

**Biology Committee Final Webinar Summary, September 30, 2016
Briefing on Green River Canal Screen for Biology Committee**

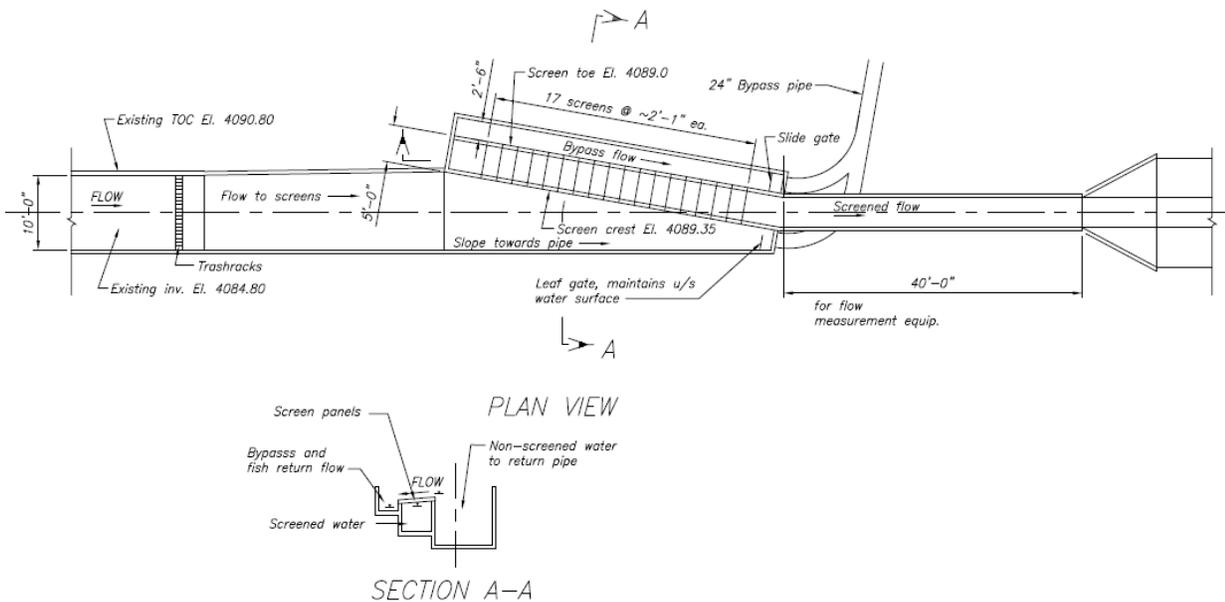
PARTICIPANTS

Biology Committee: Dave Speas, Melissa Trammell, Harry Crockett, Dale Ryden, Krissy Wilson, and Pete Cavalli.

Others: Tom Chart, Kevin McAbee, Jana Mohrman, Angela Kantola, Tildon Jones, Mark Wernke, Bob Norman, Brent Uilenberg, and Paul Badame

CONVENE: 8:00 a.m.

Brent Uilenberg described the revised concept for fish entrainment prevention project at the Green River Canal, Green River, Utah. The latest concept is weir wall that diverts the top portion of water (bottom layer is bypassed to the river) and a corrugated water screen that screens water into the canal without entraining fish (of the flow that goes onto the screen about 90% goes through the screen and about 10% carries the debris in the water into the bypass channel). Bob Norman said full testing of the Hogback Weir has not been completed, so they felt that a weir wall alone may not adequately reduce entrainment. Thus they added the corrugated screen component. The concept design is shown here:



The fall back design would be vertical plate screens like we've used before, but they require considerable automation that would be difficult to operate/maintain/support in Green River, Utah (thus the preference for the simplicity of a weir wall). We could also fall back to a "Hogback" style weir wall. They may not perform as well as a vertical plate screen when vertical plates are being operated, but weir walls perform better than a vertical plate screen when the screen is bypassed. They began investigating concept of a corrugated water screen and tests by Reclamation's Technical Service Center Hydraulic Investigations and Laboratory Services Group (Mefford, et al., provided to Committee in advance of the webinar) indicate this would be a good design. The summary from that draft report reads as follows:

“Hydraulic evaluation tests of the Corrugated Water Screen (CWS) screen were conducted in Reclamation’s Hydraulics Laboratory. The testing mainly focused on the screen’s hydraulic performance when mounted in an overshot ramp orientation. Several tests were also conducted with the screen mounted as a vertical screen with the corrugations running parallel to the flow.

In the overshot orientation the screen is designed to provide a high ratio between sweeping and screen approach velocity which promotes good passive cleaning characteristics. Clear water and debris tests were conducted of the screen operating under free flow and partially submerged conditions at different ramp slopes. A 5-ft-long by 2.1-ft-wide screen module was used for these tests.”

At the Green River Canal, the screens would be run perpendicular to the top of a weir wall, and 90% of water going over the weir wall would go through the screen (3/32”) into the canal. The remaining 10% would be bypassed back to the river. Water and fish in the lower water column would go along the weir wall through a gate bypassed back to the river. Thus, any fish that go over the top of the weir wall would be screened along with debris and returned to the river. This will require slightly more water, but well within the 50 cfs to run the fish screen described in the Green River Diversion Dam Biological Opinion.

Kevin McAbee asked why the weir wall’s bypass pipe goes under the canal, rather than a “mirror image” layout which would allow the weir wall return flow to run unimpeded to the river. Mark said one of the two bypass flows would always have to go under the canal. Kevin said he thinks the smaller volume of water should be bypassed under the canal. Mark said they will consider this and whether it would work from a hydraulic perspective. Kevin said he thinks the canal owners will be very pleased with how this design will remove debris.

