# Fish Passage Plan (FPP) Change Request Form

**Change Form # & Title**: 17MCN007 – Higher Spill Patterns w/ TSWs

**Date Submitted**: April 21, 2017

**Project**: MCN

**Requester Name, Agency**: Ann Setter, NWW

**Final Action:** **APPROVED at FPOM May 11, 2017**

**FPP Section**: Table MCN-7. Spill Patterns with TSWs.

**Justification for Change**:

Table MCN-7 defines spill patterns with TSWs up to 259.2 kcfs. For higher spill rates, table footnote “d” says to close the TSWs and use Table MCN-9 (summer patterns with TSWs removed). This footnote was added to the FPP via Change Form [15MCN003](http://www.nwd-wc.usace.army.mil/tmt/documents/fpp/2015/changes/) (approved 1/22/2015) that said TSWs should be removed at total river flow >400 kcfs, which equates to spill of ~260 kcfs if all turbines are available and powerhouse capacity is 140 kcfs.

The threshold was exceeded this year during the extremely high flows and the TSWs were closed during those hours. However, the Corps does not see any benefit to this operation and could not find any clear justification for why the threshold was established. The Corps proposes leaving the TSWs open at higher flows to maintain surface passage for downstream-migrating smolts (higher survival and reduced forebay residence time), as well as to keep spill balanced across the tailrace and avoid the creation of “dead spots” where predators are more likely to be successful. Leaving the TSWs open also prevents debris from accumulating in the forebay.

After the April FPOM meeting at McNary Dam, members in attendance observed tailrace hydraulics with the TSWs closed versus TSWs open at spill of approximately 258-261 kcfs. Those present supported leaving the TSWs open at higher flows.

**Proposed Change**:

Expand Table MCN-7 for spill w/ TSWs > 259.2 kcfs and delete footnote “d”.

Table MCN-7. McNary Dam Spill Patterns for Fish Passage with TSWs in Bays 19-20.

| **Table MCN-7 Spill Patterns with TSWs (# Gate Stops per Spillbay) - EXPANDED 5/11/17 for spill > 259 kcfs** | | | | | | | | | | | | | | | | | | | | | | **Total Stops** | **Spill** a |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** c | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19 b** | **20 b** | **21** | **22** c | **(#)** | **(kcfs)** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | TSW | TSW | 1 |  | **1** | **21.2** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | TSW | TSW | 1 |  | **2** | **23.2** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | TSW | TSW | 1 | 1 | **3** | **25.2** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | TSW | TSW | 2 | 1 | **4** | **27.1** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | TSW | TSW | 2 | 1 | **5** | **29.0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 2 | TSW | TSW | 2 | 1 | **6** | **31.0** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 2 | TSW | TSW | 2 | 1 | **7** | **32.9** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 2 | 2 | TSW | TSW | 2 | 1 | **8** | **34.9** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 |  | 2 | 2 | TSW | TSW | 2 | 2 | **9** | **36.8** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 |  | 2 | 2 | TSW | TSW | 2 | 2 | **10** | **38.7** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 1 | 2 | 2 | TSW | TSW | 2 | 2 | **11** | **40.7** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **12** | **42.6** |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **13** | **44.6** |
|  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **14** | **46.5** |
|  |  |  |  |  |  |  |  |  |  | 1 |  | 2 |  | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **15** | **48.5** |
|  |  |  |  |  |  |  |  |  |  | 2 |  | 2 |  | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **16** | **50.4** |
|  |  |  |  |  |  |  |  | 1 |  | 2 |  | 2 |  | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **17** | **52.4** |
|  |  |  |  |  |  |  |  | 2 |  | 2 |  | 2 |  | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **18** | **54.3** |
|  |  |  |  |  |  |  |  | 2 | 1 | 2 |  | 2 |  | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **19** | **56.3** |
|  |  |  |  |  |  |  |  | 2 | 2 | 2 |  | 2 |  | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **20** | **58.2** |
|  |  |  |  |  |  |  |  | 2 | 2 | 2 |  | 2 | 1 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **21** | **60.2** |
|  |  |  |  |  |  |  |  | 2 | 2 | 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **22** | **62.1** |
|  |  |  |  |  |  |  |  | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **23** | **64.1** |
|  |  |  |  |  |  |  |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **24** | **66.0** |
|  |  |  |  |  |  | 1 |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **25** | **68.0** |
|  |  |  |  |  |  | 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **26** | **69.9** |
|  |  |  |  | 1 |  | 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **27** | **71.9** |
|  |  |  |  | 2 |  | 2 |  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2 | 2 | **28** | **73.8** |
| 2.5 | 2 | 3.5 |  | 2 |  | 2 |  | 2 |  | 2 |  | 2 | 1 | 2 |  | 2 | 2 | TSW | TSW | 2 | 2 | **29** | **75.3** |
| 2.5 | 2 | 3.5 |  | 2 |  | 2 |  | 2 |  | 2 |  | 2 | 1 | 2 | 1 | 2 | 2 | TSW | TSW | 2 | 2 | **30** | **77.3** |
| 2.5 | 2 | 3.5 |  | 2 | 1 | 2 |  | 2 |  | 2 |  | 2 | 1 | 2 | 1 | 2 | 2 | TSW | TSW | 2 | 2 | **31** | **79.3** |
| 2.5 | 2 | 3.5 |  | 2 | 1 | 2 |  | 2 | 1 | 2 |  | 2 | 1 | 2 | 1 | 2 | 2 | TSW | TSW | 2 | 2 | **32** | **81.3** |
| 2.5 | 2 | 3.5 |  | 2 | 1 | 2 |  | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | TSW | TSW | 2 | 2 | **33** | **83.3** |
| 2.5 | 2 | 3.5 |  | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | TSW | TSW | 2 | 2 | **34** | **85.3** |
| 2.5 | 2 | 3.5 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | TSW | TSW | 2 | 2 | **35** | **87.3** |
| 2.5 | 2 | 3.5 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **36** | **89.0** |
| 2.5 | 2 | 3.5 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **37** | **90.9** |
| 2.5 | 2 | 3.5 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **38** | **92.8** |
| 2.5 | 2 | 3.5 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **39** | **94.7** |
| 2.5 | 2 | 3.5 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **40** | **96.6** |
| 2.5 | 2 | 3.5 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **41** | **98.5** |
| 2.5 | 2 | 3.5 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **42** | **100.4** |
| 2.5 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **43** | **102.3** |
| 2.5 | 2.5 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 2.5 | 2.5 | **44** | **103.9** |
| 2.5 | 2.5 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | TSW | TSW | 3.5 | 2.5 | **45** | **105.6** |
| 2.5 | 2.5 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2.5 | 2.5 | 3 | TSW | TSW | 2.5 | 2.5 | **46** | **107.3** |
| 2.5 | 2.5 | 4 | 2 | 2 | 2 | 2.5 | 2 | 2 | 2 | 2.5 | 2 | 2 | 2 | 2 | 2.5 | 2.5 | 3 | TSW | TSW | 2.5 | 2.5 | **47** | **109.0** |
| 2.5 | 2.5 | 4 | 2 | 2.5 | 2 | 2.5 | 2 | 2 | 2 | 2.5 | 2 | 2 | 2 | 2.5 | 2.5 | 2.5 | 3 | TSW | TSW | 2.5 | 2.5 | **48** | **110.7** |
| 2.5 | 2.5 | 4 | 2 | 2.5 | 2 | 2.5 | 2 | 2.5 | 2 | 2.5 | 2 | 2.5 | 2 | 2.5 | 2.5 | 2.5 | 3 | TSW | TSW | 2.5 | 2.5 | **49** | **112.4** |
| 2.5 | 2.5 | 4 | 2 | 2.5 | 2.5 | 2.5 | 2 | 2.5 | 2.5 | 2.5 | 2 | 2.5 | 2 | 2.5 | 2.5 | 2.5 | 3 | TSW | TSW | 2.5 | 2.5 | **50** | **114.1** |
| 2.5 | 2.5 | 4 | 2 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2 | 2.5 | 2.5 | 2.5 | 3 | TSW | TSW | 2.5 | 2.5 | **51** | **115.8** |
| 2.5 | 2.5 | 4 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2 | 2.5 | 2.5 | 2.5 | 3 | TSW | TSW | 2.5 | 2.5 | **52** | **117.5** |
| 2.5 | 2.5 | 4 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 3 | TSW | TSW | 3 | 2.5 | **53** | **119.2** |
| 2.5 | 2.5 | 4 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 3 | 3 | 3 | TSW | TSW | 3 | 2.5 | **54** | **120.9** |
| 2.5 | 2.5 | 4.5 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 3 | 2.5 | 2.5 | 2.5 | 2.5 | 3 | 3 | 3 | TSW | TSW | 3 | 2.5 | **55** | **122.6** |
| 2.5 | 2.5 | 4.5 | 3 | 2.5 | 2.5 | 3 | 2.5 | 2.5 | 2.5 | 3 | 2.5 | 3 | 2.5 | 2.5 | 3 | 3 | 3 | TSW | TSW | 3 | 2.5 | **56** | **124.3** |
| 2.5 | 2.5 | 4.5 | 3 | 3 | 2.5 | 3 | 2.5 | 3 | 2.5 | 3 | 2.5 | 3 | 2.5 | 2.5 | 3 | 3 | 3 | TSW | TSW | 3 | 2.5 | **57** | **126.0** |
| 2.5 | 2.5 | 4.5 | 3 | 3 | 3 | 3 | 2.5 | 3 | 2.5 | 3 | 2.5 | 3 | 2.5 | 3 | 3 | 3 | 3 | TSW | TSW | 3 | 2.5 | **58** | **127.7** |
| 2.5 | 2.5 | 5 | 3 | 3 | 3 | 3 | 2.5 | 3 | 3 | 3 | 2.5 | 3 | 2.5 | 3 | 3 | 3 | 3 | TSW | TSW | 3 | 2.5 | **59** | **129.3** |
| 2.5 | 2.5 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2.5 | 3 | 3 | 3 | 3 | TSW | TSW | 3 | 2.5 | **60** | **131.0** |
| 3 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2.5 | 3 | 3 | 3 | 3 | TSW | TSW | 3 | 2.5 | **61** | **132.7** |
| 3 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | TSW | TSW | 3 | 3 | **62** | **134.4** |
| 3 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | TSW | TSW | 3 | 3 | **63** | **136.0** |
| 3 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **64** | **137.6** |
| 3 | 4 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **65** | **139.2** |
| 4 | 4 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **66** | **140.8** |
| 4 | 4 | 5 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **67** | **142.4** |
| 4 | 4 | 5 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **68** | **144.0** |
| 4 | 4 | 5 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **69** | **145.6** |
| 4 | 4 | 5 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **70** | **147.2** |
| 4 | 4 | 5 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **71** | **148.8** |
| 4 | 4 | 5 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **72** | **150.4** |
| 4 | 4 | 5 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **73** | **152.0** |
| 4 | 4 | 5 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **74** | **153.6** |
| 4 | 4 | 5 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **75** | **155.2** |
| 4 | 4 | 5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | TSW | TSW | 3 | 3 | **76** | **156.8** |
| 4 | 4 | 5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | TSW | TSW | 3 | 3 | **77** | **158.4** |
| 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | TSW | TSW | 3 | 3 | **78** | **160.0** |
| 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | TSW | TSW | 4 | 3 | **79** | **161.6** |
| 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | TSW | TSW | 4 | 3 | **80** | **163.2** |
| 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | TSW | TSW | 4 | 3 | **81** | **164.8** |
| 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **82** | **166.4** |
| 4 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **83** | **168.0** |
| 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **84** | **169.6** |
| 5 | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **85** | **171.2** |
| 5 | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **86** | **172.8** |
| 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **87** | **174.4** |
| 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **88** | **176.0** |
| 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **89** | **177.6** |
| 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | TSW | TSW | 4 | 3 | **90** | **179.2** |
| 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | TSW | TSW | 5 | 3 | **91** | **180.8** |
| 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | TSW | TSW | 5 | 3 | **92** | **182.4** |
| 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | 5 | TSW | TSW | 5 | 3 | **93** | **184.0** |
| 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | TSW | TSW | 5 | 3 | **94** | **185.6** |
| 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | TSW | TSW | 5 | 3 | **95** | **187.2** |
| 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | TSW | TSW | 5 | 3 | **96** | **188.8** |
| 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | TSW | TSW | 5 | 3 | **97** | **190.4** |
| 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | TSW | TSW | 5 | 3 | **98** | **192.0** |
| 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | TSW | TSW | 5 | 3 | **99** | **193.6** |
| 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | TSW | TSW | 5 | 3 | **100** | **195.2** |
| 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | TSW | TSW | 5 | 3 | **101** | **196.8** |
| 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 6 | 6 | TSW | TSW | 5 | 3 | **102** | **198.4** |
| 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 6 | 5 | 6 | 6 | TSW | TSW | 5 | 3 | **103** | **200.0** |
| 5 | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | TSW | TSW | 5 | 3 | **104** | **201.6** |
| 5 | 5 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | TSW | TSW | 5 | 3 | **105** | **203.2** |
| 5 | 5 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 3 | **106** | **204.8** |
| 5 | 5 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 5 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 3 | **107** | **206.4** |
| 5 | 5 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 4 | **108** | **208.0** |
| 5 | 5 | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 4 | **110** | **211.2** |
| 5 | 5 | 6 | 6 | 6 | 5 | 6 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 4 | **112** | **214.4** |
| 5 | 5 | 6 | 6 | 6 | 6 | 6 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 4 | **114** | **217.6** |
| 5 | 5 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 4 | **116** | **220.8** |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | TSW | TSW | 6 | 4 | **118** | **224.0** |
| 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | TSW | TSW | 6 | 4 | **122** | **230.4** |
| 6 | 6 | 6 | 6 | 6 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | TSW | TSW | 6 | 4 | **124** | **233.6** |
| 6 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | TSW | TSW | 6 | 4 | **126** | **236.8** |
| 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 7 | TSW | TSW | 6 | 4 | **128** | **240.0** |
| 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 6 | 4 | **130** | **243.2** |
| 7 | 6 | 7 | 6 | 7 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 6 | 4 | **132** | **246.4** |
| 7 | 6 | 7 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 6 | 4 | **134** | **249.6** |
| 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 6 | 4 | **136** | **252.8** |
| 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 6 | 6 | **138** | **256.0** |
| 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 7 | 7 | **140** | **259.2** |
| 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 7 | 8 | 142 | **262.6** |
| 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 8 | 8 | 144 | **266.0** |
| 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 8 | 8 | 145 | **267.7** |
| 8 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | TSW | TSW | 8 | 8 | 146 | **269.4** |
| 8 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | TSW | TSW | 8 | 8 | 148 | **272.8** |
| 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | TSW | TSW | 8 | 8 | 150 | **276.2** |
| 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | TSW | TSW | 8 | 8 | 152 | **279.6** |
| 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | TSW | TSW | 8 | 8 | 154 | **283.0** |
| 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | TSW | TSW | 8 | 8 | 156 | **286.4** |
| 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | TSW | TSW | 8 | 8 | 158 | **289.8** |
| 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | TSW | TSW | 8 | 8 | 160 | **293.2** |
| 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | TSW | TSW | 8 | 9 | 162 | **296.4** |
| 9 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | TSW | TSW | 9 | 9 | 164 | **299.6** |
| 9 | 9 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | TSW | TSW | 9 | 9 | 165 | **301.2** |
| 9 | 9 | 9 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | TSW | TSW | 9 | 9 | 166 | **302.8** |
| 9 | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | TSW | TSW | 9 | 9 | 168 | **306.0** |
| 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | TSW | TSW | 9 | 9 | 170 | **309.2** |
| 9 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | TSW | TSW | 9 | 9 | 172 | **312.4** |
| 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | TSW | TSW | 9 | 9 | 174 | **315.6** |
| 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 9 | TSW | TSW | 9 | 9 | 176 | **318.8** |
| 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 8 | 9 | 9 | 9 | 9 | 9 | 9 | TSW | TSW | 9 | 9 | 178 | **322.0** |
| 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | TSW | TSW | 9 | 9 | 180 | **325.2** |
| 10 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | TSW | TSW | 9 | 10 | 182 | **328.4** |
| 10 | 10 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | TSW | TSW | 10 | 10 | 184 | **331.6** |

**a.** This table defines patterns in increments of 1-2 gate stops per row. Spill (kcfs) is calculated as a function of the total # of stops plus TSW spill at forebay elevation 339 ft.

b. Bays 19-20 with TSWs = fixed spill of ~19.2 kcfs (~9.6 kcfs per bay) at fb el 339’. Raise tainter gates ~3-5 ft above water surface to ensure free flow through TSW.

c. Bays 1, 22 *MAY* require special open/close sequence (pending field test verification). Open Bays 2–21 for ≥10 minutes, then open Bays 1, 22. Close Bays 1, 22 first.

**Comments**: (listed oldest to newest)

4/13/2017 FPOM Meeting: Table MCN-7 footnote “d” was added to the FPP in 2015 via a change form from Greg Moody but FPOM members are not sure why. The project does not want to be turning the TSWs off and on and would prefer to leave the TSWs open this year, then discuss further during modeling for gas cap spill patterns. FPOM agrees and recommends removing footnote “d” and adding patterns for higher spill. After the meeting, the group watched the tailrace as the TSWs were closed, then opened, during spill of ~ 258 kcfs (see emails below).

-----Original Message-----  
From: Setter, Ann L CIV USARMY CENWW (US)   
Sent: Thursday, April 13, 2017 16:58

Erick:

After reviewing the tailrace pattern at MCN today with TSW's open vs closed at spill levels of~260 K, Fish managers present onsite endorsed for spring of 2017 leaving TSW's open and not closing them per footnote d in Table 7 of the FPP. This keeps spill balanced so there are no dead spots in the tailrace where predators are likely to be more successful. This allows for a continuous flow path near the surface to support maintaining minimal forebay residence time by migrating smolts, and keeping debris from accumulating in the forebay. This decision is consistent with what the Corps felt in the best interest for migrating smolts. I will work with RCC to implement.

We have been unable to find any justification for this footnote, and as discussed at FPOM mtg today, no agency had advocated that it was necessary or even had an operating awareness that it existed until we hit the trigger. Hope this helps with understanding the operational situation and decision path.

-----Original Message-----  
From: Tom Lorz   
Sent: Thursday, April 13, 2017 19:50

Ann

on a side note, looking at TDG there might be a slight benefit to using the TSW and spreading spill out more. The hourly data appears to show a decrease after the TSW were opened at a similar spill volume. I plan to look at the FPP change forms from 2015 to see if there is some reason for this change. For the life of me can not think of one, but I am getting old and forgetful so better review the records.

thanks

tom lorz

Ann be sure to thank those at the project that helped with the goodbye lunch for John Bailey.

**Record of Final Action**: **APPROVED at FPOM May 11, 2017**