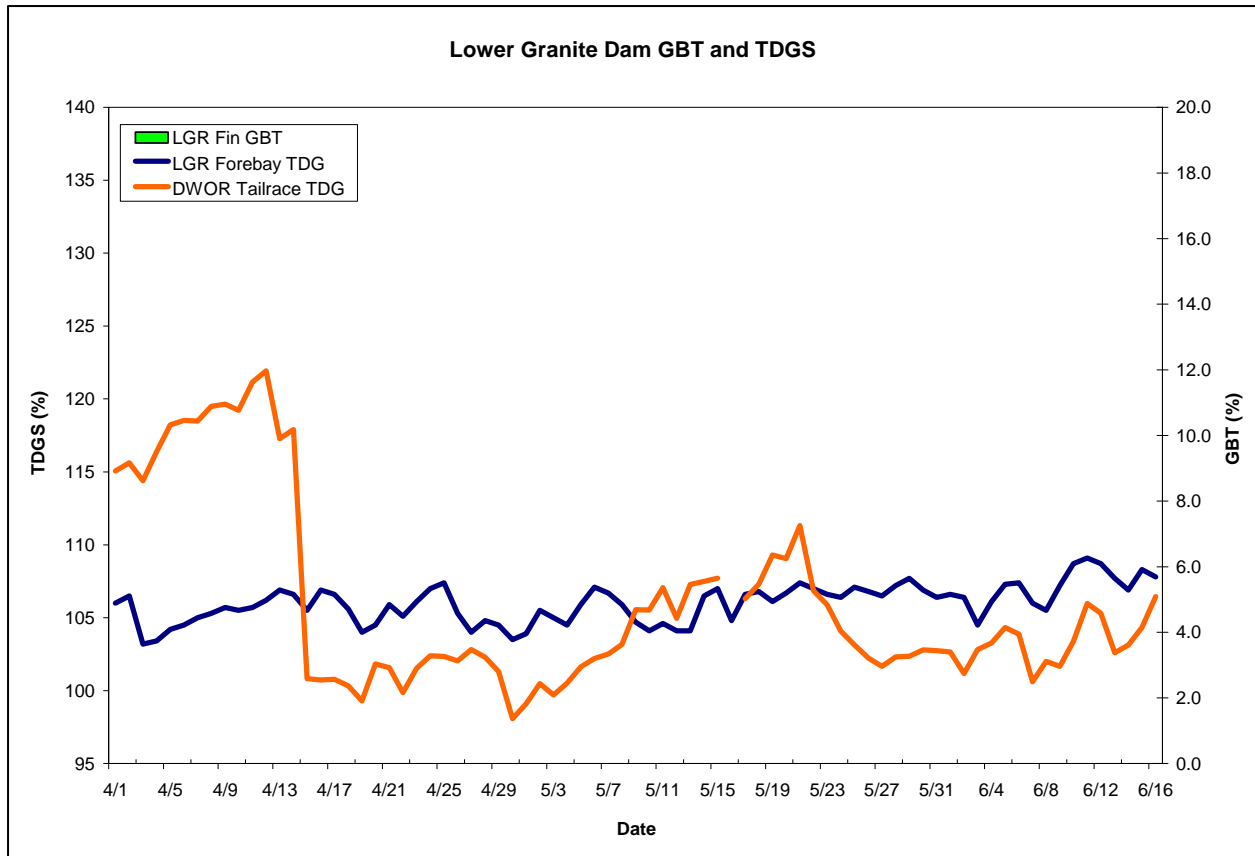


Figure 2. Percent of fish examined at Lower Granite Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Lower Granite Dam forebay and the Dworshak Dam tailrace.

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%. Incidences of GBT have increased with this week's sample. The incidence of GBT from the June 13th sample was 13.9%, which is the maximum at LGS so far this year (Figure 3). However, it is important to note that GBT monitoring at LGS did not take place during the full powerhouse outage from May 24th to June 1st.

