Stan Pauwels, Ph.D.
Senior Consultant

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Education and Credentials

Ph.D., Zoology (Aquatic Toxicology), University of Maine, Orono, Maine, 1990

M.S., Zoology (Fisheries Science), University of Maine, Orono, Maine, 1985

B.A., Biology, State University of New York, Buffalo, New York, 1983

Continuing Education and Training

Hazardous Waste Operations and Emergency Response 40-Hour Certification (1994; Annual refreshers up to current)

Electrofishing Certification through USFWS (2005)

Professional Profile

Dr. Stan Pauwels has 30 years of experience in the environmental field, with broad knowledge in the areas of ecological risk assessment (ERA), ecotoxicology, data analysis and interpretation, field support, and client support. He managed numerous RCRA and Superfund ERA projects between 2002 and 2018, where he gained extensive experience working with and interpreting state, regional, and federal ERA regulations and guidance. He has used this knowledge to write several dozen ERA reports and review more than 350 screening-level ERAs and baseline ERAs at Superfund and RCRA sites nationwide. These sites have included landfills, wood treatment facilities, tanneries, chemical facilities, refineries, nuclear power facilities, multiple mining sites, and numerous military bases. Dr. Pauwels has served as lead biologist and/or project manager at more than 80 RCRA and Superfund sites to assess and quantify the effects of heavy metals, PAHs, petroleum hydrocarbons, pesticides, PCBs, dioxins and furans, and chlorinated solvents on aquatic and terrestrial ecological receptors, communicating his findings to clients nationwide, both in writing and orally.

Dr. Pauwels' previous consulting experience includes providing ecological support for economic benefits analyses and regulatory impact analyses on environmental rules proposed by EPA for cooling water intake structures, animal feedlots, acid rain, herbicide application, eutrophication, mercury deposition, and petroleum-related activities. He started his career working at a multinational petroleum company to address environmental issues related to petroleum exploration and refining, chemical manufacturing, and oil spills, both in the U.S. and abroad.

Relevant Experience

Ecological Risk Assessments

Ottati & Gosh Superfund Site, Kingston, New Hampshire— Performed an ERA using analytical data for PCB congeners (assessed both as total PCBs and dioxin-like PCBs) in yellow perch. The fish tissue analytical data were used to evaluate if the perch, or the piscivorous wildlife feeding on them, could be impacted by PCBs. For perch, the dioxin-like PCBs were evaluated in terms of a toxicity equivalent (TEQ) for comparison to a fish critical body residue (CBR) for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD).

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Hazard quotients for dioxin-like PCBs in bird eggs were calculated by dividing the estimated avian TEQ–egg by a bird egg CBR for TCDD. Risk from total PCBs and dioxin-like PCBs was found to be negligible for fish and nonexistent for piscivores in the site-impacted pond. EPA used this information to support its remedial decision-making.

Raymark Industries Superfund Site, Stratford, Connecticut—Developed sediment preliminary remediation goals (PRGs) for use in tidal wetlands impacted by site-related contamination. Used an extensive site-specific sediment toxicity database to select sediment samples that lacked toxicity to two amphipod species and showed low levels of site-derived contaminants, and to use those samples to identify contaminant concentration ranges for copper, lead, total PCBs, total PAHs, and dioxin TEQs unlikely to cause toxicity in benthic invertebrates. Used reverse food web modeling to determine if the proposed sediment PRGs protective of benthic invertebrates would also protect semiaquatic birds and mammals foraging in the impacted wetlands. Presented the PRG development method to EPA and NOAA. The sediment PRGs were accepted by both agencies for use at the site.

