

John Toll, PhD

Principal Consultant & Managing Partner

Dr. John Toll is a chemical and environmental engineer with a doctorate in Engineering and Public Policy. He specializes in investigating physical and chemical habitat alterations that have the potential to disrupt ecological processes, damage natural resources, or impair human health. He finds ways to improve how science and technology inform environmental policy, planning, and management decisions, thereby reducing the required margin of safety in management decisions and freeing up resources for other, more useful endeavors.

Dr. Toll's 35 years of professional experience have helped him become adept at recognizing how people perceive environmental problems, how to utilize his technical expertise to help individuals re-examine their perceptions, and how to harness his skills to help people find mutually acceptable solutions to contentious problems. Dr. Toll has authored numerous peer-reviewed publications. He serves as a deputy editor-in-chief of *Integrated Environmental Assessment and Management* and is a founding member of the International Board of Environmental Risk Assessors, an accreditation board created in 2020.

Project Experience

Use of Site-Specific PFOS and PFAS Criteria to Set Water Quality-Based Effluent Limits

Human health-protective, site-specific water quality criteria for perfluorooctane sulfonate (PFOS) and per- and polyfluoroalkyl substances (PFAS) are being used in a draft permit as the foundation for water quality-based effluent limits. These criteria were developed after determining that the primary topic of concern is the potential for high exposure among people consuming fish caught at the site. The criteria have not yet been through a public comment period or scrutinized as part of another National Pollutant Discharge Elimination System (NPDES) permit. Dr. Toll and others at Windward are providing critical review on behalf of the affected permittee.

Offshore Oil and Gas Facility Decommissioning Studies

Windward is supporting Esso Australia's efforts to decommission its offshore oil and gas facilities in Bass Strait's Gippsland Basin safely and effectively. The initial campaign of the project involves evaluating decommissioning alternatives for steel pile jacket (SPJ) oil and gas platforms. Windward—with its partners Mutch Associates, EcoTox, and Barr Engineering—analyzed and prepared a report on the environmental fate of metals from decommissioned SPJ sections that would be left in place under a preferred decommissioning alternative, as well as the potential effects of those metals on marine life and people. Dr. Toll directed and contributed to the Windward team's efforts. The next campaign will involve similar investigations of decommissioning alternatives for underwater pipelines.

Allocating Legacy Sediment Contamination Among Chemical Manufacturers and Users

Dr. Toll serves as a consulting expert on a project that involves answering questions about the responsibilities of multiple parties for legacy sediment contamination.



Employment History

Windward Environmental LLC, 2006-present.

- Managing Partner, 2020-present
- Partner, 2006-2019

Toll Environmental LLC, 2004-2006, Owner & consultant

Parametrix, Inc., 1996-2004, Senior consultant, Toxicology & Chemistry Division manager

Ebasco/Foster Wheeler Environmental, 1993-1996, Senior consultant

SUNY College of Environmental Science and Forestry, 1989-1993, Assistant Professor of Environmental & Resource Engineering

Education

PhD, Engineering and Public Policy, Carnegie Mellon University, 1989

BS, Chemical Engineering, University of Iowa, 1983

Environmental Dredging to Support Development of Deep-Water Berths

Dr. Toll serves as a consulting and testifying expert on a contaminated sediment site cleanup project that coincides with a project to develop deep-water berths that would accommodate post-Panamax vessels. The case involves answering questions about the relative contributions of multiple sources of legacy sediment contamination.

Newtown Creek Remedial Investigation/Feasibility Study

Newtown Creek is a waterway on the border between the boroughs of Queens and Brooklyn in New York City. Dr. Toll has worked as a technical advisor to a member of the performing parties group, advising the client on issues related to the bioaccumulation of pollutants in fish and shellfish, ecological risk assessment (ERA), remedial alternatives analysis, sampling design, and innovative investigative methods.

Columbia Slough Sediment Management

Dr. Toll conducted the baseline ERA for the Buffalo Slough, a portion of the Columbia Slough, for the Portland Bureau of Environmental Services (BES) in 1996, during the initial stages of an intergovernmental agreement between the City of Portland and ODEQ to clean up contaminated sediments in Columbia Slough. Twenty-five years later, Dr. Toll is advising BES on next steps to improve Columbia Slough, since source control and sediment remediation programs were nearing completion.

