



FISH PASSAGE CENTER

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MEMORANDUM

TO: Fish Passage Advisory Committee

FROM: Michele DeHart

DATE: June 11, 2018

SUBJECT: Adult count discrepancy between Ice Harbor Dam and Lower Monumental Dam

Cumulative combined (adult+jack) chinook counts Lower Monumental Dam exceed those at Ice Harbor Dam (ICH). A shift in cumulative totals occurred during the period of May 31 to June 1. Prior to May 31, Ice Harbor Dam cumulative counts were greater than those at Lower Monumental Dam (LMN). Beyond May 31, the cumulative combined chinook counts at Lower Monumental exceeded those at Ice Harbor, which is not expected. The FPC evaluated PIT-tag data as well as adult count information to attempt to determine possible causes for the unexpected total counts.

We found three possible causes for the unusual count totals based on our analysis.

- Fifteen PIT-tagged adult Chinook observed at LMN that were not previously detected at ICH suggesting some adults may be locking past ICH.
- Based on adult Chinook fall back rate estimates of 4.5% at Ice Harbor Dam and 7% at Lower Monumental Dam, the counts at Lower Monumental could be biased high.
- High turbidity at the Ice Harbor Dam may have led to undercounting of adult Chinook ladder passage on May 31 and June 1.
- It may be that a combination of all these factors has led to the cumulative adult Chinook counts at ICH being lower those at LMN.

Cumulative adult counts (both jacks and adults combined) of Chinook at Ice Harbor Dam have been below the total counts at Lower Monumental Dam in recent days. There are several reasons this may be occurring; different fallback rates at the two dams leading to higher total counts at Lower Monumental Dam; difference in adult count accuracy potentially leading to an undercount at Ice Harbor Dam/over count at Lower Monumental Dam; and potentially significant numbers of adults passing Ice Harbor Dam via the lock. Any or all of these could be contributing to the unusual case of having higher adult counts at Lower Monumental Dam than Ice Harbor.

Adult Lockage at Ice Harbor Dam?

The Fish Passage Center has evaluated PIT-tag adult Chinook detections at Lower Monumental Dam and found evidence of PIT-tagged adults passing undetected at Ice Harbor Dam. A total of 19 PIT-tagged Chinook adults were detected in the ladder at Lower Monumental Dam having not been previously detected at Ice Harbor. Of those detections 4 had been marked as adults at Lower Granite Dam, and had fallen back and re-ascended past Lower Monumental Dam. The remaining 15 tags were from adults that had been marked as juveniles, or as adults at Bonneville Dam and passed undetected at ICH. One possible explanation is that those PIT-tagged adults passed via the lock at Ice Harbor. A total of 1,064 tags were detected at LMA, of these 16 appeared to have passed ICH undetected or about 1.5% of tags. Applying that to the total adult detections, i.e. 1.5% undetected at ICH and that results in an estimated 522 adults passing via the lock. There are other explanations for non-detection, including tag collisions, or adults passing over weirs where detectors are present, so it is possible that significant lockage did not occur. And since the total difference in adults is over 2,000 adults, lockage alone would only explain about one quarter of the observed difference in adult counts.

Adult fallbacks bias counts high at Lower Monumental Dam?

Another possible source of difference is higher fallback rates at Lower Monumental Dam resulting in recounting adults passing the counting station multiple times. Based PIT-tag detections, one source of fallbacks could be adults that were marked/handled at Lower Granite Dam as adults and falling back to below Lower Monumental Dam and re-ascending. We mentioned previously that 4 such adults were observed passing Lower Monumental Dam, having not been detected at Ice Harbor Dam. This too could only explain a small portion of adult count bias. The FPC looked at re-ascension of PIT-tags at Lower Monumental Dam through June 3, and estimated about at a 7% re-ascension rate. We estimated about a 4.5% re-ascension rate at Ice Harbor Dam, so that fallback could account for at most about 2.5%, or about 900 more Chinook adults counted at Lower Monumental than at Ice Harbor. PIT-tag fallbacks occurred throughout the period from mid-May to early June at Lower Monumental Dam.