Three Mining Sites in Historic Vermont Copper Belt, Eastern Vermont—Provided EPA with multiyear support at three copper mine Superfund sites. Provided ERA support to the multiagency Vermont Copper Mines work group (i.e., EPA, U.S. Fish and Wildlife Service [USFWS], U.S. Army Corps of Engineers, and U.S. Geological Survey) charged with coordinating, planning, executing, and interpreting ERAs at the three mining sites. Prepared data gap analysis reports to summarize existing analytical data sets and identify future data needs to complete the ERAs. Presented a summary to the work group on the toxicity test results, site-specific conceptual site models, and proposed assessment and measurement endpoints for evaluation in the ERAs. Identified the studies required to provide the data needed for the future ERAs, and wrote two ERAs for review by the work group. Reviewed and commented on two ERAs prepared by consultants for two of the mines and prepared risk summaries to help EPA focus on the major risk drivers, critical exposure routes, and impacted receptor groups. This technical support helped EPA streamline its internal risk management decision-making process.

Former Air Force Plant No. 51 State Superfund Site (on behalf of NYSDEC), Greece, New York—Developed a Phase I fish and wildlife impact analysis for offsite wetlands. Purpose was to identify sensitive habitats, listed state and federal species, site-specific and regional contaminant sources, known and expected ecological receptors, potential exposure pathways, the value of the habitats to their associated fauna, the value of the resources to humans, and a list of all the state and federal fish, wildlife, and habitat-specific regulatory criteria applicable to this site (i.e., ARARs). NYSDEC used this information to determine the need to perform a baseline ERA.

Ecological Evaluation of Contaminated Sediments in the Hackensack River, Rebuild by Design – Meadowlands (RBDM) (on behalf of NJDEP), Little Ferry, New Jersey—Tabulated the analytical data from nine sediment core samples collected from the Hackensack River in support of RBDM plans to create a new intertidal wetland on the river. Existing substrate was dredged from the river down to 4 ft to remove historically contaminated sediment, followed by an assessment of any residual contamination present in the post-dredged bottom located 4–4.5 ft below the current

sediment surface. The pre-design investigation ecological evaluation was used to determine if residual contamination (specifically mercury, PCBs, PAHs, and organotins) in the new post-dredge sediment bottom at 4–4.5 ft deep would be able to support benthic macroinvertebrates. Identified no-effect and low-effect sediment benchmarks for the target contaminants protective of benthic macroinvertebrates in an estuarine setting, derived sample- and contaminant-specific exposure concentrations for the future "new" bottom, and interpreted the concentration patterns in terms of potential future impacts. Determined that the residual levels of mercury, PCBs, and tributyltin at depth were potentially hazardous to benthic macroinvertebrates and would have to be addressed during future dredging.

Impact Assessment of Polychlorinated Naphthalenes (PCNs) in Aquatic and Terrestrial Environments (on behalf of NYSDEC), Union Springs, New York—Summarized the soil, sediment, surface water, and groundwater PCN analytical data collected offsite from a state RCRA facility; determined the general physical and chemical properties of the nine PCN classes; and identified or developed PCN toxicity benchmarks for surface water, sediment, soil, groundwater, and homegrown vegetables protective of human health and aquatic receptor groups for use in the risk evaluation. Concluded that the frequency of detection and concentrations of PCNs measured in the offsite samples were not a concern to human health or ecological community-level receptors.

South River Science Team, Waynesboro, Virginia—Selected by the Virginia Department of Environmental Quality (VDEQ) to provide ERA support on its behalf on the South River Science Team. This team consisted of representatives from VDEQ, EPA, USFWS, the responsible party, academia, and consulting firms tasked with coordinating a large-scale ERA for the mercury-contaminated South River. Participated in multiple meetings to discuss and reach consensus on the structure of the ERA, the use of historical data sets, the receptors of concern, the exposure pathways, the CBRs, the wildlife toxicity reference values (TRVs) and exposure factors, and the various lines of evidence proposed for evaluation. Reviewed and commented on the ERA and helped VDEQ understand and interpret the risk results. Also tasked by VDEQ with reviewing and commenting on multiple other reports, including a short-term and long-term monitoring program, monitoring data reports, ecotoxicity testing reports, public bulletins, and several remedial pilot study reports.