PCB Bioaccumulation Expert Testimony – San Diego Bay

Dr. Toll served as a testifying expert in litigation pertaining to the fate of polychlorinated biphenyls (PCBs) in San Diego Bay. PCBs, historically used in numerous industrial and consumer applications, are present in the water and sediment. When organisms interact with PCB-contaminated sediment and water, PCBs biologically accumulate (bioaccumulate) in their tissues. Since PCBs are persistent, hydrophobic organic chemicals, the concentrations in tissue tend to biomagnify, meaning that the concentrations are higher in predators than in their prey. Those predators include sport fish. Dr. Toll compiled existing, site-specific data and gathered new data; developed maps of sediment PCB congener concentrations across the embayment; and used site-specific food web bioaccumulation models to understand PCB uptake in biota from sediment, water, or other physical media through the food web into sport fish consumed by people.

Upper Columbia River Remedial Investigation/Feasibility Study

Dr. Toll is a senior advisor to Teck American Inc. (TAI) on the remedial investigation (RI)/ FS of the Upper Columbia River (UCR) in northeastern Washington State. TAI is investigating the UCR site with the support of a team of technical experts under oversight by EPA and the participation of the US Department of the Interior, Washington State Department of Ecology, Confederated Tribes of the Colville Reservation, and Spokane Tribe of Indians. The site is being investigated because of concerns about possible risks to people and the environment posed by historical metals mining and smelting operations. The principal constituents of concern at the site are cadmium, copper, lead, and zinc, four metals that are associated with historical smelter slag that was transported downstream and deposited in the UCR. The concentrations of these four metals in slag are relatively high, but the bioavailability of slag-associated metals is extremely low, creating unique challenges to understanding the fate and effects of slag-associated metals in the UCR. TAI has relied heavily on Windward's expertise in the aquatic toxicology and chemistry of metals and ERA methods and guidance to design and conduct investigations, interpret complex environmental datasets, and understand the nature and extent of risk to ecological assessment endpoints in the UCR.

Copper Site-Specific Water Quality Criteria Development on the Pajarito Plateau

Dr. Toll leads the team developing site-specific water quality criteria (SSWQC) for copper across the Pajarito Plateau region of northern New Mexico. New Mexico's Surface Water Quality Standards have not yet been updated to incorporate EPA's 2007 biotic ligand model (BLM)-based recommended ambient water quality criteria (AWQC) for copper, but the standards have been updated to permit the use of the BLM to develop copper SSWQC. Windward helped design a sampling program, implemented by LANL, that has collected a decade's worth of water quality data for all BLM parameters. Windward used those data in the BLM to calculate spatially and temporally explicit copper toxicity thresholds for locations across the Pajarito Plateau. Windward then developed a 3-parameter multiple linear regression (MLR) model, using pH, dissolved organic carbon, and hardness, that predicted acute and chronic copper toxicity thresholds with an adjusted r^2 of 0.98. The MLR equation enables LANL to propose BLM-based copper SSWQC that are consistent with EPA's 2007 recommended AWQC—and that can be written into the New Mexico Surface Water Quality Standards as a simple equation closely resembling the hardness-based equation currently in the standards—while significantly enhancing the accuracy of Pajarito Plateau copper criteria. The switch from the hardness-based equation to the BLM-based MLR equation reduced the number of false positive predictions in the Pajarito Plateau dataset from 175 to 5 out of 460 sampling events.

Windward also developed a technical demonstration report that has been provided to EPA Region 6 and the New Mexico Environment Department. The team is now in the early stages of the public involvement process that precedes filing a petition to the New Mexico Water Quality Control Commission proposing that adoption of the SSWQC. The copper SSWQC petition will be presented at a hearing before the commission in early 2023, at which time Dr. Toll will provide testimony in its support.

PFAS Mass Balance

Dr. Toll serves as a senior advisor on a project designed to better understand the sources and fate of PFAS in influent and effluent streams at a municipal wastewater treatment facility in the northwestern United States.

