

United States Army Corps of Engineers, Northwestern Division

**Court Ordered Summer Spill Implementation Plan
June 16, 2005**

Judge Redden's June 10, 2005 opinion in *NWF v. NMFS* granted in part NWF's requested injunctive relief and ordered the Corps to:

- (1) Provide spill from June 20, 2005, through August 31, 2005, of all water in excess of that required for station service, on a 24-hour basis, at the Lower Granite, Little Goose, Lower Monumental, and Ice Harbor Dams on the lower Snake River; and
- (2) Provide spill from July 1, 2005, through August 31, 2005, of all flow above 50,000, on a 24-hour basis, at the McNary Dam on the Columbia River.

Judge Redden further "encourage[d] the parties to engage in discussions to reach a consensus on issues of spill, and to advise [him] if one is reached during the period covered by [his] 2005 summer spill order. Otherwise, the spill shall proceed in accordance with this order."

In response to the Judge's suggestion to engage in discussions to reach consensus on implementation of his ordered summer spill, the Corps proposed utilizing the existing Regional Forum committees to coordinate with the plaintiffs, states, tribes and federal agencies (parties) to initiate implementation of the summer spill program. The Corps identified three issues that needed coordination for the implementation of the court ordered summer spill at Lower Granite, Little Goose, Lower Monumental, Ice Harbor and McNary Dams (projects). These areas included Total Dissolved Gas (TDG), biological research, and spill pattern development.

Based on the Corps' coordination within the Regional Forum there are some proposed modifications to the order. The Corps proposes to operate the projects to stay within the state water quality standards for TDG, as modified by state variances. Further, the Corps is proposing to implement the planned biological research testing as described below, which will only slightly modify operations ordered by the court. Finally, the Corps plans to utilize spill patterns that have been developed within the Regional Forum, however, additional efforts on spill pattern development for Lower Granite, Little Goose and Lower Monumental are planned for the week of June 20 – 25, 2005 that may slightly modify the initial spill patterns. The new spill patterns will be coordinated through the Regional Forum before they are adopted.

These adjustments will enable the action agencies and others to obtain additional information on fall Chinook passage and in the Corps' opinion should improve juvenile survival over the operations ordered by the court. General agreement was reached with the agencies and Tribes through the Regional Forum for these actions. The following is a

more detailed description of the Corps proposed operation for implementation of the court ordered spill operation.

Total Dissolved Gas:

The court ordered spill program did not address the issue of TDG and the potential exceedance of the Oregon and Washington State variances to the water quality standards (120/115% TDG). In order to reach consensus on how to implement the summer spill operation, the Corps coordinated with the parties in the Regional Forum's Water Quality Team (WQT), and Technical Management Team (TMT).

Following the coordination process that took place this week in the Regional Forum, we have developed recommendations that reflect the discussions.

Recommended Summer Spill Implementation to meet TDG Standards

Spill is scheduled to begin June 20, 2005, at Lower Granite, Little Goose, Lower Monumental, and continue at Ice Harbor. McNary summer spill is scheduled to begin July 1, 2005. The Corps will begin spill on the scheduled dates. The Corps' proposed implementation and continuation of the summer spill is detailed below.

Spill will start at Lower Granite, Little Goose, Lower Monumental, and Ice Harbor immediately after midnight Sunday night (i.e. 0001 hours June 20). Using the Corps' hydrologic model, the expected flow in the lower Snake River on June 20 may be near 38,000 cubic feet per second (cfs). The Corps will operate the powerhouses at the four lower Snake River dams at the low end of the 1% peak efficiency range on one generating unit. This is approximately 11,500 cfs at Lower Granite, Little Goose, and Lower Monumental; and 9,500 cfs at Ice Harbor. Each powerhouse will operate within 1% of peak efficiency to comply with coordinated fish measures as shown in the 2005 Fish Passage Plan. The 1% peak efficiency flow represents the court ordered "station service" flow as characterized in the Pettit declaration (para. 46).

On June 15, 2005, the TMT discussed the start of the spill operation and the relationship of spill to TDG. All members of the TMT present agreed that during the summer spill operation, the Corps should meet the TDG levels as defined by the variances provided by Washington and Oregon. The daily 12-hour maximum allowable TDG is 120% in the tailrace of a dam, and 115% in the forebay of the next dam downstream. Once either limit is met, the Corps will reduce spill at the upstream dam to reduce TDG levels consistent with the state TDG variances.