Bonita Peak Mining District Superfund Site, Silverton, Colorado—Invited by EPA to participate in the Biological Technical Assistance Group for the Bonita Peak Mining District Superfund site in Colorado. Wrote the aquatic ERA for the lower reach of the Animas River, developed an ERA work plan for the upper reach, and wrote a terrestrial ERA for this large site. In addition, led a team that statistically analyzed and graphed the metal levels measured in surface water samples collected from the Animas River before, during, and after the August 5, 2015, Gold King Mine spill, which released 3 million gallons of contaminated mine sludge. EPA used the results of these analyses to determine the need to collect post-spill samples in support of an updated Animas River ERA.

Crab Orchard National Wildlife Refuge, Marion, Illinois—Invited by EPA to participate in a technical work group convened to help organize, review, and interpret 35 separate aquatic and terrestrial ERAs prepared for the refuge. The work group members included EPA, the Illinois

Environmental Protection Agency, the U.S. Department of Defense, the responsible party, and consultants. The group met multiple times to discuss the structure of the ERAs, agree on the various input data, review risk calculations, discuss the pros and cons of proposed PRGs, review site-specific soil toxicity test results, and consider remedial options. Assisted EPA in the interpretation of ERA results and in developing a strategy to move the process towards completion.

Savannah River Site Nuclear Reservation, Aiken, South Carolina—Invited by EPA to provide support on a technical work group convened to help organize, review, and interpret an ERA for the cooling-water system of two decommissioned nuclear breeder reactors. The system consisted of several large ponds, a 2,000+ acre reservoir, and more than 12 miles of interconnected canals. The work group members consisted of EPA, the U.S. Department of Energy, and the South Carolina Department of Health and Environmental Control. Input on this project included participating in a site visit, attending multiple technical meetings in South Carolina, proposing aquatic exposure units within the cooling water system, reviewing historical analytical data for use in the exposure calculations, reviewing all the exposure factors proposed for wildlife food-web modeling, commenting of the conceptual site model, reviewing and commenting on the ERA report, and helping EPA interpret the risk conclusions to support its risk management decisions.

Sunrise #3 Mill Site, Joshua Tree National Park, California—Conducted an ERA on behalf of the National Park Service (NPS) for terrestrial habitats affected by historical mill tailings. Earthworms were exposed to tailings samples in the laboratory to assess soil toxicity and provide metal worm tissue data to calculate realistic wildlife exposures. Small rodents were trapped on and around the tailings piles for whole-animal residue analysis to provide metal tissue data and estimate exposures to a carnivorous small bird and a carnivorous small mammal via wildlife food-web modeling. Derived site-specific soil PRGs protective of the local receptor groups and compared these values to background levels. The NPS evaluated this approach to determine its application to 13 other mining sites located throughout the park.

Sudbury River, Nyanza Chemical Superfund Site, Ashland, Massachusetts—Supported EPA over a 15-year period to assess the ecological impacts of mercury in the Sudbury River in eastern Massachusetts. This support included preparing sampling and analysis plans, collecting fish samples, processing fish tissue for mercury analyses, developing mercury CBRs and TRVs for various tissues and receptors for use in the baseline ERA, reviewing and commenting on the baseline ERA prepared by a consultant, preparing risk summary tables for use in EPA risk management discussions, performing graphical and statistical analyses of historical fish mercury data collected from the Sudbury River for use in trend analyses, developing a long-term fish monitoring program for the Sudbury River, plotting stable isotope data collected from the Great Meadows National Wildlife Refuge on the Sudbury River, and reviewing the ecological impacts and benefits of sediment remediation via sand capping.

Diesel Fuel Spill, Willard Bay State Park, Utah—Wrote an ERA for the Utah Department of Environmental Quality (UDEQ) to assess post-remedial risks from residual diesel fuel in wetland sediment following a pipeline spill at Willard Bay State Park located adjacent to the Great Salt Lake in Ogden, Utah. The responsible party collected sediment porewater samples and used solid phase

microextraction (SPME) to remove the PAHs from each sample. The SPME fibers were then analyzed for 34 dissolved PAHs consisting of 18 parent PAHs and 16 groups of alkylated daughter PAHs. Converted the PAH analytical results from each pore water sample into toxic units (TU = measured concentration/final chronic value) and then summed the PAH-specific TUs across the 34 PAHs to calculate a sample-specific ΣTU PAH$_{34}$. Based on agreement between UDEQ and the responsible party, interpreted a ΣTU PAH$_{34}$ of 1.0 or less as falling below a "no-effect" toxicity threshold and a ΣTU PAH$_{34}$ of 5.0 or above as exceeding a "low-effect" threshold. This approach identified potential risk in several of the remediated sediment samples, which resulted in additional investigations to address these "hot spots."