Passaic River Remedial Investigation/Feasibility Study

Dr. Toll advised the performing parties' technical team for the Lower Passaic River Superfund site in Newark, New Jersey, on bioaccumulation modeling, ERA, and remedial alternatives analysis issues. Previously he served as the bioaccumulation modeling lead. In this capacity, he led the team that developed mechanistic and statistical bioaccumulation models, coupling the models with a dynamic chemical fate and transport model, and evaluating remedial alternatives against National Contingency Plan criteria.

Sediment Toxicant Identification Evaluation

Dr. Toll led teams conducting toxicant identification evaluations for confidential sites in the northwestern United States where mining activities might be affecting sediment and water quality.

Mine Closure Studies

Dr. Toll serves as a senior technical advisor to the Windward team on mine closure studies in the western United States and Latin America. Windward's role in these studies is to develop projections of future ecological conditions, and evaluate the ecological risks posed by projected water quality under a range of closure scenarios.

Ecological Risks of Pharmaceuticals and Personal Care Products in Treated Wastewater Treatment Plant Effluent

Dr. Toll served as senior technical reviewer of an assessment conducted to ensure that groundwater recharge of tertiary-treated municipal wastewater treatment plant effluent would not expose aquatic life in nearby streams to potentially hazardous concentrations of pharmaceuticals and personal care products.

Assessment of Population-level Effects of Mine Tailings on Brown Trout in the Upper Arkansas River

Dr. Toll created an integrated life history and toxicological model for US Environmental Protection Agency (EPA) Region 8 to elucidate the potential effects of zinc toxicity on the Upper Arkansas River brown trout (*Salmo trutta* L.) population. During spring snowmelt, these trout are exposed to elevated zinc concentrations in the water. One sensitive portion of the brown trout life cycle is survival of the year's young. In the Upper Arkansas River, the timing of zinc exposures corresponds to the period when the young fish of the year are present in areas receiving runoff.

Because the life history model was parameterized with literature data, the variability in life stage survival and fecundity estimates was high; to offset this variability, extensive sensitivity analyses were undertaken to identify key uncertainties and understand model behavior. The analysis demonstrated that despite uncertainties about the life history of the brown trout population, risk managers could be confident that the population would be highly unlikely to decline upon implementation of a proposed remedial action plan expected to result in water zinc concentrations of twice the toxicity screening threshold. Dr. Toll's work helped EPA select a final remedy for the site.

Temperature Use Attainability Analysis for Upper Sandia Canyon, New Mexico

Dr. Toll directs the Windward team working with Triad National Security, LLC to develop a use attainability analysis (UAA) for the effluent-dominated perennial stream segment in Upper Sandia Canyon downstream of Los Alamos National Laboratory (LANL) NPDES Outfall 001. The discharge of about 300,000 gallons of treated water per day from Outfall 001 creates a continuously flowing (perennial) reach in Upper Sandia Canyon and supports a 3-acre wetland. Most of the effluent comes from a co-generating power and steam plant. The UAA will use water temperature data collected over several years from gauges distributed along the perennial reach, as well as water temperature modeled as a function of air temperature data taken at meteorological stations near the upper and lower ends of the perennial reach. The UAA will determine whether naturally occurring thermal conditions prevent attainment of the cold-water aquatic life use in the perennial stream segment. If the UAA does demonstrate that naturally occurring thermal conditions prevent attainment of the cold-water aquatic life use, then it will be used to support a petition to the New Mexico Water Quality Control Commission to modify the cold-water aquatic life designated use. Dr. Toll has been retained to provide expert testimony before the commission.

Technical Advisor on Updating Oregon Ecological Risk Assessment Rules, Regulations, and Guidance

Dr. Toll served as a technical advisor to the ODEQ Cleanup and Emergency Response Program on matters pertaining to updating Oregon's ERA rules, regulations, and guidance. His role was to help ODEQ improve clarity and consistency, keep pace with the state of the science, and provide clear criteria for decision making at key points throughout the ERA process.