The court order states that projects will spill this summer in excess of station service at Lower Granite, Little Goose, Lower Monumental, and Ice Harbor. Based on the Corps' analysis, spill in excess of station service at Lower Granite, Little Goose, and Ice Harbor is expected to be consistent with state TDG standards; but, Lower Monumental spill will begin at a lesser amount. This is because the Corps' SYSTDG modeling illustrated that with total river flow near 38,000 cfs, where 11,500 cfs is used for generation and 26,500 cfs is spilled, TDG at the Lower Monumental tailrace is

expected to exceed 120%. Based on model results and past experience with spill and TDG, the Corps will start spill at 12,000 cfs which should generate TDG closer to 120% TDG. If the TDG is less than 120% TDG, the spill will be incrementally increased. If the TDG is greater than 120%, the spill will be reduced. Based on total river flow of about 38,000 cfs, the Snake River starting spill quantities and potential resultant TDG in the tailrace of the dam is shown.

Dam	Total Flow (cfs)	Flow through the Powerhouse (cfs)	Spill (cfs)	TDG Tailrace
Lower Granite	38,000	11,500	26,500*1	113%
Little Goose	38,000	11,500	26,500	114%
Lower Monumental	38,000	26,000	12,000	120%
Ice Harbor	38,000	9,500	28,500*2	115%

*1 – Lower Granite may be adjusted based on RSW testing plan

*2 – Ice Harbor may be adjusted based on RSW testing plan

The Corps plans to monitor TDG at all projects. For Lower Monumental, the Corps will utilize this monitoring to adjust spill as needed. The resultant TDG from the start of spill will be available on the Corps web page <http://www.nwd-wc.usace.army.mil/report/total.html> by about 6:00 a.m. June 20. These data will be evaluated during the first day of spill to determine if adjustments are needed to Lower Monumental spill to meet the TDG objective of 120% in the tailrace. Resultant TDG will be posted on the web page again at about 12:00 p.m. and 6:00 p.m. on June 20. The Corps will monitor TDG through the day and determine if adjustment are needed to the total spill at Lower Monumental. The goal of this operation is to implement a spill amount that will be near the TDG limit, but will not immediately exceed the limit.

At McNary Dam, the court order calls for spill from July 1, 2005 through August 31, 2005 of all flows above 50,000 cfs. Spill according to the court order will start at McNary on July 1 at 0001 hours, or just after midnight. Based on a projected total river flow of 168,000 cfs, the initial spill at McNary would be 118,000 cfs. The expected TDG in the tailrace of McNary is near 119%, which is within the state variance to the water quality standards.

Summer Monitoring and Adjustment Strategy

The Corps monitors TDG in the lower Snake and lower Columbia rivers every day and adjusts spill at dams to get as close as possible to the state standards of 120% in the tailrace or 115% in the next forebay without exceeding these objectives. As flows recede in the summer, tailwater elevations drop and TDG levels increase. For this reason, spill may need to be stopped at Lower Monumental for several hours of a day, or for several days, if the TDG exceeds the standards to allow the TDG in the river to equilibrate before beginning spill again.

From June 20 through August 31 there may be short durations when generation at lower Snake River dams may be zero and all flow is spilled. Zero power generation may

be the result of lack of regional power demand, or the result of voltage stability needs in the transmission system. Zero power generation is most likely to occur at Ice Harbor Dam from midnight through 4:00 a.m. because of lack of power demand. If Ice Harbor, or any lower Snake dam, reduces to zero powerhouse generation, the Corps will monitor the resultant TDG and adjust spill as needed to remain within variances to the water quality standards.

2005 Spill Research Summary

The Corps and the regional agencies and Tribes are interested in maintaining the existing spill research planned at Lower Granite, Ice Harbor, and McNary Dam projects. In addition, we would like to better understand project survival associated with summer spill at Little Goose, and Lower Monumental Dams. The Corps met with the Studies Review Work Group (SRWG) on June 13, 2005 and discussed the studies in question as well as additional studies at Little Goose and Lower Monumental dams. The SRWG agreed to move forward with studies and the proposed operation detailed as follows:

Summer Research Operations

Lower Granite

Revised Summer 2005 Objectives: Compare the performance and survival of RSW operation to normal bay spill to the TDG cap. Radio telemetry and hydroacoustics are the methodologies being used for this evaluation.