Moran Tunnel Portal, Butte County, Idaho—Prepared a streamlined ecological risk evaluation on behalf of the Bureau of Land Management (BLM) to determine to what extent exposure to mining-derived contaminants from the Moran Tunnel Portal affected aquatic invertebrates and fish in Champagne Creek. This evaluation helped risk managers determine if conditions warranted cleanup action or if more site-specific data were needed to support defensible and cost-effective remedial decisions. Evaluated the available analytical data to determine what matrices were available for evaluation, how many data points existed for each matrix, where the samples were collected in relation to the adit and within Champagne Creek, and what analytical detection limits were available for nondetected values. This evaluation was used to develop a conceptual site model to show primary and secondary contaminant sources, major exposure pathways, and key aquatic community-level receptor groups of concern. Summarized the findings in a report and also derived PRGs for surface water and sediment to support recommendations to BLM for collecting more samples to increase the accuracy and decrease the uncertainties in a follow-up ERA.

Identification of Vernal Pools, Bridgeport, Connecticut—In response to the site owner proposing sampling of 11 wetland-type depressions for only soil contamination as part of a remedial investigation, performed a site visit and demonstrated that these habitats had vernal pool attributes. Advised EPA to request that the site owner perform a spring survey of these potential vernal pool habitats. The ensuing report showed that 8 of the 11 depressions were certifiable vernal pools supporting obligate species (e.g., fairy shrimp, fingernail clams, wood frogs). These habitats received full regulatory protection in the ensuing ERA.

Ecotoxicology

State Certification for a Private Laboratory to Test the Ecotoxicity of Effluents for Regulatory Compliance, New Jersey—Coordinated the ecotoxicity testing program; conveyed agency requirements to the laboratory; provided technical oversight during the testing; summarized data and reported results to the state. Client obtained certification to test refinery effluents toxicity for NPDES purposes.

Literature Review on the Effects of Exposure to Crude Oils on Salmon Species, New Jersey—Organized and coordinated a literature search, summarized toxicity data from 150+ studies, entered information into a database management system, and summarized the findings for inclusion in a technical report. This information was used for legal support in *Exxon Valdez* spill litigation.

Development of Trout-Specific Hardness-Dependent Toxicity Thresholds, EPA Region 8, Colorado—Evaluated acute and chronic laboratory toxicity studies to provide evidence of a stressor-response relationship between water hardness and aluminum, cadmium, copper, and zinc. Performed a literature search focused on four trout species (i.e., brook trout, brown trout, cutthroat trout, and rainbow trout) to establish protective threshold metal concentrations in surface water to inform risk management decisions at mining sites. Data sources included surface water criteria documents, EPA's Ecotox database, and peer-reviewed journal articles. Pertinent information from each study was captured in a database and included organism parameters (length, weight, life stage), water quality characteristics (pH, hardness, alkalinity, temperature), design specifications (exposure duration, exposure type, method of chemical analysis), and toxicity endpoints. EPA used this information to interpret the surface water analytical data collected from a large mining site.

Review of Published Literature on Bioavailability of Soil Contaminants to Terrestrial Receptors, New Jersey—Organized literature search, obtained 150+ technical papers and coordinated reading assignments with team members, summarized information into a database, developed technical summaries, and coordinated report writing. The report was published as a book chapter.

Derivation of Surface Water Benchmarks Massachusetts—Performed a literature review on four chlorinated solvents to put together comprehensive acute and chronic aquatic toxicity data sets. The data were used to calculate surface water benchmarks based on EPA-approved calculation methods. The benchmarks served to derive groundwater cleanup goals protective of aquatic receptors at a Superfund site.