Beaverton Creek Ecological Risk Assessment

Dr. Toll directed an assessment of potential ecological risks to soil invertebrates and aquatic life from exposure to metals in sediments and bank soils of Beaverton Creek, near an industrial facility. To help ensure acceptance of the results, Dr. Toll engaged ODEQ in this site-specific investigation of metals bioavailability and toxicity. Based on the assessment, ODEQ decided no further action was necessary, even though a remedial action plan for the site—dredging and capping of sediments and capping of bank soils—had already been proposed. The no-action decision achieved through these studies saved the client approximately \$2.5 million.

Factors Offsetting Impacts of Warmer Water in Natal Streams on Outmigrating Salmon

Dr. Toll developed spatial models of the direct and indirect effects of water temperature changes on outmigrating juvenile salmon populations in southwestern Washington. The analysis suggested that the effects of water temperature on growth rate would alter the timing of outmigration in a manner that might mitigate predation risk.

Ecological Risk Assessment for Endangered Juvenile Salmon and Resident Benthic Macroinvertebrates Eugene Water and Electric Board Former Manufactured Gas Plant Site Remediation

Dr. Toll directed an ERA for endangered juvenile salmon and resident benthic macroinvertebrates in the Willamette River adjacent to the Eugene Water and Electric Board former manufactured gas plant. Sediment, surface water, and interstitial water were sampled to better understand the nature and extent of contamination. Although various chemicals were measured in sediment and porewater at concentrations one to two orders of magnitude greater than screening levels, the ERA helped regulators decide that no in-water action was necessary. The habitat assessment found a diverse, abundant, and mature benthic invertebrate community primarily composed of epibenthic fauna on cobble substrate. The site was characterized as having good-quality in-stream and supporting riparian habitat for rearing fish, including juvenile Chinook salmon. Disruption of in-stream and riparian habitat would have resulted in lost ecosystem services, whereas exposure to porewater and sediment contaminants did not. Both the client and Oregon Department of Environmental Quality (ODEQ) agreed with Windward's recommendation to preserve habitat by stabilizing the streambank.

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Lower Snake River Juvenile Salmon Migration Feasibility Study

Dr. Toll designed and coordinated risk and uncertainty characterization work as part of a feasibility study (FS) for the Lower Snake River. The FS evaluated the socioeconomic impacts of a set of alternatives for enhancing salmon migration, including the removal of the four Lower Snake River dams.

Population-Level Ecological Risk Assessment for Black-necked Stilts on the Great Salt Lake

Dr. Toll conducted an ERA for shorebirds feeding in wetlands on the south shore of the Great Salt Lake. A screening-level assessment identified selenium as a constituent of potential concern for shorebirds, because its concentrations in shorebird food items exceeded thresholds shown to induce dietary effects in laboratory studies. Selenium concentrations in eggs, which integrate all factors that influence shorebird exposure, were used in the detailed risk assessment to decrease uncertainty in the exposure estimates. Probabilistic techniques were used that allowed exposure estimates to quantify site variability and data uncertainty. Lastly, a probabilistic teratogenic effects distribution was used to estimate the percentage of birds/eggs affected. This approach allowed for a strong evaluation of the assessment endpoint (protection of shorebird productivity), which could not have been adequately evaluated using conventional ERA methods. The analysis allowed the client to demonstrate that controlling a single point source was sufficient to protect the birds from selenium risks.

Los Alamos National Laboratory Individual Stormwater Permit Renewal

Dr. Toll directed Windward's team supporting LANL's Legacy Cleanup Contractor (for the US Department of Energy's Los Alamos Environmental Management Field Office) in successfully updating and renewing LANL's National Pollutant Discharge Elimination System (NPDES) Stormwater Individual Permit (NPDES Draft Permit No. NM0030759). The permit is part of LANL's program responsible for stormwater discharges associated with legacy industrial activities from more than 400 solid waste management units and areas of concern.

Cost-risk Analysis of Tributyltin Self-polishing Copolymer Paints and Tin-free Alternatives on Deep-sea Vessels

Dr. Toll directed a detailed investigation of the economic costs and environmental risks of using alternative antifouling paints on deep-sea shipping fleets. The analysis found that for transoceanic shipping, the environmental benefits of increased fuel economy outweighed any possible marginal ecological risks posed by tributyltin self-polishing copolymer paints in open-water exposure.

