

## Fish Passage Plan (FPP) Change Form

**Change Form # & Title:** 24LWG002 – Alternative Low Flow Spill Patterns  
**Date Submitted:** 2-JAN-2024  
**Project:** Lower Granite Dam  
**Requester Name, Agency:** Trevor Conder, NOAA Fisheries  
**Final Action:** **FINALIZED 1-FEB-2024**

**FPP SECTION:** Add new Table LWG-9. Alternative Low Flow Spill Patterns with RSW.

**JUSTIFICATION FOR CHANGE:** This is an alternative low flow spill pattern intended to provide improved downstream egress conditions and stabilize tailwater elevation at Lower Granite Dam. There is evidence in the elevation data and ERDC modeling that during low flow ( $\leq 15$  kcfs), the current low flow RSW spill pattern can result in a strong eddy and water surface depression in the tailrace. This condition can cause suboptimal egress conditions for juvenile salmonids, and under certain conditions, low tailwater elevation readings which can lead to forebay elevation increases downstream. Raising reservoir elevation slows river flow which has been shown to increase travel time for juvenile salmonids and reduce survival. When implemented, the alternative spill pattern is expected to reduce the strength of the powerhouse eddy which may improve egress and stabilize tailwater elevations in the project tailwater reducing the need the need for reservoir elevation increases. The alternative spill pattern would be implemented following a teletype request that would be initiated if project tailwater falls below minimum tailwater and prior to a request to increase LGS forebay elevation. The operation will be monitored using existing data sources such as tailwater elevation, fishway criteria, PIT detections, adult fish counts, and project observations.

**PROPOSED CHANGES:** *edits to existing FPP text in “Track changes”*

**Table LWG-9. Alternative Lower Granite Dam Spill Patterns with RSW. \***

Alternative LWG Spill Patterns with RSW - # Gate Stops per Spillbay								Total Stops (#)	Spill (kcfs)
Bay 1 <sup>b</sup>	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8		
RSW								0 (RSW-only)	6.6
RSW		1						1	8.3
RSW		<u>2</u> 1					<u>1</u>	2	10.1
RSW		<u>3</u> 1			<u>1</u>		<u>1</u>	3	12.0
RSW		<u>4</u> 1			<u>1</u>	<u>1</u>	<u>1</u>	4	13.8
RSW		1		1	1	1	1	5	15.1
RSW		1	1	1	1	1	1	6	16.8
RSW	1	1	1	1	1	1	1	7	18.5
RSW	1	1	2	1	1	1	1	8	20.3
RSW	1	1	2	1	1	1	2	9	22.1
RSW	1	1	2	2	1	1	2	10	23.9
RSW	1	1	2	2	2	1	2	11	25.7
RSW	1	2	2	2	2	1	2	12	27.6
RSW	2	2	2	2	2	1	2	13	29.4

Alternative LWG Spill Patterns with RSW - # Gate Stops per Spillbay								Total Stops (#)	Spill (kcfs)
Bay 1 <sup>b</sup>	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8		
RSW	2	2	2	2	2	2	2	14	31.2
RSW	2	2	3	2	2	2	2	15	33.0
RSW	2	2	3	3	2	2	2	16	34.9
RSW	2	2	3	3	3	2	2	17	36.8
RSW	2	3	3	3	3	2	2	18	38.6
RSW	3	3	3	3	3	2	2	19	40.5
RSW	3	3	4	3	3	2	2	20	42.3
RSW	3	3	4	4	3	2	2	21	44.2
RSW	3	3	4	4	4	2	2	22	46.1
RSW	3	4	4	4	4	2	2	23	47.9
RSW	4	4	4	4	4	2	2	24	49.8
RSW	4	4	4	4	4	2	3	25	51.6
RSW	4	4	4	4	4	3	3	26	53.5
RSW	4	4	5	4	4	3	3	27	55.4
RSW	4	4	5	5	4	3	3	28	57.2
RSW	4	4	5	5	5	3	3	29	59.1
RSW	4	5	5	5	5	3	3	30	60.9
RSW	5	5	5	5	5	3	3	31	62.8
RSW	5	5	5	5	5	3	4	32	64.7
RSW	5	5	5	5	5	4	4	33	66.5
RSW	5	5	6	5	5	4	4	34	68.4
RSW	5	5	6	6	5	4	4	35	70.2
RSW	5	5	6	6	6	4	4	36	72.1
RSW	5	6	6	6	6	4	4	37	74.0
RSW	6	6	6	6	6	4	4	38	75.8
RSW	6	6	6	6	6	5	4	39	77.7
RSW	6	6	6	6	6	5	5	40	79.5
RSW	6	6	6	6	6	6	5	41	81.4
RSW	6	6	6	6	6	6	6	42	83.3
RSW	6	6	7	6	6	6	6	43	85.1
RSW	6	6	7	7	6	6	6	44	87.0
RSW	6	7	7	7	6	6	6	45	88.8
RSW	6	7	7	7	7	6	6	46	90.7
RSW	6	7	7	7	7	7	6	47	92.5
RSW	6	7	7	7	7	7	7	48	94.4
RSW	7	7	7	7	7	7	7	49	96.2
RSW	7	7	8	7	7	7	7	50	98.1

\* Red text indicates change from Table LWG-7. These alternative spill patterns were added in 2024 for use on an as-needed basis when spill is < 15 kcfs and the RSW is open. The intent is to improve downstream egress conditions and stabilize the tailwater elevation. *The project will shift back to patterns in Table LWG-7 if needed to maintain navigation safety.*

## **COMMENTS:**

3-JAN-2024, Ryan Laughery, Corps NWW:

My two cents. Proposal should provide increased energy dissipation with the potential to be more stable. I would suggest trying. May influence navigation if I recall correctly, something to keep an eye on.

3-JAN-2024, Elizabeth Holdren, Corps LWG:

LWG support the proposed FPP change. That said, we would like to be able to return to the current pattern if there impacts to navigation safety.

3-JAN-2024, Chris Peery, Corps NWW:

Thanks Elizabeth. I would also agree this looks worth a try.

30-JAN-2024, Dave Swank, USFWS:

Is there a reason we can't just make these the new default spill patterns at these low flows? Why wait until the TW falls below a minimum level?

30-JAN-2024, Trevor Conder, NOAA:

Dave, The Corps is working on changing which tailrace elevation monitors will be used to monitor minimum tailwater elevation. It is possible that change by itself will eliminate the need to increase LGS forebay above MOP to meet LWG min. tailwater. If that is not the case, we will implement this alternative spill pattern prior to increasing LGS MOP and monitor for effect. It is our opinion that this stepped approach reduces risk to fish.

1-FEB-2024 FPOM FPP meeting:

Conder – hopefully the new tailwater gauge methodology fixes the problem with managing the Lower Granite tailwater, or at least reduces the need to raise the Goose pool. The intent is that these patterns would be the next step to manage the tailwater. The project could shift back to the current (bulkier) patterns if needed for nav safety.

Wright confirmed that the Corps will use these patterns if needed to manage the Lower Granite tailwater prior to making any MOP adjustments at Goose. Keep in mind we could be using them as early as April if flows are low enough (they were last year). If the patterns meet the intent and don't have any issues with nav or other issues, we can talk about whether it makes sense to have these as the default patterns for low flow spill.

**RECORD OF FINAL ACTION:** Finalized at the FPOM FPP meeting 1-FEB-2024