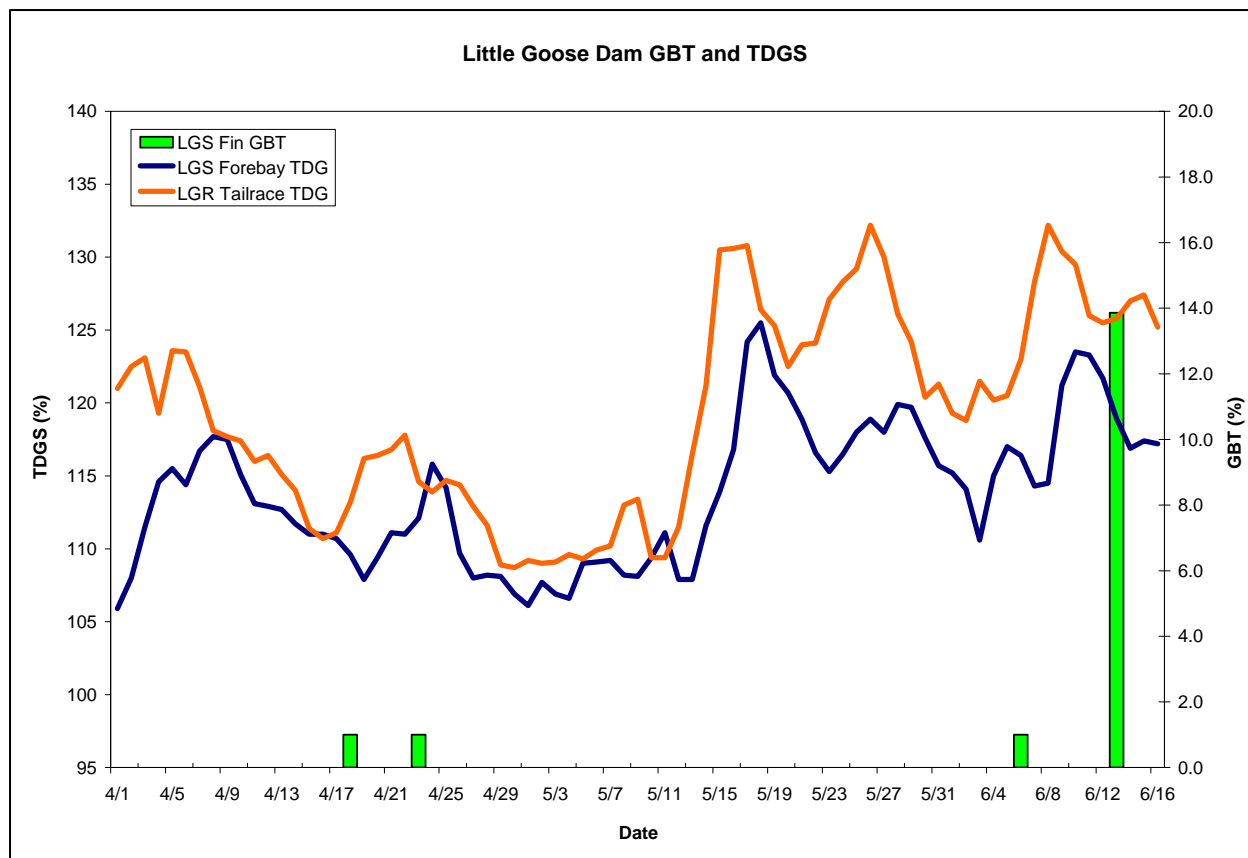


Figure 3. Percent of fish examined at Little Goose Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Little Goose Dam forebay and the Lower Granite Dam tailrace.

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%. Incidences of GBT at LMN increased over the past week. . The incidence of GBT from the June 15th sample was 8% (Figure 4).