Portland Harbor Remedial Investigation/Feasibility Study

Dr. Toll directed Windward's work for the Lower Willamette Group (LWG) in support of the Portland Harbor Superfund site RI/FS. Windward's baseline ERA was the only major Portland Harbor RI/FS deliverable approved by EPA, and it was successfully completed without compromising the integrity of LWG's work. Windward also built the site-specific chemical bioaccumulation model, which accurately predicted the effects of natural recovery on smallmouth bass tissue concentrations over three five-year sampling cycles (2002, 2007, and 2012). Other notable accomplishments included a spatially explicit, site-specific population model for Portland Harbor mink that quantified the level of conservatism in EPA's ecological preliminary remediation goal for PCBs, after accounting for physical habitat degradation in the urban industrial setting; a hardness-based water quality criteria (WQC) model for manganese that was used to rule out risk from manganese in groundwater discharges; an unprecedented toxicity testing program that demonstrated the insensitivity of lamprey ammocoetes to most toxicants; and a comprehensive benthic risk assessment approach that yielded much more realistic risk estimates than conventional assessment tools.

Duwamish River/Elliott Bay CSO Water Quality Assessment

Dr. Toll served as project manager for the consulting team on the first Duwamish River and Elliott Bay Combined Sewer Overflow (CSO) Water Quality Assessment. The study investigated the potential impacts of CSOs on public health and environmental quality. The results of the technical study were presented to a large stakeholder group that was actively involved through the life of the project. The stakeholder group then submitted recommendations for CSO control to the King County Executive; the recommendations were used to develop the long-range plan for King County's wastewater treatment system. The project was selected as one of three exemplary case studies for an EPA Science Advisory Board panel examining public involvement in risk assessments.

Marine Outfall Siting Study

Dr. Toll served as the lead consultant for the Brightwater Wastewater Treatment Plant marine outfall siting study (MOSS). The five-year alternatives analysis program involved scientific investigations of marine ecology, submarine geology, environmental chemistry and microbiology, and physical oceanography; periodic reviews of the scientific literature pertaining to endocrine disruptors in municipal wastewater effluents and sea surface microlayer phenomena; ecological and human health impact assessments for programmatic and project environmental impact statements; and an ERA for potentially threatened or endangered species in Puget Sound. The MOSS resulted in the successful siting of the Brightwater marine outfall.

Environmental Impact Statement Risk Evaluations for Receiving Waters Across Greater Sydney, Australia

Dr. Toll directed detailed ecological and human health risk assessments for prioritizing and planning improvements in sewer overflow and stormwater discharges to 68 metropolitan area catchments. The project included fate and transport modeling to estimate acute and chronic exposures to sewerage and stormwater in all the major river and estuarine systems in greater Sydney.

Site-specific Selenium Water Quality Objectives for the Athabasca Basin

Dr. Toll used data collected from 1990 to 2004 to assess selenium bioaccumulation in fish of the Athabasca Basin for the Canadian Nuclear Safety Commission at sites thought to be affected by uranium mining, milling, and waste management operations. A dataset of 358 co-located water and fish tissue selenium records was screened, pre-processed, and statistically analyzed to develop a statistical regression model for setting site-specific water quality objectives. The data were analyzed for species- and size-specific effects and for representativeness. Dr. Toll made recommendations for future sampling, and real-world complexities affecting the predictive power of the model were identified and discussed. The study demonstrated the importance and sensitivity of marshy rearing habitat. In conjunction with site-specific water and tissue selenium concentration data, the model yielded an automated lookup tool to establish site-specific water quality objectives. The lookup tool automatically accounts for future updates to the database, model, and maximum allowable tissue concentration. Assuming that certain standards are met, the input of additional data allows uncertainty to be reduced. The model thus provides an incentive to collect more data because responsible parties can obtain regulatory relief by reducing uncertainty.