Adult counts biased low at Ice Harbor Dam due to high turbidity in ladder?

A third possible explanation is that adult counts at Ice Harbor are biased low. Daily counts at Ice Harbor on 5/31 and 6/1 were abnormally low compared to counts on days previous to 5/29 and post 6/1. Daily counts at Lower Monumental did not fall as low as those on 5/31 and 6/1 at Ice Harbor. The daily and cumulative counts on 5/31 and 6/1 are highlighted yellow in the Table below.

	Daily Counts			IHR Combined Cumulative	Daily Counts			LMN Combined Cumulative
	IHR Adult Ch	IHR Jack Ch	IHR Combined Ch		LMN Adult Ch	LMN Jack Ch	LMN Combined	
5/25/2018	891	103	994	18913	759	62	821	17279
5/26/2018	594	54	648	19561	1236	156	1392	18671
5/27/2018	1696	143	1839	21400	848	106	954	19625
5/28/2018	1278	123	1401	22801	1727	208	1935	21560
5/29/2018	1631	140	1771	24572	1834	197	2031	23591
5/30/2018	1099	75	1174	25746	1012	112	1124	24715
5/31/2018	467	42	509	26255	1877	170	2047	26762
6/1/2018	320	18	338	26593	1264	111	1375	28137
6/2/2018	1272	97	1369	27962	753	105	858	28995
6/3/2018	1047	75	1122	29084	1357	128	1485	30480
6/4/2018	871	62	933	30017	1158	131	1289	31769
6/5/2018	740	62	802	30819	1120	119	1239	33008
6/6/2018	700	71	771	31590	730	84	814	33822
6/7/2018	624	42	666	32256	732	77	809	34631

In terms of cumulative combined chinook counts at Ice Harbor and Lower Monumental, a shift in cumulative totals occurred during the same period of 5/31 to 6/1 (see Figure 1). Prior to 5/31, Ice Harbor cumulative combined chinook counts were greater than those at Lower Monumental, which is expected. Beyond 5/31, the cumulative combined chinook counts at Lower Monumental were greater than those at Ice Harbor, which is not expected. The FPC has asked the COE about the low daily counts seen at Ice Harbor on 5/31 and 6/1, which could be potentially skewing difference in the cumulative combined chinook counts seen between Ice harbor and Lower Monumental. The COE reported that the fish counter at Ice Harbor did note visibility issues on the dates in question, which could have prevented some fish from being counted. However, it is uncertain as to how visibility would be limited to only Ice Harbor, as there are no known sizeable tributaries that could have resulted in turbid water predominantly only at Ice Harbor. A comparison of cumulative PIT-tag detections at Ice Harbor and Lower Monumental Dam (Figure 2) did not show the same pattern of cumulative detections as seen with adult counts. This difference between PIT-tag and adult counts adds credence to the possible miscounts at ICH.

