



FISH PASSAGE CENTER

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MEMORANDUM

TO: Michele DeHart

FROM: Brandon Chockley

DATE: April 27, 2017

SUBJECT: Gas Bubble Trauma Monitoring Quality Assurance/Quality Control Visit to Rock Island Dam.

In response to your request and in response to a recent FPAC discussion about Gas Bubble Trauma (GBT) Monitoring at Rock Island Dam (RIS), I have prepared a brief summary report of my recent visit to RIS for the annual quality assurance/quality control assessment. On April 25, 2017, we met Chelan PUD staff at RIS for FPC's annual GBT QA/QC evaluation. In addition to conducting a QA/QC evaluation, we were given a brief tour and overview of the juvenile collection facility and how fish end up in the sample.

Tour and Overview of Sampling Facility and Sampling Process

Unlike the other SMP sites at dams, RIS does not have a traditional bypass system. There are no screens that guide fish entering the powerhouse into a bypass system. Instead, a portion of the fish that enter the second powerhouse will swim through a series of submerged orifices into a bypass channel. While these submerged orifices are lighted to attract fish into the bypass channel, the process of swimming through the orifices is completely voluntary. Because of the voluntary nature of this collection system, it is unknown how much time fish may spend in the powerhouse prior to entering the bypass channel or how long fish are in the channel before being routed into the sample trap. In addition to the orifices and bypass channel that run parallel to the second powerhouse, some juvenile salmonids are also "opportunistically" collected from a screening system associated with an adult attraction pump that draws water from the forebay, just above the second powerhouse. Fish collected from this screening system are diverted to the bypass channel.

From the bypass channel, juveniles are routed to a sample trap that is located in the tailrace of the project where they are held for up to 24-hours before being processed for the SMP. Just before 9:00 am, fish in the trap are crowded into a hopper and transported to a large sample tank in the sample room. Once fish are in the sample tank, they are enumerated for the SMP and returned to a recovery tank before ultimate release into the tailrace. A portion of the SMP sample at RIS is also PIT-tagged for the SMP.

RIS conducts GBT monitoring two days per week, typically on Tuesday and Thursday. On GBT days, up to 100 total Chinook and steelhead from the SMP sample are examined for signs of GBT. Therefore, fish examined for GBT can be held in the sample trap for up to 24-hours prior to being examined. The sample trap is relatively shallow (~2-3 ft), which increases the potential that incidences of GBT may be inflated.

At most of the FCRPS projects, the GBT sample is collected directly from the separator, therefore reducing the amount of time that these fish spend in shallow water. At RIS, there is no separator where fish can be collected for quick examination. The FPC has worked with Chelan PUD over the years to try to minimize the amount of time these fish spend in the sample trap but this has proved to be difficult due to work schedules and budget constraints. In 2016, the FPC and Chelan PUD arranged for a pilot study of collecting “fresh” fish as they enter the sample trap. This involved sending SMP crew member(s) down to the trap at ~8:00 am to sample fish as they enter the sample trap in the last hour of the sample. The idea behind the pilot was to collect “fresh” fish and compare the incidence of GBT from these “fresh” fish to that of fish that were held in the sample tank for up to 24-hours. Unfortunately, we were unable to collect enough “fresh” fish in the one hour of sampling to make a robust comparison. Extending the one hour sampling window was not possible due to scheduling and budget constraints. Furthermore, the ability to collect “fresh” fish was limited to periods of peak passage (~2 weeks out of the entire 2016 season).

GBT QA/QC Results:

QA/QC evaluations typically involve me examining 10 total GBT target fish with each member of the GBT monitoring crew. After each fish, I communicate with the crew member being evaluated to make sure we agree on whether GBT was observed and, if so, what the rank(s) of the GBT sign(s) were.

Prior to our visit, GBT incidences at RIS had been 31% (April 18th) and 45% (April 20th). After the sample on April 18th, I requested that RIS try to collect “fresh” fish as they enter the sample trap. They began collecting “fresh” fish for the GBT sample on Thursday, April 20th but were only able to collect four “fresh” fish in the time allowed. I have requested that they keep collecting “fresh” fish for GBT examination in 2017, to the extent possible.

At RIS, there was only one crew member who was conducting GBT exams, Todd Jackson. The first six fish that I examined with Todd were all “fresh” fish that were collected as they entered the sample trap. All six fish were hatchery Chinook. Of these, two had signs of GBT in the anal fin (Rank 1). Therefore, GBT incidence in the “fresh” sample was 33% (all Rank 1). I then examined 10 additional fish with Todd. These 10 additional fish were fish that had been held in the sample trap for up to 24-hours prior to examination. Of these 10 fish, nine were Chinook (8 clipped, 1 unclipped) and one was a steelhead (unclipped). Of these 10 fish, three had signs of GBT. Two had Rank 1 signs in the caudal fin and Rank 2 signs in the anal fin while the third had Rank 1 signs in the dorsal fin. Based on the 10 fish from this portion of the QA/QC evaluation, GBT incidence was 30%. Over the 16 total fish that I examined with Todd,

GBT incidence was ~31%. Todd and I agreed in our assessments of all 16 fish, both on the presence of bubbles and their ranks.

As we were leaving, Todd asked me to examine an unclipped Chinook that he had just examined. Todd and I agreed that this unclipped Chinook had severe signs of GBT (Rank 3) in the anal fin and Rank 1 signs in the dorsal fin. After we left, Todd continued the GBT exams until he reached the target sample size of 100 fish. For the entire sample, the GBT incidence on April 25th was 53%. For your reference, Table 1 below outlines the ranking system that our GBT crews use when quantifying GBT in the unpaired fins and eyes.

Table 1. Ranking system used by SMP crews for quantifying GBT incidence in unpaired fins and eyes.

Rank	Description
0	No bubbles
1	<5% of fin or eye area occluded
2	6-25% of fin or eye area occluded
3	26-50% of fin or eye area occluded
4	>50% of fin or eye area occluded