Data Quality in a Soil Ecotoxicity Testing Program, Montreal, Canada—In response to a contract laboratory being unable to generate quality soil ecotoxicity data on bioremediated soils, reviewed all protocols and data packages, identified protocol deviations, and designed a program to flag sources of error. Client and contract laboratory agreed with findings and implemented the suggested testing program. High quality data were generated and submitted to the agency on time.

Assessment of Soil Contaminant Bioavailability, Montreal, Canada—Designed a study to assess toxicity of weathered petroleum in soils. Organized sampling activities, coordinated analytical and biological testing, selected test species and protocols, performed data analysis, and wrote a paper. Study results showed that weathering lowered bioavailability and toxicity.

Contaminated Refinery Soils Impact Study, Montreal, Canada—Supported client to assess ecotoxicity of bioremediated refinery soils. Participated in 15+ meetings with regulators to design the study, developed key company positions, developed approach to assess contaminant bioconcentration, and designed a tiered testing approach that saved the client more than $250,000. Study showed that bioremediated soils were least toxic. Received written commendation from regulators for high quality of support.

Technical Input to Support a Soil Ecotoxicity Testing Program, France—Reviewed test protocols after a contract laboratory measured unusually high toxicity in earthworms for a member of a European industry consortium charged with finding acceptable toxicity thresholds for gasoline in

soil. Reviewed test protocols and data, identified reasons for high toxicity, and suggested improvements using soil weathering principles. Findings were presented to the consortium and regulators. Recommendations were implemented and resulted in large decline in toxicity.

Review of Test Data to Determine TSCA Reporting Needs, New Jersey—To assist a client in determining compliance with TSCA rules on fate and toxicity data for chemicals tested in-house, coordinated team to review, summarize, and record data from 400+ laboratory reports; tabulated and evaluate data; and developed strategy with company lawyers to identify reportable data. This effort eliminated the client's liabilities under TSCA.

Negotiation to Remove Genotoxicity Testing from a Sediment Risk Assessment, Montreal, Canada—On behalf of client, engaged with regulators to review use of genotoxicity testing to assess effects of contaminated sediments on benthic invertebrates and argued that no useful risk data would be generated. Agency accepted technical arguments and removed genotoxicity testing from the programs.

Development of a Surface Water Criterion Protective of a Federally Listed Species, Kansas— Derived an alternative surface water criterion for perchlorate protective of the federally listed Topeka shiner (*Notropis topeka*) on behalf of the State of Kansas. This work involved an in-depth literature search, consultation with the State and the U.S. Fish and Wildlife Service, and derivation of the actual criterion. The State used the value in its remedial decision making at a contaminated groundwater site.

Environmental Toxicity of Mercury, Ashland, Massachusetts—Obtained 300+ papers to develop a database on the toxicity of mercury to aquatic and terrestrial ecological receptors. This effort included deriving CBRs for fish, crayfish, birds, and mammals and calculating TRVs for mercury in wildlife receptors. This work was used in an ERA to characterize the impacts of mercury historically released to the Sudbury River from nearby Superfund site.

Cause-and-Effect Evaluation of Chromium Toxicity in Sediments, Windsor Lock, Connecticut— Developed a data set consisting of site sediment chromium levels, toxicity test results (28-day exposures using the amphipod *Hyalella azteca*) on those sediments, and the threshold effect concentration (TEC) and probable effect concentration (PEC) for chromium to establish a cause-and-effect relationship between chromium and the toxicity test results. No relationship was found because the sediment chromium levels were not high enough to produce a dose response. However, growth was statistically lower in all of the sediment samples. In addition, the chromium levels exceeded the PEC, which is viewed as a toxicity threshold above which effects become possible. Calculated the sediment mean PEC quotients (mean PEC-Qs) for four metals (i.e., chromium plus copper, lead, and zinc) for which sediment samples were analyzed to determine if including other site-specific chemical stressors would result in a better relationship. No such response was observed. The mean PEC-Qs also closely overlapped the chromium-only figures, suggesting that adding the three divalent metals did not improve the explanation for the observed toxicity. EPA used this information to determine the need for sediment remediation at an impacted pond.