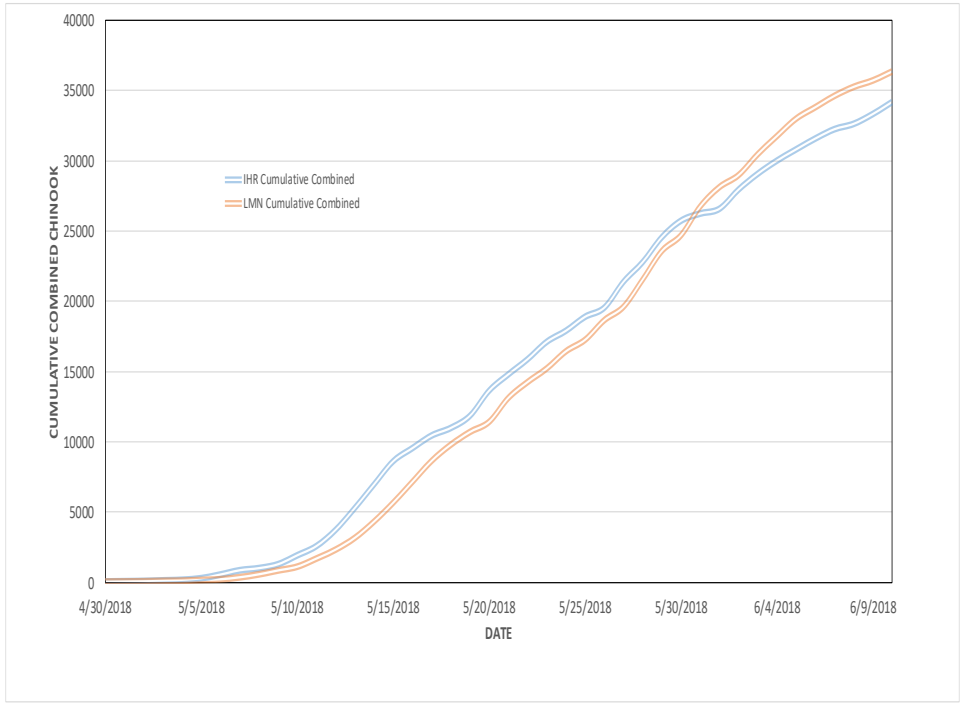


Figure 1. Cumulative adult Chinook counts at Ice Harbor Dam and Lower Monumental Dam in 2018.

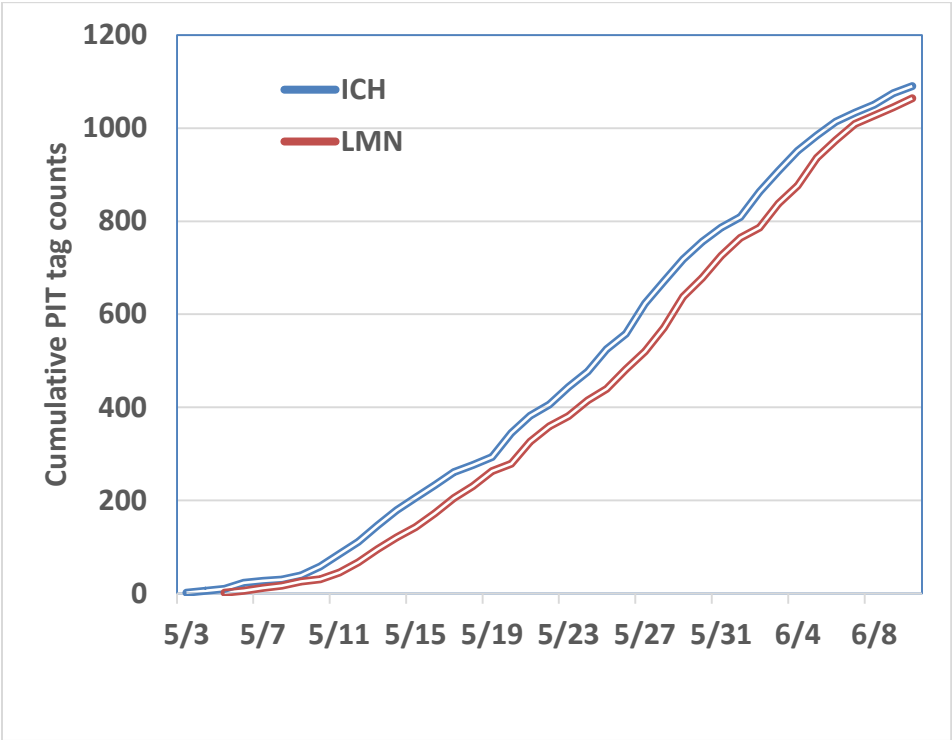


Figure 2. Cumulative PIT-tag adult Chinook detections at Ice Harbor Dam and Lower Monumental Dam in 2018

Based on available information, it is possible that a combination of factors has led to the unusual circumstance of higher cumulative adult counts at Lower Monumental Dam compared to Ice Harbor Dam.