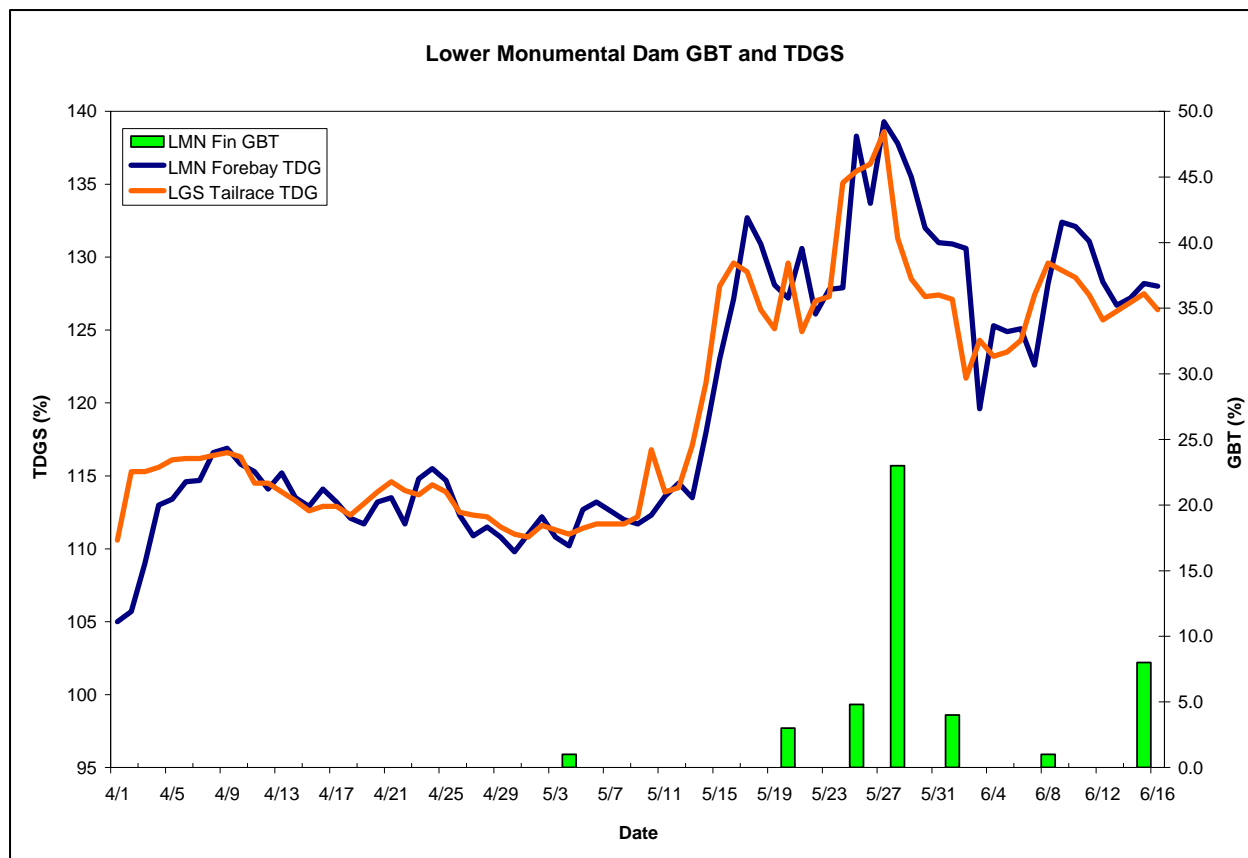


Figure 4. Percent of fish examined at Lower Monumental Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Lower Monumental Dam forebay and the Little Goose Dam tailrace.

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 122.0%, while the 12-hour average TDG levels in the Ice Harbor Dam tailrace have ranged from 115.1 to 130.6%. GBT incidence at McNary Dam has remained low but constant over the past week, with a 1% fin GBT incidence on June 13th (Figure 5).

To date, the 12-hour average TDG levels (based on Oregon methodology) in the Bonneville Dam forebay have ranged from 106.9 to 124.3%, while the 12-hour average TDG levels in The Dalles Dam tailrace have ranged from 109.4 to 126.3%. GBT incidence at Bonneville Dam has increased slightly this week, with 1.3% fin GBT on June 14th (Figure 6).

