OFFICIAL COORDINATION REQUEST FOR
NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE- 14 MCN 22 Replacing Floating Orifices at McNary Dam

COORDINATION DATE- 3 September 2014

PROJECT- McNary Lock and Dam

RESPONSE DATE- 12 September 2014

Description of the problem:

There are 12 floating orifices along the powerhouse adult fish collection channel of the Oregon shore fish ladder at McNary Dam. These orifices, when properly functioning, allow adult fish, which are attracted by the outflow of the turbine units, to directly enter the Oregon ladder, rather than having to search for, find and enter the north or south entrances at either end of the powerhouse. However, in recent years these floating orifices have deteriorated to the point that they often become stuck when the tailwater level fluctuates: They are either stuck in the high position when the tailwater drops, or stuck in the low position when the tailwater rises. We have only limited data of the use of these various floating entrances; a 1997 study is attached. However, there is sufficient data to suggest that these floating orifice entrances are important, and that they should all be made fully functional.

If funding allows, the project would like to rehabilitate as many of these floating orifices as we can over the next 2 years. This is a fairly expensive and involved process, because all of the orifices are coated with lead paint, which must be sand-blasted off at an approved, off site facility. Also, some of the old metal guide wheels have become rusted and frozen in place, which prevents the gates from properly moving in their slots. The project plans to repaint each sand-blasted orifice with lead-free paint, rebuild the axles, and replace the metal wheels with UHMW plastic wheels, which do not require lubrication, and which should function for decades before they need to be replaced.

The project has 3 sets of bulkheads, which would enable us to bulkhead off and remove up to 3 sets of floating orifices at a time. We would need to bulkhead each of the 3 orifice slots, because we do not have any spare orifices that we could immediately drop in as replacements.

We must significantly reduce the flow of the ladder to place the bulkheads in their slots. If we could remove 3 floating orifices at a time, and leave 3 slots bulkheaded off while the ladder is in operation, we may be able remove and replace all 12 floating orifices in 2 years. This is speculative, because we won't even know what the costs will be until we rehab the first 3. If we were only allowed to bulkhead off one floating orifice slot at a time, more ladder closures would be required, and replacing all of the floating orifices

would take several years. The project would prefer to have all of the floating orifices repaired and fully functional sooner rather than later, but since we do not yet have a feel for costs, this operation will need to be based on available funding.

Type of outage required:

The project plans to bulkhead off and remove 3 floating orifices during the annual maintenance de-watering of the Oregon ladder from late January, 2015 through the end of February, 2015. We don't yet know how long it will take to rehab these 3, or how much it will cost. If the first 3 are rehabbed in time, we propose to partially shut down the Oregon ladder before April 25, for one afternoon, to replace the rehabbed orifices, remove the bulkheads, bulkhead off 3 more orifice slots, and restart the ladder. Once the bulkheads were in place, we could then remove that second set of orifices for rehabilitation after the ladder is restarted. If approved, and if funding permits, we would proceed with additional orifice swaps over the next 2 years, with the swaps occurring those times of the year, such as April and late October, when there is a lull in fish migrations, and during the winter maintenance period when the ladder is shut down.

Impact on facility operation:

Based on past experience, we believe that we can reduce ladder flows sufficiently, for the April and October orifice swaps, by just reducing the fish pump blade angles to 0^o and by going into ladder exit orifice flow, without stopping the 1000 CFS of the gravity flow attraction water system, or the 450 CFS flow from the collection channel attraction water. We would conduct the swap between 1300 and 1900 hours, which the McNary diel charts (attached) show to be a time of reduced fish passage for the various salmonid species as well as for lamprey.

Dates of impacts/repairs:

The first proposed flow reduction of the Oregon ladder, to allow the orifice swap, would occur between April 1 and April 25, which the fish counts show to be a time of very limited passage of spring Chinook and steelhead, the only species of salmonids even passing McNary that time of year. We propose a second swap and flow reduction after October 25, by which time the fall runs would have significantly declined.

Length of time for repairs:

Three of the 12 floating orifice slots would be blocked off continuously for the duration of the orifice rehabilitation process, which would likely take 2 years.