Spill Duration: June 20 - August 31

Study Duration: June 21 – July 21

Spill Pattern During Study Period (June 21 – July 11): The study design is an alternating pattern of RSW spill and BiOp spring spill to the TDG cap. Because spill patterns have not been fully developed for the low river flow operations at Lower Granite, the SRWG team will be traveling to ERDC on June 20th to model summer spill patterns. Until this information is available, the gas cap pattern will be based on the pattern developed from the spring spill pattern in Table 1. The tentative spill patterns for the RSW and Gas Cap spill are provided in Table 1. These patterns will be alternated in accordance with the schedule provided in Table 2.

**Table 1.
Lower Granite "RSW" operation for Summer, 2005.**

Project Discharge	Turbine units						Spillbays								Total Spill
	1	2	3	4	5	6	1	2	3	4	5	6	7	8	
23.8			12				6.7	1.7	0	1.7	0	1.7	0	0	11.8
25.5			12				6.7	1.7	0	1.7	0	1.7	0	1.7	13.5
27.2			12				6.7	1.7	0	1.7	0	1.7	1.7	1.7	15.2

28.9		12	6.7	1.7	1.7	1.7	0	1.7	1.7	1.7	16.9
30.6		12	6.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	18.6
34.6		16	6.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	18.6
39.6		21	6.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	18.6
42.6	12	12	6.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	18.6
44.6	13	13	6.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	18.6

At total discharges between 39.6 kcfs and 42.6 kcfs, unit 2 may have to be turned on and off periodically to maintain forebay levels and desired spill discharges.

Lower Granite tentative "Gas Cap Spill" operation for Summer, 2005.

Project Discharge	Turbine units						Spillbays								Total Spill
	1	2	3	4	5	6	1	2	3	4	5	6	7	8	
23.9			12				0	6.8	1.7	0	1.7	0	1.7	0	11.9
25.6			12				0	6.8	1.7	0	1.7	0	1.7	1.7	13.6
27.3			12				0	6.8	1.7	0	1.7	1.7	1.7	1.7	15.3
29			12				0	6.8	1.7	1.7	1.7	1.7	1.7	1.7	17
30.8			12				0	6.8	1.7	1.7	3.5	1.7	1.7	1.7	18.8
32.6			12				0	6.8	3.5	1.7	3.5	1.7	1.7	1.7	20.6
34.4			12				0	6.8	3.5	1.7	3.5	1.7	3.5	1.7	22.4
36.2			12				0	6.8	3.5	3.5	3.5	1.7	3.5	1.7	24.2
38			12				0	6.8	3.5	3.5	3.5	3.5	3.5	1.7	26
39.8			12				0	6.8	3.5	3.5	3.5	3.5	3.5	3.5	27.8
41.5			12				0	6.8	3.5	3.5	5.2	3.5	3.5	3.5	29.5
43.2			12				0	6.8	5.2	3.5	5.2	3.5	3.5	3.5	31.2

The gas cap pattern will be evaluated at ERDC; results of the modeling will be coordinated with the region.

Table 2. Lower Granite study design treatment dates.

Date	Block	Treatment	Date	Block	Treatment
6/20/2005	1	Spill	7/6/2005	9	RSW
6/21/2005	1	RSW	7/7/2005	9	Spill
6/22/2005	2	RSW	7/8/2005	10	Spill
6/23/2005	2	Spill	7/9/2005	10	RSW
6/24/2005	3	Spill	7/10/2005	11	RSW
6/25/2005	3	RSW	7/11/2005	11	Spill
6/26/2005	4	Spill	7/12/2005	12	Spill
6/27/2005	4	RSW	7/13/2005	12	RSW
6/28/2005	5	RSW	7/14/2005	13	Spill
6/29/2005	5	Spill	7/15/2005	13	RSW

6/30/2005	6	Spill	7/16/2005	14	RSW
7/1/2005	6	RSW	7/17/2005	14	Spill
7/2/2005	7	Spill	7/18/2005	15	RSW
7/3/2005	7	RSW	7/19/2005	15	Spill
7/4/2005	8	RSW	7/20/2005	Extra	RSW
7/5/2005	8	Spill	7/21/2005	Extra	Spill

