# Fish Passage Plan (FPP) Change Form

**Change Form # & Title**: 23MCN001 – Reduced Auto Operation of Spillway Hoists & Cranes

**Date Submitted**: 1-DEC-2022 *(revised and resubmitted* [*22MCN005*](https://pweb.crohms.org/tmt/documents/fpp/2022/changes/)*)*;

 REVISED 6-FEB-2023

**Project**: McNary Dam

**Requester Name, Agency**: Chris Peery, Corps NWW

**Final Action:**

**FPP Section**: MCN section 2.2.1 (Spill Management)

**Justification for Change**:

Testing conducted 2003-2005 showed that McNary Dam spillway hoists have been operated above their rated capacity since installation. Following recent failure of Spillway Hoist 6 and resulting McNary Lock and Dam Spillway Gate Hoist Rehabilitation site inspection, it was recommended that use of all spillway hoists be minimized until hoists have been replaced.

The engineering analysis report on Hoist #6 identified macro pitting on gear contact surfaces that will increase friction as more wear and tear is experienced. Sheave bearings are also showing signs of failure due to being operated in a 100% duty cycle environment, beyond designed operational loading capability, for over 20 years.

This inspection has identified conditions of unacceptable risk to our critical Emergency Action Plan (EAP) response equipment and Project personnel. The risk of continuing to operate all hoists in an auto response mode, is no longer acceptable due to the level of risk to personnel, equipment, and downstream stake holders. As a result, McNary Dam has modified the spill patterns to reduce the use of auto response mode in the interim until the spillbay hoists can be upgraded or replaced to achieve the appropriate lifting capacity, a process estimated to take up to 10 years. In general, the modified patterns uses only four or five spillbay hoists set to auto mode at a time, with the remaining spillbays in manual mode. Auto-mode gates and hoists will be used to accommodate small changes in flow within defined flow bands. As flow changes to either higher or lower bands, manual-mode gates will be adjusted accordingly, manually.

Spill operations described here are intended to reduce risk to personnel and prolong operational life of the spillway gate hoists. These operations have not been evaluated to estimate the potential to affect fish passage and tailrace egress conditions.

**Proposed Changes**:

*See following pages for edits to existing FPP text in track changes.*

2.2. Spill Management

**2.2.1.** Spring and summer spill operations for juvenile fish passage are defined in the *Fish Operations Plan* (FOP), included in the Fish Passage Plan as **Appendix E**. Spill at McNary Dam will be distributed in spill patterns defined in **Tables MCN-7, -8, -9, -10**, except as noted below in s**ection 2.2.1.1**.

**2.2.1.1.** **Interim Spillway Hoist Operation - Minimization of Unsafe Operating Practices**.

As an interim operation until hoists are repaired or replaced so they are no longer in an overloaded condition, McNary spillway hoists will be separated into two control groups: Manual/dogged and Auto modes. There are currently 3 spillbays that are manually adjusted – Bays 2, 6, and 16. Two of the remaining 19 spillbays serve TSW1 and TSW2 until they are removed, typically in early June. This provides a total of 17 spillbays with functioning hoists until early June, then 19 spillbays for the remaining of the spill season that can be rotated through Manual and Auto mode assignments, as described below. During spring and summer spill, April 10–August 31, four or five (during June) of these spillbays will be operated in Auto-adjusted mode each month according to the rotation schedule below. The change will occur during the first full week of the month. Hoists will initially be set to the average openings identified in the applicable interim spill patterns in **Table MCN-11**. Gate operation categories are as follows:

1. **Manual Gates** – Manual gates will be set at the mid-point of the 50 kcfs spill block associated with the current flow level and manually dogged and will not be adjusted for 30 days or until there is a delta of 50 kcfs (+/- 25 kcfs) of current settings. All Manual gates will be raised or lowered with a safety observer stationed at the spillway deck, in the event of sustained flow increases more than the difference of designated spill limits, when one or more of the following occur:
2. Present for more than 72 hours.
3. All Auto Gate openings exceed an increase of 2+ “stops” per Auto Gate beyond normal flow settings of Spillway Gate stops identified in Spill Pattern Table settings and if flows are expected to increase for 72 hours or more.
4. Expected flows are at peak delta and are predicted to rise beyond a max spill delta of 30 kcfs.
5. **Auto Gates** – Auto gates will be set at the pattern associated with the current spill and flow rate in **Table MCN-11** and will be left in auto-response mode for approximately 30 days before being rotated to the next spillway gate assignment. See gate rotation schedule below:



Table MCN-11. Interim McNary Dam Manual/Auto Spill Patterns with Bays 2, 6, and 16 Locked at four or six Stops. See section 2.2.1.1 for more information (added July 2022).

**APRIL Manual/Auto Spill Patterns w/ TSWs:**

|  |  |  |
| --- | --- | --- |
| **APRIL Manual/Auto Spill Patterns with TSWs (# Gate Stops per Spillbay). Bays 2, 6, and 16 locked at 4 or 6 stops (manually adjusted)** | **Total Stops** | **Total Spill** a |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19 b** | **20 b** | **21** | **22** | **(#)** | **(kcfs)** |
| 2 | 4 | 0 | 2 | 2 | 0 | 0 | 2 | 1 | 2 | 0 | 2 | 2 | 0 | 2 | 4 | 2 | 2 | TSW | TSW | 2 | 0 | **31** | **78.5** |
| 2 | 4 | 3 | 2 | 2 | 0 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 0 | 2 | 4 | 2 | 2 | TSW | TSW | 2 | 3 | **43** | **100.9** |
| 2 | 4 | 6 | 2 | 2 | 0 | 6 | 2 | 1 | 2 | 6 | 2 | 2 | 0 | 2 | 4 | 2 | 2 | TSW | TSW | 2 | 6 | **55** | **120.1** |
| 3 | 4 | 0 | 3 | 3 | 6 | 0 | 3 | 3 | 3 | 0 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | TSW | TSW | 4 | 0 | **55** | **120.0** |
| 3 | 4 | 3 | 3 | 3 | 6 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | TSW | TSW | 4 | 3 | **67** | **142.4** |
| 3 | 4 | 6 | 3 | 3 | 6 | 6 | 3 | 3 | 3 | 6 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | TSW | TSW | 4 | 6 | **79** | **161.6** |
| 4 | 4 | 2 | 4 | 5 | 6 | 2 | 4 | 5 | 5 | 1 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | TSW | TSW | 5 | 2 | **80** | **162.5** |
| 4 | 4 | 5 | 4 | 5 | 6 | 5 | 4 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | TSW | TSW | 5 | 5 | **92** | **182.4** |
| 4 | 4 | 8 | 4 | 5 | 6 | 8 | 4 | 5 | 5 | 7 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | TSW | TSW | 5 | 8 | **104** | **201.9** |
| 6 | 4 | 3 | 6 | 6 | 6 | 3 | 6 | 6 | 6 | 2 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 3 | **105** | **203.1** |
| 6 | 4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 6 | **117** | **222.4** |
| 6 | 4 | 9 | 6 | 6 | 6 | 9 | 6 | 6 | 6 | 8 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 9 | **129** | **242.0** |
| 7 | 6 | 5 | 8 | 7 | 6 | 4 | 7 | 7 | 7 | 4 | 7 | 7 | 7 | 7 | 6 | 8 | 8 | TSW | TSW | 8 | 4 | **130** | **243.6** |
| 7 | 6 | 8 | 8 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 8 | 8 | TSW | TSW | 8 | 7 | **142** | **262.9** |
| 7 | 6 | 11 | 8 | 7 | 6 | 10 | 7 | 7 | 7 | 10 | 7 | 7 | 7 | 7 | 6 | 8 | 8 | TSW | TSW | 8 | 10 | **154** | **282.3** |

