

Adverse Outcome Pathways and Ecological Risk Assessment: Bridging to Population Level Effects

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The viability of populations of plants and animals is a key focus for environmental regulation. Population-level responses integrate the cumulative effects of chemical stressors on individuals as those individuals interact with and are affected by their conspecifics, competitors, predators, prey, habitat and other biotic and abiotic factors. Models of population-level effects of contaminants can integrate information from lower levels of biological organization and feed that information into higher-level community and ecosystem models. As individual-level endpoints are utilized to predict population responses, this requires that biological responses at lower levels of organization be translated into a form that is useable by the population modeler. In this presentation we describe how mechanistic data, as captured in adverse outcome pathways, can be translated into modeling focused on population-level risk assessments. First, we provide a succinct overview of different approaches to population modeling, and discuss the types of data needed for these models. Then we discuss how toxicity data are used currently for population modeling, and provide recommendations as to how testing might be modified to better generate information to support modeling. From this we describe how different key processes measured at the level of the individual serve as the bridge between mechanistic toxicology data and predictions of population status, and provide case examples of how this linkage has been/can be achieved.