FERC Project No. 2426
South SWP Hydropower
Fish Entrainment Risk Assessment Study

FIELD RESULTS AND DATA SUMMARY

April 30, 2018

Consistent with Section 5.0 of the South SWP Hydropower Revised Study Plan (RSP) and as approved in the Federal Energy Regulatory Commission (FERC) Study Plan Determination (June 14, 2017), the California Department of Water Resources (DWR) and Los Angeles Department of Water and Power (LADWP) (Licensees) provide the following status update for the *Fish Entrainment Risk Assessment Study,* which includes work completed to date, key findings, associated data files, variances, and remaining work. The Licensees consider these data to be public.

Completed Work to Date:

The Licensees completed the four steps in the FERC-approved study. Work completed includes characterization of intake structures for the Angeles Tunnel and Pyramid Dam, including calculations of intake velocities; determination of the likelihood that rainbow trout and largemouth bass would be near the intakes; and calculations of swim speeds of rainbow trout and largemouth bass.

Key Accomplishments/Summary of Findings to Date:

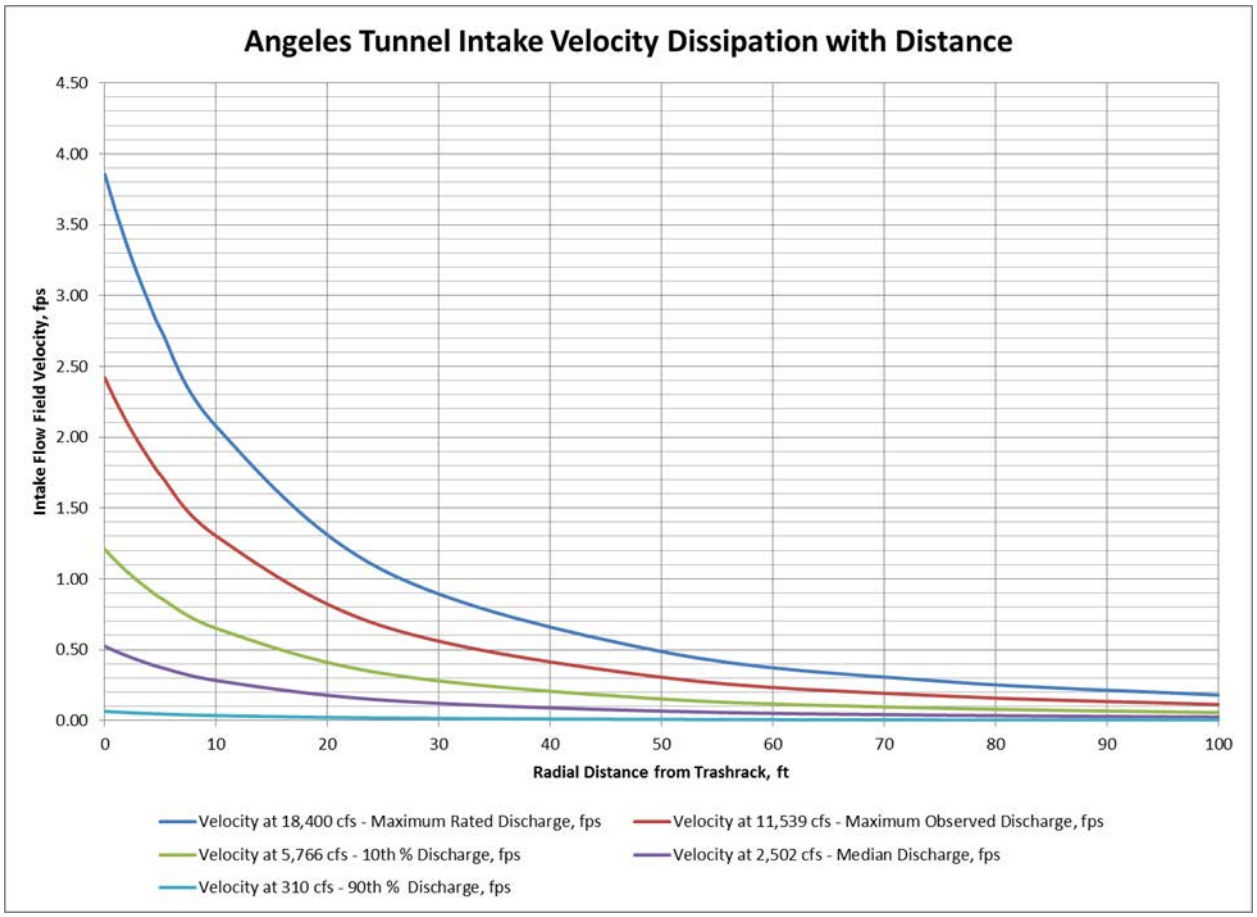
The Licensees found a very low likelihood that rainbow trout (*Oncorhynchus mykiss*) or largemouth bass would be entrained into the Angeles Tunnel or Pyramid Dam low-level intake for three reasons: (1) based on the species life history, it is unlikely they would be in the deep portions of Pyramid Lake where the two intakes are located; (2) in the unlikely case that individuals of these species were in the deep portions of the lake, it is unlikely they would be in the very small portions of the lake affected by the intakes; and (3) in the unlikely case that individuals of these species were in the deep portions of the lake and in the very small areas affected by these intakes, adult rainbow trout and largemouth bass can avoid being entrained because they each have swim speeds in excess of the intake velocities.

