

STUDENT RESEARCH WEEK

POSTERS · TALKS CREATIVE WORK

Investigation of Sub-Lethal Effects of Variable Concentrations of Oil Sands Process Water on Behavioural Traits in Zebrafish

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Abstract

Oil sands process water (OSPW) is a by-product of the recovery and separation of bitumen from oil sands extraction sites. After its use in these processes, OSPW is sequestered in large, lake-like storage basins called tailing ponds. To date, there have been very few studies examining the sub-lethal toxicity of OSPW on fish. In this study, we explored the possible effect of OSPW obtained from the Athabasca Oil Sands on zebrafish (*Danio rerio*) behaviour. Zebrafish are an excellent model organism for this study because they exhibit basic and quantifiable behaviour, such as fear and anxiety, when certain external stimuli are applied. We exposed half of the fish ($n=50$) to 10% OSPW and the other half ($n=50$) to dechlorinated Edmonton tap water as a control group for a period of 30 days. To test anxiety levels in the fish, motion-tracking software was used to observe and analyze shoals of five zebrafish in an open field testing arena. Subsequently, activity of the shoal was tracked after a novel object was introduced to the center of the arena. Testing was performed after an OSPW exposure period of 10, 20, and 30 days. In the OSPW fish, we observed a significantly larger inter-individual distance (IID) after day 10, and a significantly lower level of mobility after day 20. The duration and frequency that the OSPW fish spent in the object zone was significantly greater after day 10, 20, and 30. These data suggest that after exposure to 10% OSPW, zebrafish have altered behaviour.

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