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Track:
Aquatic Toxicology and Ecology

Session:
Assessing Ecological Risks of Resource Extraction on Inland Environments

Abstract Title:
Relationships determining the toxicity of major ion mixtures to *Ceriodaphnia dubia*

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Abstract:
Significant impacts to aquatic systems can occur due to increases in major ions (Na, K, Ca, Mg, Cl, SO4, HCO3) from various anthropogenic activities, these impacts varying with both the specific combination of ions that are elevated and the chemistry of the background water. A series of experiments on the toxicity of single salts and binary salt mixtures to *Ceriodaphnia dubia* has provided various insights into understanding and assessing major ion toxicity. First, because of the relatively high concentrations involved in major ion toxicity, effects on speciation and chemical activity can be large, and are important for rationalizing responses to different exposures. Second, the toxicity of major ion salts can vary substantially due to the ion composition of the dilution water. Specifically, K toxicity is greater at low background Na concentrations and the toxicities of both Na and Mg salts are greater at low background Ca concentrations. Third, Na salts are the least toxic of all major ion salts, but the toxicity of Na salts does not appear attributable solely to Na (i.e., it matters what the anion is). Fourth, the greater toxicity of K, Mg, and Ca salts than Na salts under comparable background water conditions indicate that cation-specific mechanisms contribute to the overall salt toxicity. Fifth, binary salt mixtures that involve a single cation in association with different anions adhere very closely to concentration-addition, whereas mixtures that involve two cations exhibit a considerable degree of independence between the salts. These results suggest certain mechanisms for ion toxicity that should be useful for developing assessment tools.