

## Risk Assessment

Ecological and human health risk assessments are integral parts of many Windward projects. These efforts can range from small evaluations of individual properties to large-scale, multi-year investigations of Superfund sites. Our approach emphasizes the use of an appropriate level of risk assessment, and the application of site-specific data to develop a realistic estimate of risk. In many cases, this method has resulted in reduced estimations of risk compared — with a commensurate reduction in remediation costs to the client.

Windward’s biologists, toxicologists, and chemists take an interdisciplinary approach to ecological risk assessment (ERA). We are experienced in conducting both predictive risk assessments, in which effects are estimated using literature data, and empirical risk assessments, in which effects are measured in the field.

Human health risk assessments (HHRA) at aquatic sites are often driven by human consumption of contaminated fish and shellfish. Windward has specialized expertise in assessing risks to human health from the consumption pathway; our staff can evaluate the risks associated with fish consumption in both freshwater and marine environments and prepare guidance documents for conducting fish consumption surveys. We focus on quantitative uncertainty analyses, often using probabilistic analyses to facilitate the identification of areas where additional data collection might be warranted to develop a more reasonable risk estimate.

### Lower Passaic River ERA

Windward has been retained by the Cooperating Parties Group (CPG), a consortium of private entities, to develop a comprehensive ecological risk technical strategy and address environmental issues associated with sediment contamination as part of the remedial investigation (RI) of the Lower Passaic River (LPR) in Newark, New Jersey. The LPR study area encompasses the 17.4-mile reach of the Passaic River from below Dundee Dam to the mouth of the river at Newark Bay, the river’s tributaries, and the surrounding watershed below Dundee Dam. Windward is leading the effort to develop a risk assessment framework document that will provide an overarching project roadmap for the site characterization, ERA, and HHRA.

Key project components have included agency negotiations, establishing toxicity reference values (TRVs), developing study designs and implementing data collection efforts, conducting an inventory of ecological resources, surveying habitat, and performing food web and bioaccumulation modeling. Windward’s experience on other large, complex sediment sites has been key in supporting the CPG in this investigation effort. It is anticipated that a combination of site-specific risk assessment and restoration planning efforts will result in a restored system, with reduced risks and improved functionality.

### Tissue-Based ERA of Trace Elements in Elk Valley, BC

The Elk Valley in British Columbia, Canada, consists of five active coal mining operations. Trace elements have been routinely monitored in tissues of aquatic organisms and aquatic-dependent biota collected from streams and water bodies in the valley, as well as downstream at Lake Koochanusa. An evaluation of risks posed by trace elements in tissues was conducted to help support components of a regional aquatic effects monitoring program and, potentially, local aquatic effects monitoring programs. The assessment was also used to inform the Elk River Water Quality Plan, which was developed to address the management of water quality constituents released by mining activities throughout the Elk River watershed.

Windward was able to take advantage of its in-house expertise in the ecotoxicology of dietary trace element concentrations, and understanding of key uncertainties, to defensibly evaluate dietary trace element risks to several consumer organisms, including benthic invertebrates, fish, amphibians, and aquatic-dependent birds, as well as direct toxicity risks from selenium and mercury to fish and birds. Windward developed an initial list of constituents of potential concern based on a conservative screening-level assessment, followed by a more detailed characterization of risks in order to support future monitoring needs. The risk assessment currently serves as a framework for ongoing discussions with the Ministry of Environment relative to larger risk-based questions in the Elk Valley.

### Upper Columbia River NRDA

Windward has been contracted by a confidential client to conduct a “reasonably conservative injury evaluation” for this site in northeast Washington State. Our work to date has focused on developing a reasonable worst-case estimate of the scale of restoration that could be required at the site. This estimate, which has been reached using previously secured environmental data, is based on a site-specific Habitat Equivalency Analysis (HEA) model that summarized discounted service acre years (dSAYs), the net present value unit for habitat services. Natural resource trustees will be able to use this estimate in settling any natural resource damage assessment (NRDA) claim.

Additionally, based on the perspective of an experienced former natural resource trustee representative, Windward has provided the client with strategic and tactical advice on how to coordinate an RI with attempts to resolve NRDA liability.