

RECLAMATION

Managing Water in the West

TR-2015-01

Travel to Northwest Hydraulic Consultants Laboratory

Travel to observe and provide input on sediment testing for 1:6 scale physical model of Trabuco Creek fishway at Northwest Hydraulic Consultants Laboratory in Seattle, WA

Date(s) of Travel: December 10 – 11, 2014



**U.S. Department of the Interior
Bureau of Reclamation
Technical Service Center
Hydraulic Investigations and Laboratory Services Group
Denver, Colorado**

BUREAU OF RECLAMATION
Technical Service Center
Denver, Colorado

TRAVEL REPORT

Code: 86-68460

Date: January 28, 2015

To: Manager, Hydraulic Investigations and Laboratory Services Group
From: Connie Svoboda, Hydraulic Engineer

Subject: Travel to Northwest Hydraulic Consultants Laboratory in Seattle, Washington to observe sediment testing on 1:6 scale physical model of Trabuco Creek fishway

1. **Travel period:** December 10-11, 2014
2. **Places or offices visited:** Northwest Hydraulic Consultants Laboratory
3. **Purpose of trip:** Observe and provide input on sediment testing for 1:6 scale physical model of Trabuco Creek fishway at Northwest Hydraulic Consultants Laboratory in Seattle, WA.
4. **Synopsis of trip:** Connie Svoboda arrived in Seattle, WA on the morning of December 10th and proceeded to Northwest Hydraulic Consultants (NHC) Laboratory. Connie met up with Darren Hinton, Engineer and Principal Investigator for the Trabuco Creek physical models, and Tim Croom, lead laboratory technician. Darren showed Connie the features of the 1:6 and 1:20 scale models of Trabuco Creek fishway and discussed model layout, instrumentation, materials, and procedures (Figures 1 and 2).



Figure 1. 1:20 scale Trabuco Creek physical model.



Figure 2. 1:6 scale Trabuco Creek physical model.

The Trabuco Creek fishway project is located within the city of San Juan Capistrano in Orange County, CA. The project goal is to replace an existing grouted drop structure with an engineered fishway. The existing structure at the Metrolink light rail crossing is an impassable fish barrier in a critical habitat area for endangered southern steelhead. At the request of Trout Unlimited, CDM Smith designed a proposed cascade and pool fishway to provide passage for steelhead. The fishway consists of a sequence of pools with one large pool followed by four small pools. Concrete sills separate pools, and boulders and larger rock are placed strategically to provide hydraulic control in the fishway.

In addition to the original model scope of work, NHC was tasked with conducting a series of sediment scour tests in the 1:6 scale physical model to develop an approximate relationship between sediment scour and discharge in the fishway. The Bureau of Reclamation supported the project by providing Endangered Species Act (ESA) funds for the sediment testing. NHC tested three sediment sizes in the model with $d_{50} = 0.5$ mm, 2 mm, and 3/8 in. A single fishway pool sequence was manually filled with sediment at the start of the test (Figure 3). The model was turned on with a low initial discharge. The model was run until sediment movement was minimal as determined by measuring scour depths, extents, and patterns in each pool (Figure 4). Measurements were documented and video was recorded. The discharge was then increased and the process was repeated. Darren continued to increase the discharge until enough material had scoured to allow for steelhead passage through the fishway (prototype depth of 6 in).



Figure 3. Sediment ($d_{50} = 2$ mm) was manually filled in one pool sequence at the start of each test.



Figure 4. Scour depths, extents, and patterns were observed and measured in each pool to determine when sediment movement had settled out.

Sediment testing for the small ($d_{50} = 0.5$ mm) and mid-size ($d_{50} = 2$ mm) sediment was completed during the site visit. Sediment testing for the larger material was scheduled to occur after the site visit. Darren will incorporate sediment testing results into a comprehensive report for the 1:6 and 1:20 scale Trabuco Creek fishway models. Connie will review the model report when completed.

5. Conclusions: A series of sediment scour tests were conducted in NHC's 1:6 scale physical model to develop an approximate relationship between sediment scour and discharge in the proposed Trabuco Creek fishway. Sediment testing for the small ($d_{50} = 0.5$ mm) and mid-size ($d_{50} = 2$ mm) sediment was completed during the site visit and sediment testing with larger material ($d_{50} = 3/8$ in) was expected to occur after the site visit.

6. Recommendations: None.

7. Action correspondence initiated or required: None.

7. Client feedback received: None.

cc: SCAO-1500 (McPherson)

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SIGNATURES AND SURNAMES FOR:

Travel to: Northwest Hydraulic Consultants Laboratory, Seattle, WA

Dates of Travel: December 10-11, 2014

Names and Codes of Travelers: Connie Svoboda, 86-68460

Travelers:

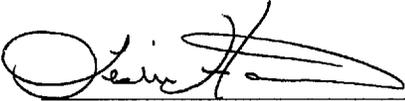


Connie D. Svoboda
Hydraulic Investigations and Laboratory Services Group

1/26/2015

Date

Peer Review by:



Leslie Hanna
Hydraulic Investigations and Laboratory Services Group

1/28/2015

Date

Noted and Dated by:



Robert F. Einhellig, Manager
Hydraulic Investigations and Laboratory Services Group

1/27/2015

Date