Based on the GBT monitoring this week, the 15% fin GBT action criterion for curtailment of voluntary spill was only met at Rock Island Dam on June 14th. However, the GBT incidence level from the June 16th sample was below the 15% criterion. The 5% severe fin GBT action criterion has not been met at any of the GBT monitoring sites so far this year.

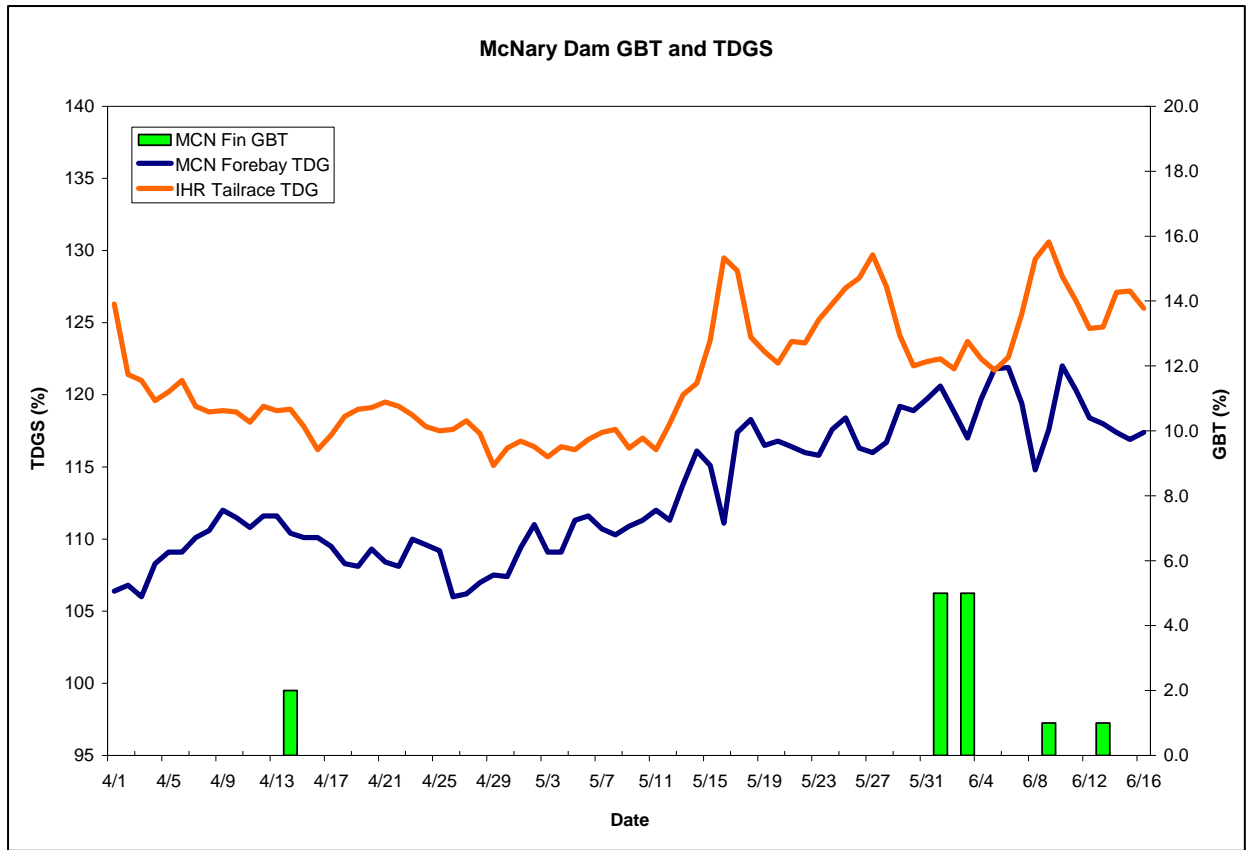


Figure 5. Percent of fish examined at McNary Dam showing signs of fin GBT with associated dissolved gas saturation levels in the McNary Dam forebay and the Ice Harbor Dam tailrace.

