

**COMPARATIVE PERFORMANCE OF THREE THREATENED  
CALIFORNIA FISHES TO REPEATED SCREEN EXPOSURE**

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**EXTENDED ABSTRACT ONLY - DO NOT CITE**

**Introduction**

The threatened splittail (*Pogonichthys macrolepidotus*), threatened delta smelt (*Hypomesus transpacificus*), and endangered winter-run chinook salmon (*Oncorhynchus tshawytscha*) may be vulnerable to >2000 water diversions distributed throughout the Sacramento-San Joaquin Delta in northern California. Installation of fish screens has been identified as one means of reducing direct mortality associated with water diversions. However, exposure to multiple screened diversions could be detrimental to these native fishes. This study was conducted to quantitatively measure the performance and behavior of these species in a simulated two-screen exposure at 19°C (splittail) and 12°C (delta smelt and chinook salmon) using the Fish Treadmill apparatus.

**Methods**

Fish (20 per group; standard length: 4-6 cm) were exposed to a circular 3-m diameter fish screen with 2.3-mm vertical bar spacing in a 0.67-m wide test channel of the Fish Treadmill apparatus for 2 hours in a simulated two-screened diversion exposure at target flows of 10 cm/s (0.33 f/s) approach flow at different sweeping

(0, 31, 62 cm/s or 0, 1, 2 f/s) flows.

## **Results**

Preliminary results (1-3 replicates so far) showed high survival for all three species. Mortality occurred only in one delta smelt (out of 100 experimental fish) and only at 10 cm/s approach flow with 31cm/s sweeping flow.

A general increase in total screen contact rates was observed in all fishes as water velocity was gradually increased to target flow (simulating conditions as fish approach a screened diversion), followed by either a slight decrease or maintained level as the fish were acclimated to target flow (simulating exposure to the screened diversion). Splittail screen contact rates (tail touch and body contact rates) in all flow combinations decreased at the second screen exposure indicating no detrimental effects of a second screen exposure after a 10-min rest period (no flow, simulating no screen exposure). However, delta smelt and chinook salmon screen contact rates increased at the simulated second screen exposure at the 10 cm/s approach flow with no sweeping flow, indicating that a repeated screen exposure at this flow combination may be detrimental to delta smelt and chinook salmon even after a 10-min rest period. Winter-run chinook salmon had the highest contact rates at target flows, compared with those of splittail and delta smelt.

For all species, downstream velocity past the screen was highest at the 62 cm/s sweeping velocity.

These preliminary results indicate that a second screen exposure at approach flow of 10 cm/s with no sweeping flow could be more detrimental to both delta smelt and winter-run chinook salmon than to splittail. Also, the 62 cm/s sweeping flow seems to increase fish passage past the screen, for all three species.

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