Operation Considerations:

General:

- Units 1-3 have a much wider band of operation that is within 1% of peak efficiency, so use units 2 and 3 during the test (unit 1 is out of service). Lower limit for these units is 11.9 kcfs and upper limit is 21.0 kcfs (at 100 foot head).
- Inflow during the evaluation is expected to range from 28 kcfs to 40 kcfs.
- Keep operations as constant as possible.
- Start the test with the spring RSW pattern (Table 1) and the Spill to the Gas Cap pattern (Table 1) in accordance to the randomized block design (Table 2). After observation of the Lower Granite model at ERDC the week of June 20, the Gas Cap pattern may be revised. A summary of the changes to the patterns will be provided by June 23rd and coordinated through the TMT.

For the RSW Treatment:

- If inflow is above 40 kcfs, operate units 2 and 3 (requires approximately 24 kcfs to operate both units), and keep spill levels constant by varying between 1 and 2 unit operation during the day.
- If inflow is below 40 kcfs, operate just unit 3, or unit 2, depending on modeling results at ERDC.
- If inflow falls below 31 kcfs, then spill will have to be reduced to keep one unit operating at minimum (~12 kcfs). So, when inflow is below 31 kcfs, gradually drop spill for the RSW treatment to a minimum of 12 kcfs. **See Table 1.**

Spill Pattern After Study Period (July 21 – August 31): Under spill to the TDG cap with the minimum of one unit operation at about 11.5 kcfs, the spill pattern will be the RSW pattern developed for the study. See Table 1.

Little Goose

New Summer 2005 Objectives: Estimate reach and project survival of fall Chinook through Little Goose Dam under the revised summer 2005 operation using radio telemetry.

Spill Duration: June 20 - August 31

Study Duration: June 21 – July 11

Spill Pattern During Study Period (June 21 – July 11): The operation is based on spill to the gas cap with one unit of operation within the 1% turbine efficiency operating range, estimated at 11.5 kcfs. The spill pattern for this operation under the low summer flows will be reviewed during the first week of the operation (June 20th) by the SRWG modeling of pattern at ERDC. Until new information is available the spring pattern provided in the Fish Passage Plan will be used. **See Table 3.**

Spill Pattern After Study Period (July 12 – August 31): The same spill pattern used during the study will continue through August 31.

**Table 3.
Little Goose Tentative Summer Spill
Pattern, 2005 Operation Based on the Fish
Passage Plan**

Project Discharge (kcfs)	Powerhouse (kcfs)	Spillbays (stops)								Total Spill (kcfs)
		1	2	3	4	5	6	7	8	
13.3	11.5	0	1	0					0	1.8
15.1	11.5	0	1	1	0				0	3.6
17.0	11.5	0	1	1	1	0			0	5.5
18.8	11.5	0	1	1	1	1	0		0	7.3
20.6	11.5	0	1	1	1	1	1	0	0	9.1
22.4	11.5	0	1	1	1	1	1	1	0	10.9
24.4	11.5	0	2	1	1	1	1	1	0	12.9
26.3	11.5	0	2	2	1	1	1	1	0	14.8
28.3	11.5	0	2	2	2	1	1	1	0	16.8
30.3	11.5	0	2	2	2	2	1	1	0	18.8
32.2	11.5	0	2	2	2	2	2	1	0	20.7
34.2	11.5	0	2	2	2	2	2	2	0	22.7
36.2	11.5	0	3	2	2	2	2	2	0	24.7
38.3	11.5	0	3	3	2	2	2	2	0	26.8
40.4	11.5	0	3	3	3	2	2	2	0	28.9
42.4	11.5	0	3	3	3	3	2	2	0	30.9
44.5	11.5	0	3	3	3	3	3	2	0	33.0

Lower Monumental

New Summer 2005 Objectives: Estimate reach and project survival of fall Chinook through Lower Monumental Dam under the revised summer 2005 operation using radio telemetry.

Spill Duration: June 20 - August 31

Study Duration: July 5 – July 15

Spill Pattern During Study Period (July 5 - July 15): The operation is bulk spill to the gas cap with a minimum of one unit of operation within the 1% turbine efficiency operating range, estimated at 11.5 kcfs. The spill pattern for this operation under the low summer flows will be reviewed during the first week of the operation (June 20th) by the SRWG modeling of pattern at ERDC. Until new information is available the spill pattern will be based on the large gate opening spill pattern used in the 2004 bulk spill evaluation. **See Table 4.**

Spill Pattern Before and After the Study Period (June 20 – July 4 and July 16 – August 31): The same spill pattern used during the study will continued through August 31.

Table 4.
Lower Monumental Tentative Summer Spill Pattern,
2005 Operation, Based on the 2005 Involuntary Spill

Project Discharge (kcfs)	Powerhouse (kcfs)	Spillbays (stops)								Total Spill (kcfs)
		1	2	3	4	5	6	7	8	
19.4	11.5	0					5	0		7.9
21.1	11.5	0					6	0		9.6
22.8	11.5	0	0				7	0		11.3
27.3	11.5	0	5				5	0		15.8
29.0	11.5	0	5				6	0		17.5
30.7	11.5	0	6				6	0		19.2
32.4	11.5	0	6				7	0		20.9
34.1	11.5	0	7		0		7	0		22.6
35.2	11.5	0	5		5		5	0		23.7
36.9	11.5	0	5		5.5		5.5	0		25.4
38.6	11.5	0	5.5		5.5		6	0		27.1
40.3	11.5	0	6		6		6	0		28.8
42.0	11.5	0	6		6.5		6.5	0		30.5
43.7	11.5	0	6		7		7	0		32.2
45.4	11.5	0	7		7		7	0		33.9

Note: TDG may be an issue at the project, refer to the TDG discussion.

Ice Harbor

Summer 2005 Objectives: The original objective, to compare the migration behavior and survival of fall Chinook passage through BiOp spill (with large gate openings) with passage through the RSW (approximately 30% spill), will be conducted under the revised summer operation. This study uses radio telemetry and hydroacoustics methodologies.

Spill Duration: June 20 - August 31

Study Duration: June 9 – July 21

Spill Pattern During Study Period (June 9 - July 21): The study design is an alternating pattern of RSW spill and BiOp spill. **See Table 5.** These patterns will be alternated in accordance with the schedule provided in Table 6.

Spill Pattern After the Study Period (July 21 – August 31): Following the research period, project operation will be a minimum of one unit operation with spill to the gas cap following the spill to the gas cap pattern used in the study. **See Table 5.**

Table 5.
IHR "RSW" Treatment for Summer Spill
Pattern, 2005.

Project Discharge (kcfs)	Powerhouse (kcfs)	Spillbays (stops)										Total Spill (kcfs)		
		1	2	3	4	5	6	7	8	9	10			
18.4	9.5											0		8.9
20.1	9.5											0	1	10.6
21.8	9.5											1	1	12.3
23.6	9.5											0	1	14.1
25.3	9.5											1	1	15.8
26.9	9.5											0	0	17.4
28.6	9.5											0	1	19.1
30.3	9.5											1	1	20.8
32	9.5											1.5	1.5	22.5
33.8	9.5	0	RSW	5								2	2	24.3
35.4	9.5	5	RSW	5								0	0	25.9
37.1	9.5	5	RSW	5								0	1	27.6
38.8	9.5	5	RSW	5								1	1	29.3
40.5	9.5	5	RSW	5								1.5	1.5	31.0
42.2	9.5	5	RSW	5		0						2	2	32.7
43.9	9.5	5	RSW	5		5						0	0	34.4
45.6	9.5	5	RSW	5	0	5	0	0	0	0	0	0	1	36.1

IHR "Gas Cap" Summer Spill Pattern, 2005

Project Discharge (kcfs)	Powerhouse (kcfs)	Spillbays (stops)										Total Spill (kcfs)		
		1	2	3	4	5	6	7	8	9	10			
17.9	9.5	0		5									0	8.4
19.7	9.5	0		5									0	10.2
21.4	9.5	0		5									1	11.9
23.1	9.5	0		5									1.5	13.6