**MAY Manual/Auto Spill Patterns w/ TSWs:**

|  |  |  |
| --- | --- | --- |
| **MAY Manual/Auto Spill Patterns with TSWs (# Gate Stops per Spillbay). Bays 2, 6, and 16 locked at 4 or 6 stops (manually adjusted)** | **Total Stops** | **Total Spill** a |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19 b** | **20 b** | **21** | **22** | **(#)** | **(kcfs)** |
| 2 | 4 | 2 |   | 2 | 0 | 3 | 2 | 1 |   | 2 | 2 | 1 |   | 2 | 4 |   | 2 | TSW | TSW | 2 |   | **31** | **78.5** |
| 2 | 4 | 2 | 3 | 2 | 0 | 3 | 2 | 1 | 3 | 2 | 2 | 1 | 3 | 2 | 4 | 3 | 2 | TSW | TSW | 2 |   | **43** | **100.7** |
| 2 | 4 | 2 | 6 | 2 | 0 | 3 | 2 | 1 | 6 | 2 | 2 | 1 | 6 | 2 | 4 | 6 | 2 | TSW | TSW | 2 |   | **55** | **120.1** |
| 3 | 4 | 3 | 0 | 3 | 6 | 3 | 3 | 3 | 0 | 3 | 3 | 3 | 0 | 3 | 4 | 0 | 4 | TSW | TSW | 4 | 3 | **55** | **120.0** |
| 3 | 4 | 3 | 3 | 3 | 6 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | TSW | TSW | 4 | 3 | **67** | **142.4** |
| 3 | 4 | 3 | 6 | 3 | 6 | 3 | 3 | 3 | 6 | 3 | 3 | 3 | 6 | 3 | 4 | 6 | 4 | TSW | TSW | 4 | 3 | **79** | **161.6** |
| 4 | 4 | 5 | 1 | 5 | 6 | 5 | 4 | 5 | 2 | 4 | 5 | 4 | 2 | 4 | 4 | 1 | 5 | TSW | TSW | 5 | 5 | **80** | **162.5** |
| 4 | 4 | 5 | 4 | 5 | 6 | 5 | 4 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | TSW | TSW | 5 | 5 | **92** | **182.4** |
| 4 | 4 | 5 | 7 | 5 | 6 | 5 | 4 | 5 | 8 | 4 | 5 | 4 | 8 | 4 | 4 | 7 | 5 | TSW | TSW | 5 | 5 | **104** | **201.9** |
| 6 | 4 | 6 | 3 | 6 | 6 | 6 | 6 | 6 | 3 | 5 | 6 | 6 | 3 | 6 | 6 | 3 | 6 | TSW | TSW | 6 | 6 | **105** | **203.1** |
| 6 | 4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 6 | **117** | **222.4** |
| 6 | 4 | 6 | 9 | 6 | 6 | 6 | 6 | 6 | 9 | 5 | 6 | 6 | 9 | 6 | 6 | 9 | 6 | TSW | TSW | 6 | 6 | **129** | **242.0** |
| 7 | 6 | 8 | 5 | 7 | 6 | 7 | 7 | 7 | 4 | 7 | 7 | 7 | 4 | 7 | 6 | 5 | 8 | TSW | TSW | 8 | 7 | **130** | **243.6** |
| 7 | 6 | 8 | 8 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 8 | 8 | TSW | TSW | 8 | 7 | **142** | **262.9** |
| 7 | 6 | 8 | 11 | 7 | 6 | 7 | 7 | 7 | 10 | 7 | 7 | 7 | 10 | 7 | 6 | 11 | 8 | TSW | TSW | 8 | 7 | **154** | **282.3** |