Brent noted this design has no screen bypass, meaning that if the screen did clog, it likely would receive immediate attention to maintain flow in the canal. Dave asked if floating debris might pile up against the bypass pipe; Mark and Bob didn’t think so.

Dave asked how corrosion is addressed; Bob said the screens are all stainless steel. The vertical plate screens on the Government Highline canal have had no corrosion. Krissy noted the buildup she observed on the Government Highline screens. Brent said these screens occasionally require pressure washing, but other than that, buildup hasn’t created problems. Bob said the higher velocities over this Tusher screen design should prevent some of the bio-fouling observed on the Government Highline vertical screens.

Melissa asked if the outside trough edge in section A-A (carrying water, debris, and fish returned from over the screens) would be high enough to prevent fish (especially bonytail) from flipping out the top. Bob thought the wall would be ~2.5’ above the water depth and Melissa thought that would be adequate. Bob also asked for a recommendation from the committee on what a minimum depth would be. Tom Chart asked if there’s a difference in elevation in the two bypass pipes. Brent said they start at different elevations, but reach a common elevation where they join. Tom Chart wondered if there would be a velocity difference that could impact fish. Bob Norman said there could be small differences in velocity, but doesn’t think it would hurt the fish (in comparison to other velocities they survive). Bob said HDPE is a smooth-walled, pretty fish-friendly pipe, but noted they typically shave the inside seams, The diameter of these pipes may be too small to allow shaving, but Bob thinks the seams are smooth enough that it won’t be a problem.

Kevin McAbee asked if this design will allow the canal to divert their sluice right (the canal owners can divert up to 80 cfs: 60 consumptive, 20 for sluicing). With this screen system, they may not need to sluice as much and has that been discussed. Measurements from irrigation year 2015 indicate that the maximum delivered into the canal was about 40 cfs. The canal was mucked out last winter to increase the capacity. This irrigation season they also opened a sluice gates downstream from the canal siphon which allowed the initial portion of the canal

to carry their full water right of 80 cfs. (Dave later asked questions about the leaf gate operation. If it's closed for sluicing, half of the ability to bypass fish would be precluded. Would that only be temporary going forward?) Reclamation has currently designed the fish barrier and weir wall for 60 cfs, because if it built for 80 cfs and only 40 cfs was diverted, it will be harder to keep clean. Therefore, Bob said they are recommending to the canal owners that the screen not be designed for 80 cfs. There should be less sediment and thus less need to sluice than in the past. In any case, the fish screen would be able to deliver their full water right at most river stages as they can currently.

The Committee discussed the trough (labeled Bypass Flow in the drawing) dimensions. Perhaps it needs to be narrower and deeper as opposed to 2' wide. Bob noted it will move slower as it's made deeper. The end of the channel has to be 30" inside diameter to connect to the return pipe. The depth hasn't been finalized and Reclamation would appreciate the Committee's input. Dave suggested a minimum of 10"-12". At that depth Bob thought the velocity might be about 6 cfs. Bob noted they plan to install a walkway above the bypass flow (will allow access for any needed maintenance/cleaning of the screens), and that also would limit bird predation.

Bob asked if we want antennas on the structure, suggesting they wouldn't be very useful downstream of the screens, but one could be accommodated near the trash rack and then downstream of the siphon. Dave and Kevin will work through that and discuss with Peter MacKinnon. We likely will keep at least one set of antennas below the weir wall for a couple of years to evaluate performance of the structure (even though we expect no entrainment). Kevin would like an antenna in the bypass pipe so we know how many fish are being returned to the river from the weir wall and the screen. Kevin said Peter typically recommends installing these far enough from the river so the antenna doesn't detect fish in the river and mis-classify them as being in the bypass. Tildon noted some fish likely will try to enter the pipe. Melissa asked if the location of the pipe will allow access to the antenna. Melissa suggested antennas in bypass pipe, but perhaps closer to the facility for ease of installation and maintenance.

Brent noted that although not shown in the diagram, the gate structure at the entrance to the raceway will be replaced to provide the head. This is a significant cost to the project.

Pete asked about the trash rack. Bob Norman said the openings will be ~6" with the hopes that any adult fish would make it through and be returned to the river. Bob didn't think large debris would go over the wall and screen. Pete thought it might be worth considering a trash rack with large openings near the bottom, but smaller openings near the surface. That should allow large fish to go through, but still catch large branches that could cause problems if they make it down to the bypass pipe.

The Committee viewed videos of screen tests. Likely 6-8" of water would go over the screens. Larval fish not expected to go through the screen openings. Crest elevation of weir wall will be constant; screens will be slightly sloped.

The Committee thought the overall idea for this weir wall and screen looks very good and thanked Reclamation for the innovative approach. Brent said he believes this design will meet the dual goals of delivering water to the canal and preventing fish entrainment. Kevin noted that the data indicates this canal entrains substantial number of fish, and that the Colorado pikeminnow PVA indicates that any increase in adult survival improves the population outlook. So halting the entrainment of migrating adults, juveniles, and drifting larvae here will be a very positive project for the population. Tildon reminded the group that not all fish that go into canal are lost now (many opportunities to return to the river); most the native fish they salvaged last year were young of year.

Action Item & Current Timeline: Brent said Reclamation is meeting with the Green River Canal Company to finalize plans for this project and the associated O&M contract. Brent hopes to award a contract in FY17 and construct in winter 2017-2018. Reclamation will keep the Committee informed as work progresses.

ADJOURN: 9:20 a.m.