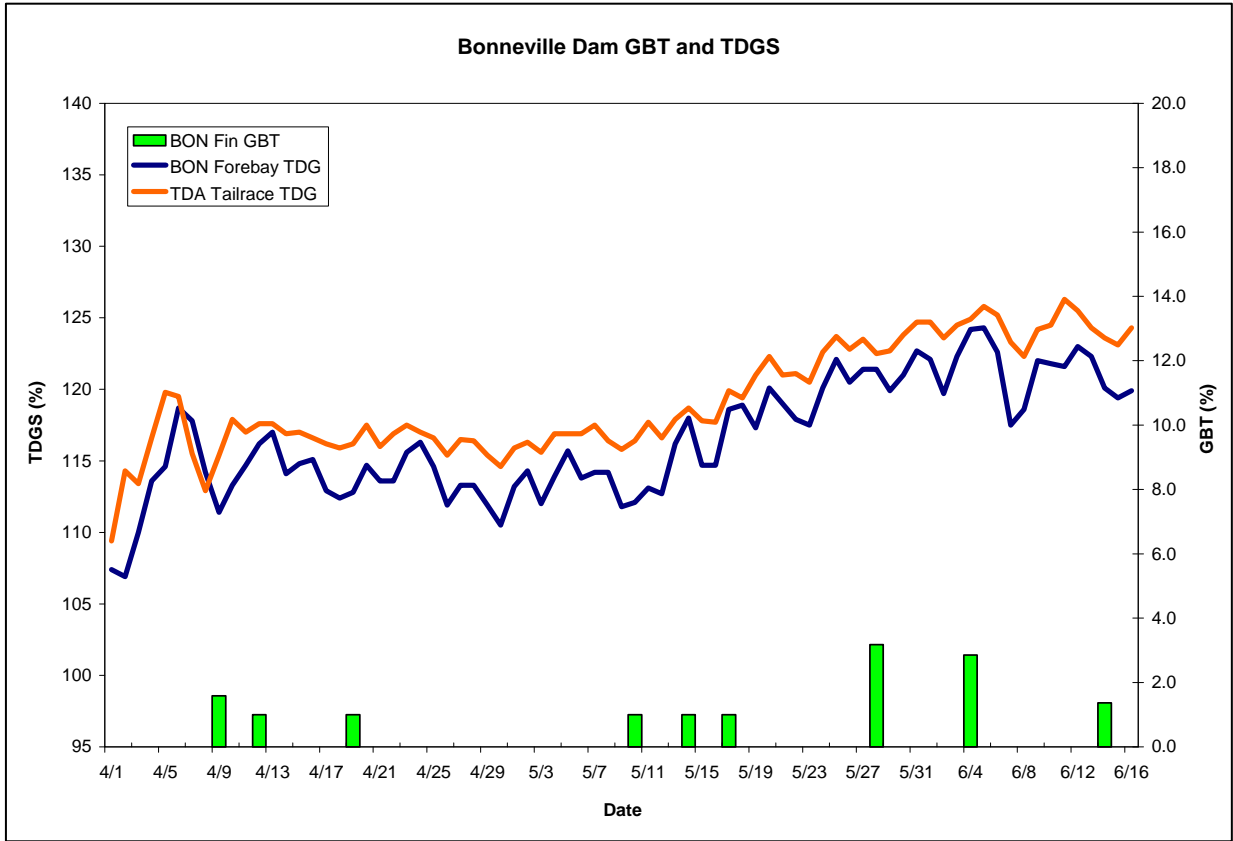


Figure 6. Percent of fish examined at Bonneville Dam showing signs of fin GBT with associated dissolved gas saturation levels in the Bonneville Dam forebay and The Dalles Dam tailrace.