**JUNE Manual/Auto Spill Patterns w/ TSWs:**

|  |  |  |
| --- | --- | --- |
| **JUNE Manual/Auto Spill Patterns with TSWs (# Gate Stops per Spillbay). Bays 2, 6, and 16 locked at 4 or 6 stops (manually adjusted)** | **Total Stops** | **Total Spill** a |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19 b** | **20 b** | **21** | **22** | **(#)** | **(kcfs)** |
| 2 | 4 | 2 | 2 | 0 | 0 | 2 | 2 | 0 | 2 | 1 | 0 | 2 | 0 | 2 | 4 | 2 | 0 | TSW | TSW | 2 | 2 | **31** | **78.5** |
| 2 | 4 | 2 | 2 | 3 | 0 | 2 | 2 | 3 | 2 | 1 | 3 | 2 | 0 | 2 | 4 | 2 | 3 | TSW | TSW | 2 | 2 | **43** | **100.7** |
| 2 | 4 | 2 | 2 | 6 | 0 | 2 | 2 | 6 | 2 | 1 | 6 | 2 | 0 | 2 | 4 | 2 | 6 | TSW | TSW | 2 | 2 | **55** | **120.1** |
| 3 | 4 | 3 | 3 | 0 | 6 | 3 | 3 | 0 | 3 | 3 | 0 | 3 | 3 | 3 | 4 | 3 | 1 | TSW | TSW | 4 | 3 | **55** | **120.0** |
| 3 | 4 | 3 | 3 | 3 | 6 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | TSW | TSW | 4 | 3 | **67** | **142.4** |
| 3 | 4 | 3 | 3 | 6 | 6 | 3 | 3 | 6 | 3 | 3 | 6 | 3 | 3 | 3 | 4 | 3 | 7 | TSW | TSW | 4 | 3 | **79** | **161.6** |
| 4 | 4 | 5 | 4 | 2 | 6 | 5 | 4 | 2 | 5 | 4 | 2 | 4 | 5 | 4 | 4 | 4 | 2 | TSW | TSW | 5 | 5 | **80** | **162.5** |
| 4 | 4 | 5 | 4 | 5 | 6 | 5 | 4 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | TSW | TSW | 5 | 5 | **92** | **182.4** |
| 4 | 4 | 5 | 4 | 8 | 6 | 5 | 4 | 8 | 5 | 4 | 8 | 4 | 5 | 4 | 4 | 4 | 8 | TSW | TSW | 5 | 5 | **104** | **201.9** |
| 6 | 4 | 6 | 6 | 3 | 6 | 6 | 6 | 3 | 6 | 5 | 3 | 6 | 6 | 6 | 6 | 6 | 3 | TSW | TSW | 6 | 6 | **105** | **203.1** |
| 6 | 4 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 6 | **117** | **222.4** |
| 6 | 4 | 6 | 6 | 9 | 6 | 6 | 6 | 9 | 6 | 5 | 9 | 6 | 6 | 6 | 6 | 6 | 9 | TSW | TSW | 6 | 6 | **129** | **242.0** |
| 7 | 6 | 8 | 8 | 4 | 6 | 7 | 7 | 4 | 7 | 7 | 4 | 7 | 7 | 7 | 6 | 8 | 5 | TSW | TSW | 8 | 7 | **130** | **243.6** |
| 7 | 6 | 8 | 8 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 8 | 8 | TSW | TSW | 8 | 7 | **142** | **262.9** |
| 7 | 6 | 8 | 8 | 10 | 6 | 7 | 7 | 10 | 7 | 7 | 10 | 7 | 7 | 7 | 6 | 8 | 11 | TSW | TSW | 8 | 7 | **154** | **282.3** |