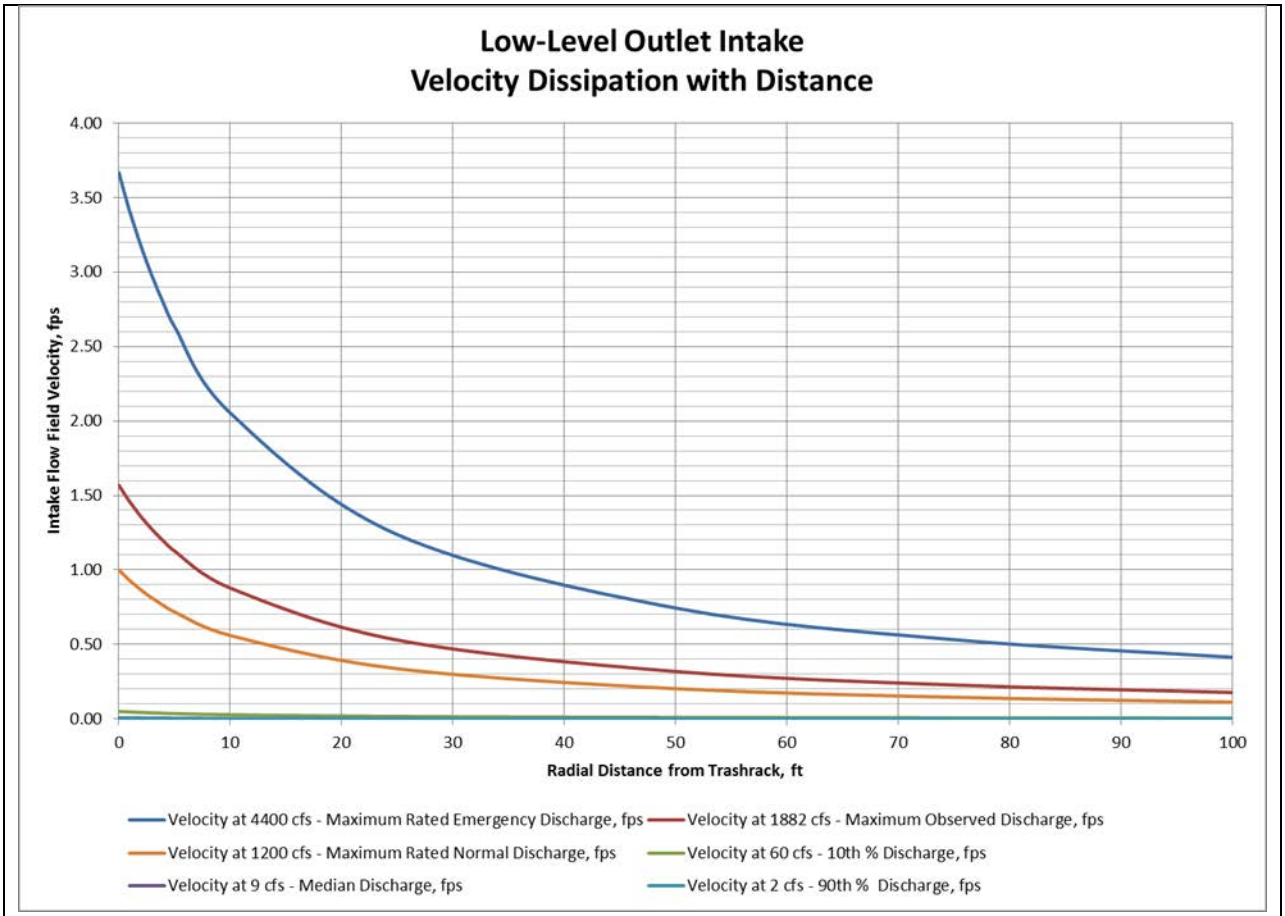
A review of existing literature found that all lifestages of both largemouth bass and rainbow trout, except for the adult lifestage of rainbow trout, prefer littoral habitat near the shallow edges of reservoirs. Rainbow trout adults may be found in the mid water portions of reservoirs, but rarely at depths of 200 feet where the Pyramid Lake intakes are located.

The Licensees used a hemispherical model of surface area to determine the area of influence of the intakes. The figures below show that each intake's area of influence is relatively limited in the deep portion of the lake (i.e., a velocity of less than 0.5 feet per second [fps] 40 to 80 feet away from the intake), and even at the intake itself, the maximum intake velocity is less than 3.8 fps.

In the very unlikely instance that an adult rainbow trout with burst swim speed ranging from 6.4 to 13.5 fps (Bell 1986) was in the vicinity of the intake structure, it can easily avoid being entrained. Similarly, in the very unlikely instance that an adult largemouth bass with burst swim

speed of greater than 4.34 fps (Beamish 1978) was in the vicinity of the intake structure, it can easily avoid being entrained.





Associated Data Files *(all associated data can be found in the folder with this summary form. Note: confidential CEII/privileged information will not be posted on the public):*

File Name	Data Description	File Type	File Location
20180405_dwr_sswp_p2426_Intake_Entrainment_Velocity_Calculations	Intake velocity calculations	Excel	STUDIES/Study-17-Fish-Entrainment-Risk-Assessment/Associated Data Files

Variances from Study Methods, Schedule or Approach and Abnormalities in Expected Field Conditions:

There have been no variances from the FERC-approved study.

Remaining Work:

None.

References Cited:

Beamish, F.W.H. 1978. Swimming capacity. Fish Physiology, Vol. VII:101-187.

Bell, M.C. 1986. Fisheries Handbook of Engineering Requirements and Biological Criteria. U.S. Department of the Army, Portland Division Corps of Engineers, Portland, Oregon. 290 pp.