24.8	9.5	0	5	0	2	2	15.3
26.4	9.5	0	5	5	0	0	16.9
28.1	9.5	0	5	5	0	1	18.6
29.8	9.5	0	5.5	5.5	0	1	20.3
31.5	9.5	0	5.5	5.5	1	1	22.0
33.2	9.5	0	5.5	5.5	0	1.5 1.5	23.7
34.8	9.5	0	5	5	5	0 0	25.3
36.5	9.5	0	5	5	5	0 1	27.0
38.2	9.5	0	5.5	5.5	5	0 1	28.7
39.9	9.5	0	5.5	5.5	5.5	0 1.5	30.4
41.5	9.5	0	6	6	6	0 1	32.0
43.3	9.5	0	5	5	5	5 0	33.8
45.0	9.5	0 0	5 0	5 0	5 0	5 1	35.5

Table 6.
IHR 05 Treatment Schedule

Date	Block #	Treatment	Date	Block #	Treatment
8-Jun	12	RSW	30-Jun	17	RSW
9-Jun	12	RSW	1-Jul	17	RSW
10-Jun	12	Gas Cap	2-Jul	18	Gas Cap
11-Jun	12	Gas Cap	3-Jul	18	Gas Cap
12-Jun	13	RSW	4-Jul	18	RSW
13-Jun	13	RSW	5-Jul	18	RSW
14-Jun	13	Gas Cap	6-Jul	19	Gas Cap
15-Jun	13	Gas Cap	7-Jul	19	Gas Cap
16-Jun	14	Gas Cap	8-Jul	19	RSW
17-Jun	14	Gas Cap	9-Jul	19	RSW
18-Jun	14	RSW	10-Jul	20	Gas Cap
19-Jun	14	RSW	11-Jul	20	Gas Cap
20-Jun	15	RSW	12-Jul	20	RSW
21-Jun	15	RSW	13-Jul	20	RSW
22-Jun	15	Gas Cap	14-Jul	21	RSW
23-Jun	15	Gas Cap	15-Jul	21	RSW
24-Jun	16	RSW	16-Jul	21	Gas Cap
25-Jun	16	RSW	17-Jul	21	Gas Cap
26-Jun	16	Gas Cap	18-Jul	22	Gas Cap
27-Jun	16	Gas Cap	19-Jul	22	Gas Cap
28-Jun	17	Gas Cap	20-Jul	22	RSW
29-Jun	17	Gas Cap	21-Jul	22	RSW

McNary

Revised Summer 2005 Objectives: Estimate migration behavior, project and route specific survival of fall Chinook through McNary Dam under the revised summer 2005 operation using radio telemetry.

Spill Duration: July 1 - August 31

Study Duration: July 1 – July 31. This study has been split into two components, a non-spill phase that takes place before July 1st, the start of summer spill and a spill evaluation starting on July 1st.

Spill Pattern During Study Period (July 1 - July 31): The spill pattern developed in the Fish Passage Plan will be used for the start of the study. **See Table 7.** This pattern will be confirmed with field observation. Dependent of the field observations, changes will be coordinated through the regional forums.

Spill Pattern After Study Period (July 31 – August 31): The spill pattern used during the study period will be continued through the remainder of the summer spill operation.

Table 7.

McNary tentative summer spill pattern, 2005, based on the spring pattern in the fish passage plan.

Project Discharge (kcfs)	Powerhouse (kcfs)	Spillbays (stops)																						Total Spill (kcfs)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
53.9	50																			2	0		3.9	
57.8	50																			2	2		7.8	
59.5	50																		0	3	3		9.5	
61.7	50																		2	2	2		11.7	
63.4	50																	0	2	3	3		13.4	
65.6	50																	2	2	2	2		15.6	
67.3	50														0		2	2.5	3	2			17.3	
69.5	50														2		2	2	2	2			19.5	
71.2	50												0	2		2	2.5	3	2				21.2	
73.4	50												2	2		2	2	2	2				23.4	
75.1	50										0	2	2	2		2	2.5	3	2				25.1	
77.3	50										2	2	2	2		2	2	2	2				27.3	
79.0	50								0	2	2	2	2		2	2.5	3	2					29.0	
81.2	50								2	2	2	2	2		2	2	2	2					31.2	
82.9	50							0	2	2	2	2	2		2	0	2	2.5	3	2			32.9	
85.1	50							2	2	2	2	2	2		2	2	2	2	2	2			35.1	
86.8	50				0	2	2	2	2	2	2	2	2		2	2	3	2	3	2			36.8	
89.0	50				2	2	2	2	2	2	2	2	2		2	2	2	2	2	2			39.0	
90.7	50				2	2	2	2	2	2	2	2	2		2	2	3	2	3	2			40.7	
92.9	50				2	2	2	2	2	2	2	2	2		2	2	2	2	2	2			42.9	
94.6	50				2	2	2	2	2	2	2	0	2	2	2	3	2	3	2				44.6	
96.8	50				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			46.8	