**Manual/Auto Spill Patterns w/ NO TSWs (after TSW removal):**

|  |  |  |
| --- | --- | --- |
| **Manual/Auto Spill Patterns with NO TSWs (# Gate Stops per Spillbay). Bays 2, 6, and 16 locked at 3 or 5 stops** | **Total Stops** | **Total Spill** a |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **(#)** | **(kcfs)** |
| 3 | 5 | 0 | 2 |   | 3 | 2 | 0 | 2 |   | 2 | 2 | 0 | 3 | 2 | 3 | 2 |   | 3 | 0 | 2 |   | **36** | **68.0** |
| 3 | 5 | 1 | 2 |   | 3 | 2 | 1 | 2 |   | 2 | 2 | 1 | 3 | 2 | 3 | 2 |   | 3 | 1 | 2 |   | **40** | **76.0** |
| 3 | 5 | 2 | 2 |   | 3 | 2 | 2 | 2 |   | 2 | 2 | 2 | 3 | 2 | 3 | 2 |   | 3 | 2 | 2 |   | **44** | **83.6** |
| 3 | 5 | 3 | 2 |   | 3 | 2 | 3 | 2 |   | 2 | 2 | 3 | 3 | 2 | 3 | 2 |   | 3 | 3 | 2 |   | **48** | **90.4** |
| 3 | 5 | 4 | 2 |   | 3 | 2 | 4 | 2 |   | 2 | 2 | 4 | 3 | 2 | 3 | 2 |   | 3 | 4 | 2 |   | **52** | **96.8** |
| 4 | 5 | 2 | 2 | 3 | 3 | 3 | 0 | 3 | 2 | 2 | 3 | 0 | 3 | 3 | 3 | 3 | 2 | 3 | 0 | 3 | 2 | **54** | **101.0** |
| 4 | 5 | 3 | 2 | 3 | 3 | 3 | 1 | 3 | 2 | 2 | 3 | 1 | 3 | 3 | 3 | 3 | 2 | 3 | 1 | 3 | 2 | **58** | **108.7** |
| 4 | 5 | 4 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | **62** | **116.0** |
| 4 | 5 | 5 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | **66** | **122.7** |
| 4 | 5 | 6 | 2 | 3 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 3 | 2 | 3 | 4 | 3 | 2 | **70** | **129.1** |
| 4 | 5 | 3 | 4 | 3 | 3 | 4 | 2 | 4 | 3 | 3 | 4 | 2 | 3 | 3 | 3 | 4 | 3 | 4 | 2 | 3 | 3 | **72** | **132.5** |
| 4 | 5 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | **76** | **139.2** |
| 4 | 5 | 5 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | **80** | **145.6** |
| 4 | 5 | 6 | 4 | 3 | 3 | 4 | 5 | 4 | 3 | 3 | 4 | 5 | 3 | 3 | 3 | 4 | 3 | 4 | 5 | 3 | 3 | **84** | **152.0** |
| 4 | 5 | 7 | 4 | 3 | 3 | 4 | 6 | 4 | 3 | 3 | 4 | 6 | 3 | 3 | 3 | 4 | 3 | 4 | 6 | 3 | 3 | **88** | **158.4** |

Spill (kcfs) is calculated as a function of the total number of gate stops at forebay elevation 339 ft.

**COMMENTS**:

 November 10, 2022 - FPOM;

Condor requested that wording be added that this is a temporary change until hoists and cranes can be updated/repaired and to include previous spill pattern tables.

3-FEB-2023 FPOM FPP Meeting:

Lorz – these patterns are degrading what we should be doing. “Temporary” in this case is on the order of 10 years, which is extremely concerning.

Peery – working with project manager to make repairs. This is getting a lot of attention and is a high priority. More updates at next FPOM.

Van Dyke – what is the difference between micro and macro?

Peery – difference is how often they are adjusted. Macro gates are changed less frequently because they are dogged off and manually adjusted due to hoist issues. Micro gates are automatically adjusted.

Van Dyke – it would be clearer to change it from micro/macro to auto/manual.

Peery – yes, that makes sense. Will make that change.

Van Dyke - what are tailrace impacts?

Peery – no modeling has been done. This isn’t how we’d like to operate the spillway but have to.

Hesse – these patterns are a degradation over multiple salmon generations. Request adding to Justification section to state that the modified spill patterns have not been evaluated to estimate effects to fish passage and tailrace egress conditions.

Peery - will do that.

Conder – would like more language that this is truly temporary and not the default patterns.

Ebel – echo Jay’s concerns. Ten years is two generations of salmon, and nearly the duration of the BiOp. At this point, in 2023, this is nearly the remaining duration of the Proposed Action.

There was general agreement that the expected 10 years needed for repairs is too long and all efforts are needed to restore original spill patterns ASAP.

Peery will make requested edits and add to next week’s FPOM with more updates.

6-FEB-2023 email from Chris Peery to FPOM: “Attached is the McNary Spill FPP change form modified per our discussion at last Friday’s meeting, for your review.  We will discuss at Thursday’s FPOM meeting.”

**RECORD OF FINAL ACTION**: