

# **Appendix M**

**2012 TDG TMDL**

**Implementation Summary**

**ERRATA: Revised in July, 2014**

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## **Introduction**

This appendix provides a summary of the status of the short-term, operational and long-term Corps TDG TMDL implementation activities recommended in the Summary Implementation Strategy (SIS) of the TDG TMDLs for the lower Columbia River (approved by EPA on November 18, 2002) and the lower Snake River (approved by EPA on September 30, 2003). The SIS incorporates actions described and analyzed by the NOAA Fisheries in the 2000 and 2004 Biological Opinions and by the Corps in the Dissolved Gas Abatement Study (DGAS). The SIS was developed in consultation with NOAA Fisheries, so that TMDL implementation would be coordinated with requirements of the ESA. Both Phase I short-term and Phase II long-term measures are described with specific TDG and spill reduction measures. Phase I was in effect through 2011. Phase II began after 2010 and continues through 2020; however, some action items began before the projected year of 2011. In addition, supplemental activities, which are above and beyond what the TMDL requires, were taken from 2002 to present that provide benefits for TDG and fish survival.

## **The TMDL Summary Implementation Actions:**

The following summary tables provide an overview of the status of the short-term and long-term Corps TDG TMDL implementation activities. Tables M-1 and M-2 provide the current status of the Phase I (short-term) TDG TMDL implementation actions. Implementation actions in Table M-1 are directly related to achievement of the water quality standard, where actions in Table M-2 are indirectly related to this standard. Table M-3 provides the operational implementation actions that are used to minimize TDG. Table M-4 provides the current status of the Phase II (long-term) TDG TMDL implementation activities. Table M-5 provides a summary of supplemental TMDL activities. These supplemental activities were undertaken in addition to Phase I and Phase II measures.

**TABLE M-1**  
**PHASE I – SHORT-TERM TMDL IMPLEMENTATION ACTIVITIES**  
**Structural Implementation Actions**

<b>2000 Biological Opinion Action Item Description</b>	<b>Status</b>	<b>Estimated Completion Date</b>	<b>Actual Completion Date</b>
Ice Harbor Deflectors	Deflectors in bays 2 - 5 (1996); bays 6 - 9 (1997); and bays 1 and 10 (1998;) construction completed.	1998	1998
John Day Deflectors	Deflectors in bays 2 - 19; construction completed.	1998	1998
John Day Deflectors	Deflector in bay 20; construction completed.	2011	2011
All Projects - Survival based spill caps at all dams (e.g. 40% at The Dalles).	Studies are on-going.	N/A	N/A
Bonneville Endbay Deflectors	Deflectors in all interior bays 1-17; construction completed for bays 1-3 and 16-18 in 2002.	2002	2002
McNary Endbay Deflectors	Deflectors in bays 1, 2, 21, 22 construction completed.	2002	2002
Lower Monumental Endbay Deflectors	Deflectors in bays 1 and 8 construction completed. Repairs to bay 2 deflector. Preliminary studies were completed.	2003	2003
Lower Monumental Endbay Deflectors	Post RSW installation testing has been completed.	2009	2009
Little Goose Endbay Deflectors	Construction of deflectors in bay 1 and 8 completed.	2009	2009
Little Goose Endbay Deflectors	Evaluate and test after Temporary Spillway Weir (TSW) installed which was completed in 2009. Testing was planned for two years but was reduced to one year.	2009	2009
Chief Joseph Deflectors	Construction of spill bay deflectors completed October 2008.	2008	2008
Chief Joseph Deflectors	Post-deflector spill test to check TDG exchange properties during spillway discharges completed.	2009	2009
The Dalles Deflectors	No deflectors planned at this time; spillway survival completed 2012.	N/A	N/A
John Day Endbay Deflectors	End bay #20 constructed 2009-2010. Bay #1 not considered, would interrupt fish attraction flow.	2010	2010
Little Goose Spillway Divider Wall	Not under consideration at this time.	N/A	N/A
Divider Walls at Appropriate Dams	(See below for itemized list of divider walls.)		
John Day Spillwall	No spillwall planned at this time since not cost effective due to depth of stilling basin.	N/A	N/A
The Dalles Spillwall	The first spillwall construction completed between bays 6 and 7.	2004	2004
The Dalles Spillwall	Biological evaluations after first spillwall was installed. Full project evaluations occurred in 2004 and 2005; a spillway specific evaluation occurred in 2006. Completed.	2006	2006
The Dalles Spillwall	Construction of a larger and longer spillwall between bays 8 and 9 began in 2008. Completed.	2010	2010
The Dalles Spillwall	Biological evaluations after spillwall construction completed.	2010-12	2010-12

Table M-1 correlates to Table 15 of the 2002 TMDL for Lower Columbia River TDG and Table 18 of the 2003 TMDL for Lower Snake River TDG.

**TABLE M-2**  
**PHASE I – ADDITIONAL SHORT-TERM TMDL IMPLEMENTATION**  
**ACTIVITIES**  
**Structural Implementation Actions**

<b>2000 Biological Opinion Action Item Description</b>	<b>Status</b>	<b>Estimated Completion Date</b>	<b>Actual Completion Date</b>
Bonneville Powerhouse 2 Corner Collector (B2CC)	Construction of corner collector in powerhouse 2 completed.	2004	2004
Bonneville Powerhouse 2 Fish Guidance Efficiency (FGE) Improvement	Installed turning vanes on Submerged Traveling Screens (STS). Installed ceiling gap closure device.	1997	1997
Bonneville Powerhouse 2 FGE Improvement	Decision document completed FY05 – FGE and in-take improvements. Modified Vertical Barrier Screens (VBS).	2008	2008
Bonneville Powerhouse 2 FGE Improvement	Completed biological evaluations after new designed VBS.	2009	2009
Lower Granite Removable Spillway Weir (RSW)	RSW construction completed.	2001	2001
Lower Granite RSW	Testing of spring and summer migrants after RSW construction was completed. Testing spanned three years from 2005 to 2007.	2007	2007
The Dalles Turbine Intake Blocks	Construction of turbine intake blocks was completed.	2001	2001
The Dalles Turbine Intake Blocks	Testing was performed and results showed that block hydraulics were harmful to fish. All were removed. Completed.	2004	2004
Lower Monumental Bypass Outfall Relocation	Relocation completed. Evaluated in 2012-2013.	2012	2012
The Dalles Sluiceway Outfall Relocation	Not being investigated at this time; current sluiceway being used as is.	N/A	N/A
Bonneville Powerhouse 1 Surface Bypass or Extended Screens	Biological evaluations completed but biological benefits were out weighted by cost, thus suspending progress.	2002	2002
Bonneville sluiceway improvement study	Finished letter report for modification of B1 sluiceway chain gates.	2007	2007
Bonneville sluiceway improvement	Removed the Juvenile Bypass System (JBS) channel.	2009	2009
Bonneville sluiceway improvement	Construction of 3 automated sluiceways begin in 2008. Completed.	2009	2009

Table M-2 correlates to Table 16 of the 2002 TMDL for Lower Columbia River TDG and Table 19 of the 2003 TMDL for Lower Snake River TDG.

**TABLE M-3**  
**PHASE I – OPERATIONAL TMDL IMPLEMENTATION ACTIONS**

<b>Operational Action</b>	<b>Status</b>
Scheduling routine turbine maintenance and repair during low-power load and river flow periods.	Ongoing
Preventative maintenance of turbines to prevent breakdown.	Ongoing
System management of water release from upstream storage reservoirs to minimize involuntary spill at dams in the TMDL area.	Ongoing
Optimizing power purchasing to allow maximum use of powerhouse capacity and minimization of involuntary spill. This has become more complex with the increase in wind energy in the Columbia River Basin.	Ongoing
Testing various spill patterns to find the most effective for fish passage and TDG production. If spill pattern produces undesirable results, modify spill pattern.	Ongoing

Table M-3 correlates to language on page 73 of the 2002 TMDL for Lower Columbia River TDG and page 76 of the 2003 TMDL for Lower Snake River TDG.

**TABLE M-4**  
**PHASE II – LONG-TERM TMDL IMPLEMENTATION ACTIVITIES**  
**Fish Passage Actions That Support TDG Water Quality Goals**

<b>2000 Biological Opinion Action Item Description</b>	<b>Status</b>	<b>Estimated Completion Date</b>	<b>Actual Completion</b>
John Day Top Spillway Weir (TSW)	Construction of 2 TSWs completed in bays 15 and 16.	2008	2008
John Day TSW	Moved 2 TSWs from bays 15 and 16 closer to powerhouse in bays 18 and 19.	2010	2010
John Day TSW	Biological testing after TSW construction is completed. Ongoing.	2010-14	---
Removable Spillway Weirs (RSWs) at Lower Monumental, Little Goose and Ice Harbor dams	See Details below	See Details below	See Details below
Lower Monumental RSW	Construction completed.	2008	2008
Lower Monumental RSW	Evaluation and testing after RSW construction completed. Began 2008 and completed 2009.	2009	2009
Little Goose TSW	Construction and Installation of Temporary Spillway Weir (TSW) completed.	2009	2009
Little Goose TSW	Testing occurred during 2012.	2014	---
Ice Harbor RSW	RSW construction completed.	2005	2005
Ice Harbor RSW	Post - construction testing occurred in 2009-2010.	2010	2010
McNary Bypass Improvements (New Outfall Flume)	Completed in 2012, and post-construction testing completed.	2012	2012
McNary Bypass Improvements (temperature)	A prototype model has been developed by M. Schneider to assist with temperature issues.	2013	---
Lower Monumental Extended Screens	Extended screens are suspended because of the cost-to-benefit ratio.	Unknown	Unknown
John Day Extended Screens	Tested prototype performed well. Shelved due to information indicating lower SARs for bypassed fish and high O&M costs.	2003	2003
All Projects - Spill Effectiveness Studies	Ongoing, site-specific as warranted. Study done when performance standard testing is undertaken.	Site-specific	Site-specific
Predator Removal and Abatement	Ongoing at Lower Columbia River projects including avian hazing and wires, pike minnow removal and seas lion hazing (see below).	N/A	N/A
The Dalles Predator Removal and Abatement	Ongoing pikeminnow removal program at Lower Columbia River dams. Funded by BPA. Ongoing.	N/A	N/A
Bonneville Predator Removal and Abatement	Sea Lion Exclusion Device constructed and installed.	2007	2007
All Projects - Improved O&M	Ongoing.	N/A	N/A
Bonneville Powerhouse 1 Minimum Gap Runners	See details below.	See Details below	See Details below
Bonneville PH1 - Unit 10	Construction of unit 10 began in 2009 and was completed in 2010.	2010	2010
Bonneville PH1 - Unit 1-6, 9	Units 1,2,3,4,5,6,9 completed.	1990-2007	1990-2007
Bonneville PH1 - Unit 7	Construction completed on unit 7.	2007	2007
Bonneville PH1 - Unit 8	Construction completed on unit 8.	2008	2008
All Projects - Implement Turbine Survival Program Results	Ongoing. Work being done in support of IHR turbine development in 2014. Biological testing will follow at IHR once new turbine units installed.	N/A	N/A

Table M-4 correlates to Table 17 of the 2002 TMDL for Lower Columbia River TDG and Table 20 of the 2003 TMDL for Lower Snake River TDG.

**TABLE M-5**  
**SUPPLEMENTAL TMDL IMPLEMENTATION ACTIVITIES**  
**Fish Passage Actions That Support TDG Water Quality Goals**

2000 Biological Opinion Action Item Description	Status	Estimated Completion Date	Actual Completion Date
Ice Harbor Modernization, Turbine Runner Prototype.	Construction of new Turbine Runners. Ongoing Kaplan Runner installation contract award in 2015 for unit 2 with completion in 2016, fixed runner in unit 3 during 2016, fixed runner in unit 1 in 2017-2018.	2015-2018	---
McNary Temporary TSW	Construction of TSW completed on bays 20 and 22.	2007	2007
McNary Temporary TSW	The TSWs were moved to various bays to optimize for surface fish passage. Move spanned two years from 2008 to 2009.	2009	2009
McNary Temporary TSW	Biological testing after TSW construction was completed. Testing spanned three years from 2007 to 2009.	2009	2009
McNary Modernization	Biological testing completed 10/26/07. Testing spanned three years from 2005 to 2007.	2007	2007
Bonneville Powerhouse 2 Behavioral Guidance System (BGS)	Behavioral Guidance System (BGS) for improved guidance for yearling and subyearling chinook to the B2CC installation completed.	2008	2008
Bonneville spillway gate re-design	Bonneville spillway gate re-design of 18 gates began in 2008. Completed.	2009	2009