

MEMORANDUM FOR THE RECORD 18 LGS 22 Unit Priority Violation Due To Failed Through-Bushing and Oil Level Sensing Equipment**SUBJECT: Little Goose Unit Priority Violation**Background

Little Goose Lock and Dam experienced another 15 kv ground fault on October 9 at 19:00, causing Unit 1 to trip and be forced out of service. Upon extensive troubleshooting, electricians determined that a through-bushing between Unit 1 and the T1 transformer failed and caused the ground. The configuration at Little Goose Dam is such that Units 1-4 are connected to the T1 transformer, and Units 5-6 are connected to the T2 transformer. Additionally, the buss work for units are run in pairs, starting with Units 1 and 2, then 3 and 4, and finally 5 and 6. The aforementioned configuration prohibits conducting repairs to the through-bushing with the T1 transformer in operation which removed Units 1-4 from service during repairs. Therefore, Little Goose Dam was unable to operate within unit priority as outlined in the Fish Passage Plan (Chapter 8-Little Goose Dam, Table LGS-5) during this outage.

With Units 1-4 OOS, Little Goose was forced to operate the only available turbine, Unit 6, as Unit 5 is also out of service for overhaul (Table 1). District engineers and powerhouse electricians were able to disconnect the paired buss work from Units 1 and 2 from the T1 transformer on October 12 and restore Units 3 and 4 to service by 19:18. Although this did not restore Unit 1 for proper unit priority, it helped Little Goose Dam meet load demand and minimize the need for involuntary spill.

During troubleshooting, Little Goose Dam required multiple line outages. During these outages, all units were shut down for short amounts of time while switching plant configuration. Once the plant was configured, Unit 6 was operated to provide station service. These line outages occurred on October 10, 11, 12, and 17. Involuntary spill occurred during line outages on October 11, 12, and 17.

Additionally, Unit 4 turbine guide bearing oil annunciation failed during this period. Little Goose has concern operating Unit 4 due to the loss of emergency shutdown features associated with the annunciation. Therefore, Unit 4 is currently being operated in a last on/first off basis. During times of increased load demand, Unit 6 was operated in order to reduce the need for operating Unit 4. The instances where Unit 6 was utilized are outlined in Table 2.

Path Forward

Electricians replaced the bushing and returned T1 transformer to service at 17:31 on October 18. Little Goose returned to normal unit priority operation with the exception of unit annual maintenance.

Relevance to Adult and Juvenile Fish Passage

Unit 1 is the priority unit for adult fish attraction flow. Currently Little Goose is nearing the end of peak passage for both fall Chinook salmon and steelhead (Fish Passage Plan, Chapter 7-Little Goose, Table LGS-4). Adult fish counts at Little Goose Dam are relatively low compared to the 10-year average (Figure 1 & 2).

Juvenile fish passage is very low, consistent with the 10-year average smolt index (Figure 3) and consists predominately of subyearling Chinook salmon. Summer spill at Little Goose ended on August 31, routing all juvenile fish through the juvenile bypass system and/or turbine unit. During involuntary spill on October 11, 12 and 17, juvenile fish may have been routed through spillways.

Estimated mortalities by species, and origin:

- A. Species – N/A
- B. Origin – N/A
- C. Length – N/A
- D. Marks and tags – N/A
- E. Marks and Injuries found on carcass – N/A
- F. Cause and Time of Death – N/A
- G. Future and Preventative Measures – N/A

Table 1: Little Goose Dam Unit Outages.

Unit	Out of Service	Time	Return to Service	Time	Description
5	4/14/2017	14:11	06/01/2019	17:00	Spider and Upper Guide Bearing Repair
2	10/01/2018	07:00	10/22/2018	17:00	Annual Maintenance
1, 2	10/09/2018	19:00	10/18/2018	17:31	Unit 1/T1 Through-Bushing
3, 4	10/09/2018	19:00	10/12/2018	19:18	Unit 1/T1 Through-Bushing
All	10/10/2018	06:58	10/10/2018	07:30	Line Outage
All	10/11/2018	09:47	10/11/2018	17:04	Line Outage
All	10/12/2018	07:04	10/12/2018	19:18	Line Outage
All	10/17/2018	07:34	10/17/2018	19:12	Line Outage

Table 2: Dates and Times Little Goose Dam operated Unit 6 outside of unit priority to mitigate damage to Unit 4.

Date	Start Time	Stop Time
10/09/2018	19:03	22:10
10/14/2018	14:55	22:13
10/18/2018	07:06	11:15
10/18/2018	16:57	17:36
10/18/2018	17:58	22:02

Figure 1: Adult Chinook salmon counts at Little Goose Dam; 2018 and 10-year average.

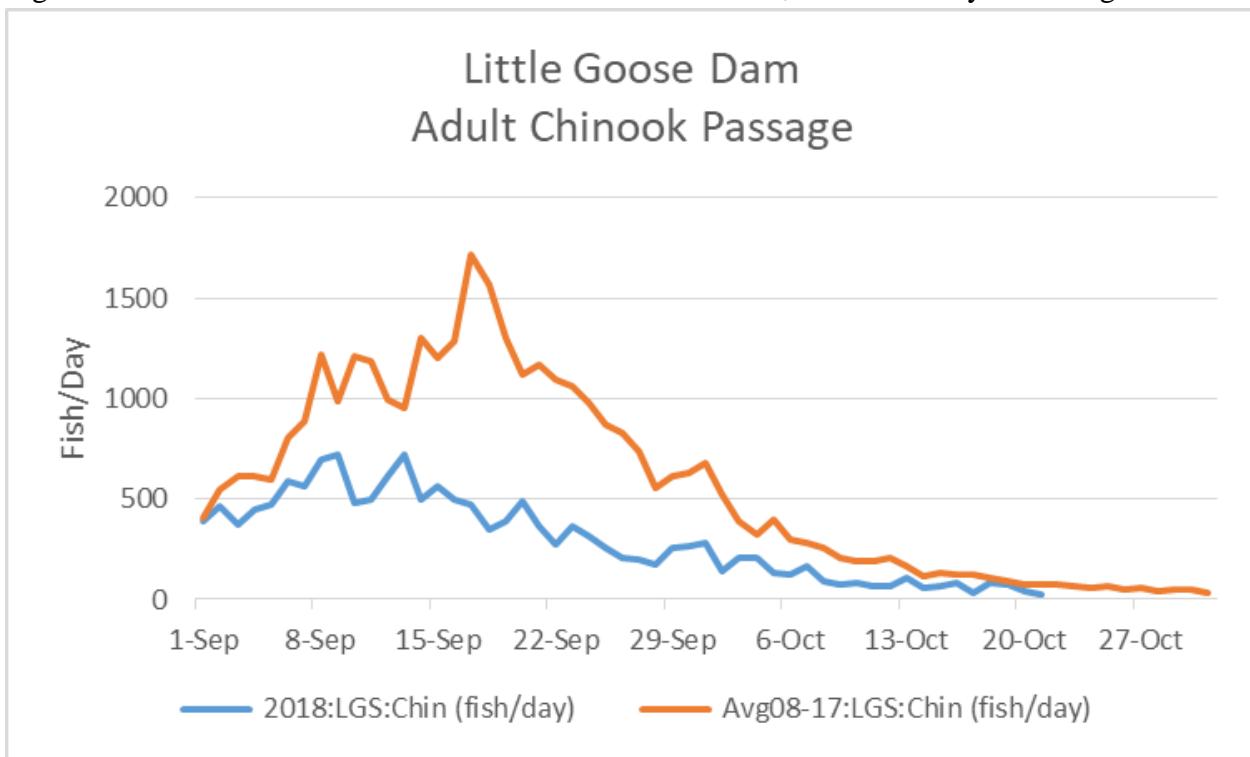


Figure 2: Adult steelhead counts at Little Goose Dam; 2018 and 10-year average.

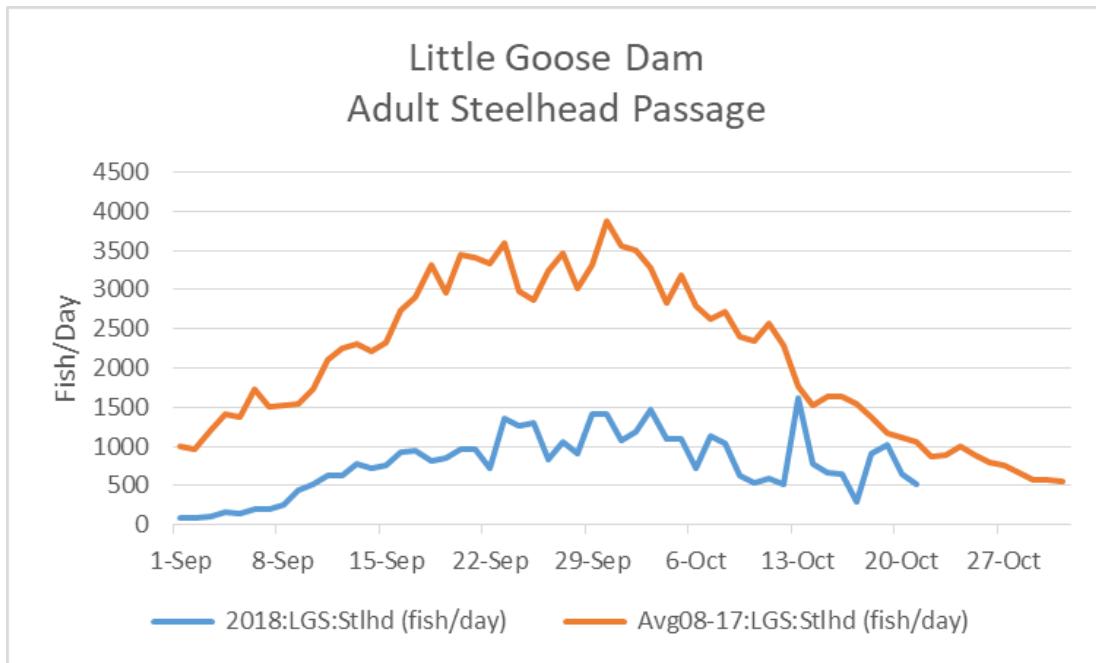
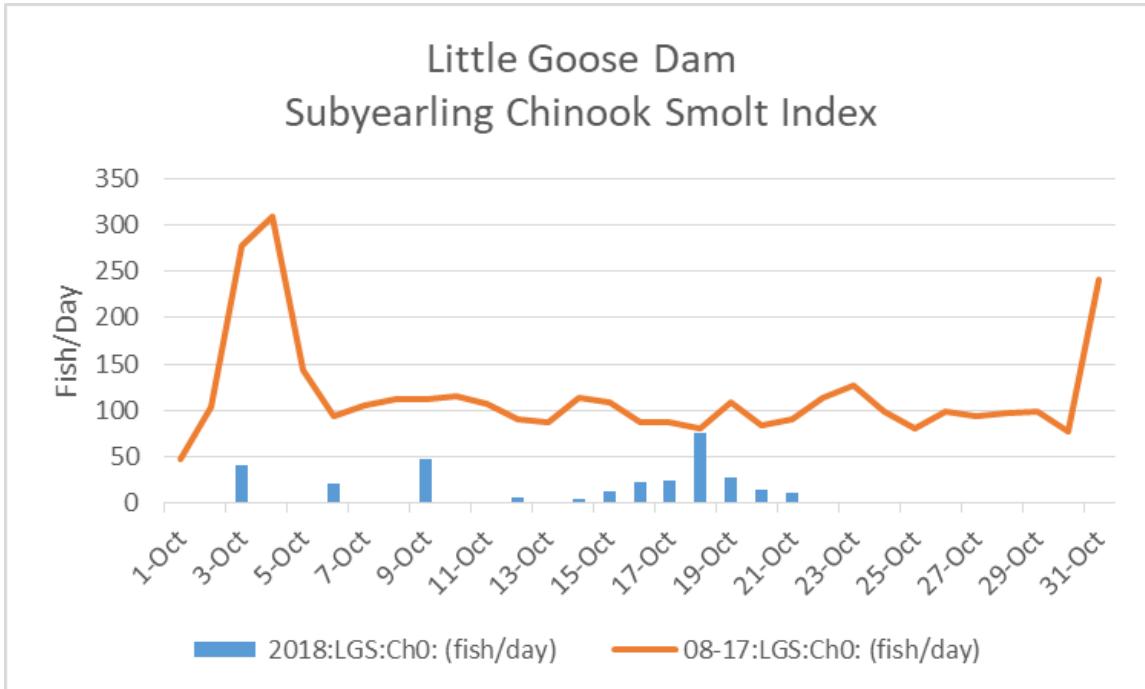


Figure 3: Subyearling Chinook salmon smolt index for October at Little Goose Lock and Dam; 2018 and 10-year average.



Sincerely,
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