98.5	50				2	2	2	2	2	2	2	2.5	2	2.5	2	2	0	48.5
100.7	50				2	2	2	2	2	2	2	2	2	2	2	2		50.7
102.4	50				2	2	2	2	2	2	2	2.5	2	2.5	2	2	0	52.4
104.6	50				2	2	2	2	2	2	2	2	2	2	2	2		54.6
106.3	50				2	2	2	2	0	2	2	2	2.5	2	2.5	2	2	56.3
108.5	50				2	2	2	2	2	2	2	2	2	2	2	2	2	58.5
110.2	50				2	2	2	2	2	2	2	2.5	2	2.5	2	2	2	60.2
111.9	50				2	2	2	2	2	2	3	2	2.5	2	2.5	2	3	61.9
113.6	50				2	2	2	2	2	2	3	2	2.5	3	2.5	2	3	63.6
115.3	50				2	2	2	2	2	2	3	3	2.5	3	2.5	3	3	65.3
117	50				2	2	2	2	2	3	3	3	2.5	3	2.5	3	3	67.0
118.7	50				2	2	2	3	3	3	3	3	2.5	3	2.5	3	3	68.7
120.4	50	0	0	0	0	2	0	2	0	2	0	3	3	3	3	3	3	70.4
121.3	50	2	3.5	3.5	2	2	2	2	2	2	2	2	2	2	2	0	0	71.3
123.0	50	2	3.5	3.5	3	2.5	3	2	2	2	2	2	2	2	2	0	0	73.0
124.7	50	2.5	3.5	3.5	3	2.5	3	2	2	2	2	2	2	2	2	0	0	74.7
126.3	50	2.5	4	4	3	2.5	3	2	2	2	2	2	2	2	2	0	0	76.3
128.0	50	2.5	4	4	3	2.5	3	3	3	2	2	2	2	2	2	0	0	78.0
129.6	50	2.5	4.5	4.5	3	2.5	3	3	3	2	2	2	2	2	2	0	0	79.6
131.3	50	2.5	5	5	3	2.5	3	3	3	2.5	3	2	2	2	2	0	0	81.3
132.9	50	2.5	5	5	3	2.5	3	3	3	2.5	3	2	2	2	2	0	0	82.9
135.1	50	2.5	5	5	3	2.5	3	3	3	2	2	2	2	2	2	0	0	85.1
136.8	50	2.5	5	5	3	2.5	3	3	3	2.5	3	2	2	2	2	0	0	86.8
138.5	50	2.5	5	5	3	2.5	3	3	3	2.5	3	3	3	2	2	0	0	88.5
140.2	50	2.5	5	5	3	2.5	3	3	3	2.5	3	3	3	2	3	2	0	90.2
142.4	50	2.5	5	5	3	2.5	3	3	3	2.5	3	3	3	2	2	2	0	92.4
144.1	50	2.5	5	5	3	2.5	3	3	3	2.5	3	3	3	3	2	3	0	94.1
145.8	50	2.5	5	5	3	2.5	3	3	3	2.5	3	3	3	3	2	3	0	95.8
148.0	50	2.5	5	5	3	2.5	3	3	3	2.5	3	3	3	3	2	3	0	98.0
149.7	50	2.5	5	5	3	2.5	3	3	3	2.5	3	3	3	3	2	3	0	99.7
151.4	50	3	5	5	3	2.5	3	3	3	2.5	3	3	3	3	2	3	0	101.4

Summary

As noted above, based on the coordination within the Regional Forum since the order was issued, the Corps is recommending the modifications as described for the summer spill operations at the lower Snake River and McNary projects. Operating these projects to stay within the state variances for TDG and implementing biological research testing as proposed, will only slightly modify the court ordered spill operations. These adjustments will provide valuable information on fall Chinook passage, and the Corps believes will improve juvenile survival.