Nooksack Watershed Management Plan

Dr. Toll helped develop a watershed management plan under the 1998 Washington State Watershed Management Act, which allows citizens and local governments to develop plans specifically pertaining to local water-related circumstances and needs. The Nooksack Watershed management plan included a description of management options for water quality, quantity, in-stream flow, and habitat; criteria for evaluating options; recommendations; and an implementation plan. Dr. Toll worked with intergovernmental oversight and planning groups, building on a broad base of local knowledge and expertise. Examples of the types of management options considered included storage (ground and surface water), conservation, reclamation/ reuse, total maximum daily load implementation strategies, water transfers, land use changes, flood and drainage management practices, and in-stream flow management.

Critical Review of Statistical Methods Used by the European Union for Zinc Risk Assessment

Dr. Toll performed a critical review of statistical issues as part of a zinc risk assessment for the European Union. Specific issues addressed in the review included the use of statistical bootstrapping techniques; the choice of an appropriate statistical model, including consideration of threshold models, to estimate the chronic effect threshold for aquatic organisms; the assignment of degrees of freedom when splitting a toxicity dataset into subpopulations; and the choice of an appropriate statistical model to estimate the chronic effect threshold for terrestrial ecosystems, particularly the possibility of using a non-parametric model.

Predicted No-effects Concentration Derivation for Data-rich Substances in Aquatic Ecosystems

Dr. Toll developed statistical extrapolation techniques for deriving predicted no-effects concentrations (PNECs) for aquatic ecosystems to investigate several issues of particular interest to European Union nations. These investigations included comparing phylogenetic diversity in ecosystems and laboratory datasets; validating laboratory data in the field; using acute toxicity data to derive chronic exposure PNECs; determining the sensitivities of PNECs to the underlying dataset; accounting for background concentrations of naturally occurring substances, including essential elements; and offering recommendations for the choice of a PNEC statistic. Dr. Toll presented a detailed report on these issues at the European Union-European Central Bank Special Technical Meeting: PNEC Derivation for Data-Rich Substances.

Procedure for Setting Site-specific Water Selenium Concentration Benchmarks

When EPA issued the 2004 draft aquatic life criteria for selenium, implementation procedures were not included. Instead, the agency requested submittal of scientific information, data, and views on available data by which to derive localized bioaccumulation factor values. The bioaccumulation factors would be used where needed to convert tissue concentrations to water concentrations for pollution control decisions. Dr. Toll submitted a procedure to be used for that purpose.

Tissue Residue-based Site-specific Water Quality Criteria Method Development and Application to Selenium

Dr. Toll developed a method for setting site-specific water quality standards, for substances regulated based on concentrations in biological tissue, and applied the method using selenium as an example. The method requires mathematical models to describe selenium bioaccumulation in aquatic-dependent bird eggs and whole fish. These models can be used to calculate site-specific standards for a wide range of water-tissue combinations that might be encountered in the environment and have been shown to be protective in the face of uncertainty. By explicitly providing for the use of additional data to reduce the margin of safety in site-specific criteria, the methodology offers an advantage over alternative approaches.

Colorado Selenium Study

Dr. Toll guided development of a statewide database of selenium in aquatic systems in Colorado. Using aquatic selenium data solicited from prospective holders of Colorado-specific data, he developed the database for use in investigating site-specific selenium issues. Potential applications included using the database to understand the number of locations at which aquatic selenium exceeded the Colorado standard but not tissue-based toxicity values for birds and fish. For the database to have maximum utility, especially in terms of its potential use in developing SSWQC, it was designed so that temporally and spatially co-located data could be identified and easily queried. The compiled data could be evaluated to determine the similarities, differences, and probable sources at collection sites, and to address the uncertainty of the existing water quality standard. Such an evaluation could then indicate a need for SSWQC.

Development of Risk-based Decision-making Methodology for Dredged Material Management

Dr. Toll developed an analytical framework for the US Maritime Administration for incorporating risks, costs, and benefits and their associated uncertainties into the decision-making process. The purpose of the project was to improve communication among regulatory agencies, port authorities, environmental groups, and the public regarding the management of contaminated dredged materials.