Ecotoxicity of Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) to Mammals and Birds, Nationwide—Performed a literature search to summarize data on the subchronic and chronic toxicity of PFOS and PFOA to mammals and birds. The toxicity endpoints of interest were no-effect and effect doses affecting mortality, growth, or reproduction, and the no-effect and effect PFOS and PFOA residues in liver and kidneys for use in deriving mammalian CBRs for these two organs associated with mortality, growth, and reproduction.

Effect-Based Ecological Soil Screening Levels (EcoSSLs), Nationwide—Derived effect-based EcoSSLs for 16 metals, 3 organochlorinated pesticides, low-molecular-weight PAHs, and high-molecular-weight PAHs for birds and mammals based on the method developed by EPA to derive the no-effect EcoSSLs protective of birds and mammals.

Automated Contaminant Toxicity Screening Spreadsheets, Nationwide—Developed linked Excel spreadsheets to allow for quick and automated screening of surface water, sediment, and soil analytical data for 12 metals in 25 samples at a time. EPA used the spreadsheets to screen analytical data from multiple mining sites and help prioritize follow-up investigations and risk assessments.

Support for Regulatory Rulemaking

Caspian Sea Comparative Risk Assessment (U.S. Agency for International Development), Eastern Europe—Developed an ecological risk assessment framework to prioritize the environmental impacts of current and future crude oil extraction and refining activities in the Caspian Sea region. This effort included developing an approach to measure and rank the relative risks in terrestrial and aquatic environments. Presented this approach in Moscow at a conference on Caspian Sea environmental issues sponsored by the Russian Academy of Sciences.

Modeling to Predict Brook Trout Densities in Mountain Streams in Response to Surface Water Acidification, Southern Appalachian Mountain Initiative—Reviewed the literature to identify fishery surveys in brook trout streams affected by acidic deposition. Selected a study to develop a multivariate regression model to predict brook trout densities based on the acid neutralizing capacity in streams. The trout model used the output generated by the Model of Acidification of Groundwater in Catchments (MAGIC) to generate input used in a regional recreational fishing analysis to quantify the economic benefits of reduced sulfur and nitrogen emissions.

Superfund Integrated Cost–Benefit Model (SICM), EPA, Office of Policy—Investigated the feasibility of modeling ecological risks and quantifying ecological benefits of site remediation in support of SICM. Efforts included reviewing existing EPA guidance documents on ERAs, identifying relevant endpoints and potential approaches applicable across Superfund sites, and investigating the availability of analytical, ecotoxicological, and biological data from EPA's records of decision to support modeling efforts.

Regulatory Impact Analysis for Groundwater Pesticide Management Plan Rule, EPA, Office of Pesticide Programs—Assessed the potential impacts of exposure to four pesticides (atrazine, simazine, alachlor, and metolachlor) on algae, invertebrates, and fish in Midwestern streams. This

work included performing a literature search to obtain data on the aquatic toxicity of the target pesticides; estimating a range of pesticide concentrations in receiving streams based on surface runoff and groundwater recharge data; and quantifying the effects of exposure to the target pesticides to ecological receptors. Received written commendation from the client for this effort.

Regulatory Impact Analysis for Metal Plating and Manufacturing (MP&M) Rule, EPA, Office of Water—Collected and summarized data on the fate (biodegradation, volatilization, bioaccumulation, sedimentation) and effects (carcinogenicity, systemic toxicity, ecotoxicity) of 150+ pollutants detected in MP&M effluents. The data were categorized and ranked based on established criteria to assess the overall impact of each pollutant on human health and the environment. This information formed the basis of a benefits analysis in support of the MP&M regulatory impact analysis.

Eutrophication of Reservoirs by Nutrients Derived from Animal Waste, EPA, Office of Policy— Quantified the biological impacts of phosphorus from animal waste runoff on dissolved oxygen levels in 400+ reservoirs. Several phosphorus loading scenarios were modeled to estimate summer dissolved oxygen levels in the hypolimnia of the reservoirs. The dissolved oxygen levels were compared to ecotoxicological benchmarks to estimate the improvement in cold-water fisheries for each phosphorus loading scenario.