Expected impacts on fish passage:

Due to the reduced flows during the orifice swaps, some fish could be delayed for several hours at the Oregon ladder in the afternoon and early evening of 1 day in April and 1 day in late October or early November. Secondly, fish would not be able to enter 3

floating orifices for the duration of the replacement process which, without complications, would take 2 years. All of this would be mitigated by the fact that all 12 floating orifices would become fully functional for the first time in decades.

Comments from agencies:
September 11, 2014 FPOM meeting:

14MCN22 Replacing Floating Orifices at McNary Dam. Fredricks and Moody discussed the MOC in greater detail. **FPOM is supportive of getting the work done. NWW will need to come back in spring to update on the progress. There will be no changes to the spill.**

After Action:

Twelve FOGs were to be rehabilitated. Here is the current status of the rehabilitation:

FOGs in six slots have been completed:

Slots 1, 3 and 4: rehabilitated FOGs installed February, 2016.

Slots 14, 43 and 44: rehabilitated FOGs installed August, 2017.

Six slots have FOGs requiring rehabilitation:

Slots 8, 37 and 41: FOG rehabilitation is now scheduled for winter, 2019. This work was originally scheduled to be completed February, 2018. However, exit weir rehabilitation at both ladders (5 weir drives and two gearboxes removed) consumed much of the fisheries budget. Unless, more funds are allocated to fisheries, the FOG rehabilaiton will be delayed one year.

Slots 21, 26 and 32: rehabilitated FOGs installed in winter, 2020 instead of 2019. FOG rehabilitation will be completed at this time.

Final results:

Please email or call with questions or concerns.

Thank you,

~~Carl R. Dugger~~ Bobby Johnson
Supervisory Fisheries Biologist
McNary Lock and Dam
(541) ~~922-2263~~ 922-2212
~~carl.r.dugger@usace.army.mil~~
bobby.johnson@usace.army.mil

Table 17. Location of first and total approaches to fishway entrances by radio-tagged steelhead and sockeye salmon at McNary Dam; approaches with unknown times were included at specific entrances if subsequent telemetry records inside fishways clearly identified approach site.

	Steelhead								Sockeye	
	1997		2000		2001		2002		1997	
First approach	N	**%**	N	**%**	N	**%**	N	**%**	N	**%**
N Ladder Entrance	57	**11**	65	**10**	109	**14**	65	**8**	186	**41**
N PH Entrance	41	**8**	124	**19**	216	**27**	229	**27**	20	**5**
OG-44	5	**1**							3	**1**
OG-43	3	**1**							4	**1**
OG-41										
OG-37	9	**2**							3	**1**
OG-32	11	**2**							8	**2**
OG-26	27	**5**							11	**2**
OG-21	23	**4**							19	**4**
OG-14	43	**8**							39	**9**
OG-8	10	**2**							18	**4**
OG-4	4	**1**							13	**3**
OG-3	38	**7**							9	**2**
OG-1	5	**1**							4	**1**
S Ladder Entrance	197	**37**	410	**64**	391	**49**	501	**59**	110	**24**
Unknown	5	**1**	31	**5**	65	**8**	39	**5**	2	**<1**
Unknown OG			10	**2**	14	**2**	11	**1**		
Total	535		640		795		845		449	
Total approaches										
N Ladder Entrance	195	**5**	556	**12**	702	**14**	872	**12**	309	**15**
N PH Entrance	300	**8**	1657	**36**	1724	**34**	2488	**35**	65	**3**
OG-44	94	**2**							52	**3**
OG-43	134	**4**							60	**3**
OG-41	2	**<1**							3	**<1**
OG-37	100	**3**							37	**2**
OG-32	226	**6**							115	**6**
OG-26	469	**12**							209	**10**
OG-21	365	**10**							148	**7**
OG-14	474	**12**							203	**10**
OG-8	95	**3**							102	**5**
OG-4	126	**3**							115	**6**
OG-3	330	**9**							127	**6**
OG-1	153	**4**							127	**6**
S Ladder Entrance	728	**19**	2100	**45**	2307	**46**	3218	**46**	329	**16**
Unknown	7	**<1**	37	**1**	88	**2**	84	**1**	2	**<1**
Unknown OG			310	**7**	198	**4**	377	**5**		
Total	3798		4660		5019		7039		2003	

Unpublished data from M. Keefer, University of Idaho, 6 May 2013. (Disclaimer: data quality should be high, but information is dated)

[1]Totals differ from Table 16 because includes unknown approaches. 2000-2002 OG were not monitored