Statistical Methodology for Reducing Uncertainty about PCB Remediation Levels

Dr. Toll developed methods to reduce uncertainty about the spatial extent of cleanup areas required to meet target PCB levels in fish and shellfish tissues. He demonstrated the use of Bayesian Monte Carlo analysis and expected value of information to support PCB remediation decisions for New Bedford Harbor, Massachusetts.

Chemairspray Ecological Risk Assessment

Dr. Toll designed and implemented a probabilistic baseline ERA for raptors consuming wildlife in the vicinity of a crop dusting airstrip in Palm Beach County, Florida. The ERA included methods for investigating the relative contributions of off-site background contamination to risk, and it analyzed the marginal costs of reducing these concentrations.

Sediment Remediation Decision Analysis

Dr. Toll developed a scoring system to assess the relative environmental impacts of for six remedial alternatives and five operable units at a marine sediment site; ranked the alternatives on environmental impact and cost; and analyzed sensitivities of the remediation recommendations to environmental, engineering, and management uncertainties.

Illustrative Peer and Technical Review Experience

Using Probabilistic Methods to Enhance the Role of Risk Analysis in Decision-Making

Dr. Toll served on the peer review panel for EPA's 2010 draft report *Using Probabilistic Methods to Enhance the Role of Risk Analysis in Decision-Making with Case Study Examples*. He offered written and verbal comments on draft guidance, participated in the peer review panel's public meetings, and provided content for the peer review report.

Committee on Sources of Lead Contamination at or near Superfund Sites

The US Congress asked EPA to commission a study by the National Academies of Science, Engineering, and Medicine to determine whether there were techniques or methods that could help identify sources of lead at Superfund sites associated with mining activities. Dr. Toll served on the Committee on Sources of Lead Contamination at or near Superfund Sites convened by the National Academies of Sciences, Engineering, and Medicine.

Risk Assessment Guidance for Superfund Peer Review

Dr. Toll served on the peer review panel for EPA's *Risk Assessment Guidance for Superfund (RAGS) 3A: Process for Conducting Probabilistic Risk Assessment*. He offered written and verbal comments on draft guidance, participated in public meetings of the peer review panel, and provided content for the peer review report.

Case Study Analysis of an ECOFRAM Implementation Plan for Probabilistic Ecological Assessments

Dr. Toll conducted case study reviews of a new probabilistic risk assessment methodology being developed by the Environmental Fate and Effects Division of EPA's Office of Pesticide Programs. The methodology was the Ecological Committee on FIFRA (Federal Insecticide, Fungicide and Rodenticide Act) Risk Assessment Methods Implementation Plan for Probabilistic Ecological Assessments: Terrestrial Systems.

Hudson River PCBs Reassessment and Ecological Risk Assessment Peer Review

Dr. Toll reviewed the ERA report and supporting documentation for a Hudson River PCB reassessment. As part of this effort, he provided written and verbal comments on EPA contractors' presentations and led and actively contributed to on-site discussions of the ERA report and supporting documentation.

Contaminated Sediments in Ports and Waterways: Cleanup Strategies and Technologies

Dr. Toll advised the National Research Council Marine Board Committee on Contaminated Marine Sediments on methods for analyzing information on risks, costs, and benefits of contaminated sediment management. As part of the project, he conducted a decision modeling demonstration project and was the lead author of a chapter on the use of decision analysis in contaminated sediment management. Dr. Toll also served on the task group assigned to integrate the decision analysis, economics, and risk communication sections of the committee's report.

Reducing Uncertainty in Mass Balance Models of Toxics in the Great Lakes: Lake Ontario Case Study

Dr. Toll was a member of the team responsible for reviewing current mass balance modeling methods for the Great Lakes and recommending analytical methods for analyzing and reducing model uncertainties.