Toxic Release Inventory (TRI), EPA, Office of Pollution Prevention and Toxics—Developed a comparative risk-based framework to help EPA analyze potential ecological impacts of TRI chemicals to aquatic receptors. This work included identifying key assessment variables, proposing an approach to combine exposure and effects data, assembling an aquatic-toxicity database for TRI chemicals, and developing an approach to score facilities based on annual releases and biological response measures.

Confined Animal Feeding Operations, EPA, Office of Policy—Developed a risk-based framework to analyze the potential ecological effects of different animal waste management practices. This effort included selecting appropriate ecotoxicological endpoints for each constituent of concern; identifying and delineating important knowledge gaps needed to quantify effects; and coauthoring a report to outline the proposed assessment strategies and recommend future research needs.

Support 316(b) Rule Making, EPA, Office of Water—Assessed the effects of impingement and entrainment by cooling water intake structures (CWIS) on aquatic biological resources. This work included designing an approach using physico-chemical, biological, and site-specific parameters to rank facilities for potential effects to aquatic receptors; developing two case studies for use in quantifying the impacts of CWIS to local ecosystems; identifying and quantifying the effects of CWIS on threatened and endangered aquatic species; and writing technical chapters in support of the biological assessments associated with the rule.

Proposed Part 158 Data Requirements and Cost Estimates for Study Guidelines, EPA, Office of Pesticide Programs—Provided ecotoxicity cost data to support EPA in calculating the cost changes associated with the proposed Part 158 regulation development. The work included becoming

familiar with 40+ different pesticide fate and effects testing guidelines and protocols, contacting commercial laboratories across the U.S. to obtain a range of cost estimates for each test, and summarizing the cost data in a technical memorandum to EPA.

Review of Public Comments on the Chlorfenapyr Pesticide Reregistration Notice, EPA, Office of Pesticide Programs—Reviewed the technical merits of the human health and ecological comments generated by dozens of organizations in response to EPA's chlorfenapyr reregistration notice. Each individual comment was identified, categorized, and entered in a database for further evaluation by EPA. The structure of the database was developed specifically to support this effort.

Assessment of Cost Differential of Remediating Groundwater with and without Methyl **tert-Butyl** *Ether (MTBE), EPA, Office of Pollution Prevention and Toxics*—As part of a cost–benefits analysis in support of a proposed rule to ban MTBE as an oxygenate in gasoline, performed a literature review to compare the fate of MTBE when present in gasoline-contaminated groundwater at gas stations and to assess remediation costs. Developed an algorithm to calculate the average groundwater cleanup costs in the presence or absence of MTBE.

Revision of Lipid and Organic Carbon Databases for Ambient Water Quality Criteria Derivation, EPA, Office of Water—Spearheaded efforts to update the list of fish and invertebrate species commonly consumed in the United States, identified representative diets for target fish species, estimated and compared trophic levels for target species, and coordinated a literature search to locate data on tissue lipid contents.

Determination of Average Mercury Concentrations in Fish Tissues, EPA, Office of Air Quality Planning and Standards—As part of a national analysis to assess the health benefits of proposed mercury emission reductions., coordinated efforts to geocode and map 45,000+ mercury concentrations in fish obtained from the National Listing of Fish and Wildlife Advisories Mercury Fish Tissue Database; developed a method to weigh the average fish mercury concentration in terms of fish trophic level, recreational consumption patterns, and minimum legal size; critically reviewed the Office of Water's Mercury Maps model to evaluate its usefulness for the national benefits analysis and suggested ways to improve the modeling approach to support our efforts.

RCRA Corrective Actions, Considerations for Assessing Ecological Risks—Supported EPA Region 1 with developing a guidance document to address 10 common technical issues associated with ERAs at RCRA sites. This guidance was routinely used in the region to ensure that RCRA facility owners addressed the ERA concerns of interest to EPA.