

EFFECTS OF CONTAMINATION FROM OIL EXTRACTION ON AMPHIBIAN ABUNDANCE, SURVIVAL, AND SIZE

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Saline wastewaters (brine) that contain sodium-chloride salts (NaCl) and heavy metals are a common byproduct of oil extraction. Wetlands and streams are commonly contaminated by brines, but there is sparse information on its effects on freshwater vertebrates. Amphibians are especially sensitive to increased salinity because of their porous skin and primarily-aquatic lifecycle. Therefore, we investigated the influence of brines and pure NaCl on three widespread amphibian species (barred tiger salamanders *Ambystoma mavortium*, leopard frogs *Rana pipiens*, and boreal chorus frogs (*Pseudacris maculata*) in the Prairie Pothole Region of Montana and North Dakota. We determined abundance of larvae in 33 wetlands that spanned a gradient of contamination. We also used lethal concentration 50 experiments to determine the influences of brine and pure NaCl contamination on survival and size. Abundance and survival of chorus frog larvae declined most rapidly in response to increased concentration of brines and NaCl, followed by leopard frogs and tiger salamander larvae. However, survival of larvae was lower when exposed to brine compared to pure NaCl. For larvae that survived experimental exposures, mass and length were lower for larvae exposed to higher concentrations of brine and NaCl. Our results suggest that brine contamination has reduced survival and abundance of larvae, brine is more toxic to larvae than pure NaCl, and that sublethal concentrations of brine and NaCl negatively influence growth of larvae. The persistence and negative influence of salts in freshwater ecosystems underscores the critical need for tools to restore landscapes affected by brine and NaCl contamination.