Select Presentations, Conferences, and Seminars

- Invited Panelist, Sediment Management Work Group/U.S. Army Corps of Engineers Engineer Research & Development Center-Sponsored Contaminated Sediment Beneficial Use Workshop. March 2024.
- Invited Presenter, Sediment Management Work Group Members' Closed Meeting on Critical Issue in Risk Assessment. May 2012.
- Chairman, Special Symposia on Solution-Focused Risk Assessment. Society of Environmental Toxicology and Chemistry 32nd, 33rd and 34th Annual North American Meetings. November 2011, 2012 and 2013.
- Invited presenter, Sediment Management Work Group Members' Closed Meeting on Critical Issue in Risk Assessment. May 2012.
- Invited presenter, Society of Environmental Toxicology and Chemistry 32nd Annual North American Meeting. November 2011. "Evaluating Human Health & Ecological Risk Assessments & Remediation Decisions: Is the Cure Worse than the Disease?"
- Invited delegate and plenary session speaker, Pellston Workshop on Methods of Uncertainty Analysis for Pesticide Risks, sponsored by the Society of Environmental Toxicology and Chemistry (SETAC). February 2002.
- Invited delegate, European Workshop on Probabilistic Risk Assessment (EUPRA), sponsored by the European Commission. The workshop considered the use of probabilistic methods to assess the ecological risks of pesticides. June 2001.
- Instructor. Practical Application of Bayesian Methods in Ecological Risk Assessment. Developed course on fundamentals of Bayesian statistical methods and practical examples of using Bayesian methods for assessing ecological risks for SETAC and Society for Risk Analysis.

Publications

- Church BG, Toll JE, Tobiason S, White A. 2023. Characterization of Ambient Polychlorinated Biphenyl Background Concentrations in Surface Waters of the Pajarito Plateau, New Mexico. *Integr Environ Assess Manag* 19(1):doi 10.1002/ieam.4728.
- Santore RC, Toll JE, DeForest DK, Croteau K, Baldwin A, Bergquist B, McPeck K, Tobiason K, Judd NL. 2022. Refining our understanding of metal bioavailability in sediments using information from porewater: Application of a multimetal biotic ligand model as an extension of the equilibrium partitioning sediment benchmarks. *Integr Environ Assess Manag* 18(5):1335-1347.
- Judd NL, Toll JE, McPeck K, Baldwin A, Bergquist B, Tobiason K, DeForest DK, Santore RC. 2022. Collection and use of porewater data from sediment bioassay studies for understanding exposure to bioavailable metals. *Integr Environ Assess Manag* 18(5):1321-1334.
- DeForest DK, Toll JE, Judd NL, Shaw A, McPeck K, Tobiason K, Santore RC. 2022. Sediment toxicity data and excess simultaneously extracted metals from field-collected samples: Comparison to United States Environmental Protection Agency benchmarks. *Integr Environ Assess Manag* 18(1):174-186.
- Toll JE, DeForest D, Santore R, Judd N. 2020. Sediment benchmarks based on acid-volatile sulfide and simultaneously extracted metals—when is organic carbon normalization meaningful? *Integr Environ Assess Manag* 16(1):151-152.
- Toll JE. 2019. Expertise, integrity, public trust and professionalism in environmental risk assessment. *Integr Environ Assess Manag* 15(5):672-673.
- Toll JE. 2018. Professionalism in Environmental Assessment and Management. *Integr Environ Assess Manag* 14(3):314-315.
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- Replinger S, Katka S, Toll JE, Church B, Saban L. 2017. Recommendations for the derivation and use of biota-sediment bioaccumulation models for carcinogenic PAHs. *Integr Environ Assess Manag* 13(6):1060-1071.
- DeForest DK, Croteau K, Ryan A, Santore R, Toll J. 2017. Retrospective on USEPA's guidelines for deriving ambient water quality criteria. *Integr Environ Assess Manage* 13(6):1125-1126.
- Judd NL, Tear L, Toll JE. 2014. From sediment to tissue and tissue to sediment: an evaluation of statistical bioaccumulation models. *Integr Environ Assess Manage* 10(1):102-113.
- Luxon M, Toll JE, Hanson C. 2014. Assessing effects of PCB exposure on American mink (*Mustela vison*) abundance in Portland Harbor. *Integr Environ Assess Manage* 10(1):60-68.
- DeForest DK, Reash RJ, Toll JE. 2013. Comment on "Wildlife and the coal waste policy debate: proposed rules for coal waste disposal ignore lessons from 45 years of wildlife poisoning." *Environ Sci Technol* 47(19):11363- 11364.
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