

Exponent®
Engineering & Scientific Consulting

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Professional Profile

Andy Deines, Ph.D., is a Certified Fisheries Professional and managing scientist in Exponent's Ecological & Biological Sciences practice with more than 20 years of experience in fisheries ecology, endangered species assessment, natural resource damage assessment, and environmental causation determination. He advises law firms, industry clients, and government agencies on aquatic ecosystem impacts, ESA compliance, and NRDA matters, with particular expertise in salmon and freshwater fish population analysis.

Fisheries Ecology Consulting

Dr. Deines evaluates how fish populations, fisheries, and aquatic ecosystems respond to environmental change, including altered river flows, dam operations, water withdrawals, oil spills, submerged power transmission cables, and invasive species introductions. His work spans salmon (Chinook, Coho, Steelhead, and Atlantic), temperate and tropical freshwater fish assemblages, and near-shore marine species across the western U.S. and internationally. He applies mechanistic population modeling, ecological analytics, and field-based sampling data to characterize baseline conditions, detect population-level responses, and distinguish natural variability from human-caused change.

Dr. Deines has conducted field and analytical work around the world including Africa and Australia, collecting fish, water quality, and environmental DNA (eDNA) samples. He collaborates with multidisciplinary teams of geneticists, economists, toxicologists, and resource managers to deliver integrated assessments that withstand regulatory and legal scrutiny.

Endangered Species Act Assessments

Dr. Deines addresses scientific questions involving threatened and endangered species and their critical habitats under the Endangered Species Act (ESA), including effects of hydropower and water management operations, infrastructure development, contamination, and climate change. He has supported ESA Section 7 consultations and litigation involving Pacific salmon, Steelhead trout, suckers, and freshwater mussels, evaluating both the biological opinion process and the underlying ecological science.

Dr. Deines has served as an expert witness in environmental litigation. His analyses link exposure, injury, and population-level response in ways that are transparent, reproducible, and defensible in regulatory proceedings and federal court.

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Natural Resource Damage Assessment

Dr. Deines evaluates ecological injury and natural resource damages arising from oil spills, chemical releases, and other environmental stressors under the Oil Pollution Act (OPA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Clean Water Act (CWA), and related frameworks. He has supported natural resource damage assessment (NRDA) proceedings for major incidents and legacy contaminants in California, Washington, and the Gulf of Mexico, including the Deepwater Horizon oil spill and the Refugio oil spill as well as legacy contamination in a major west-coast waterway, assessing impacts to marine populations, fisheries productivity, and aquatic habitat.

His NRDA work integrates injury quantification, baseline characterization, and restoration scaling, providing clients with scientifically grounded assessments that can withstand challenge from opposing experts and regulatory trustees. He also supports net environmental benefits analysis (NEBA) to help industry evaluate development and restoration alternatives and compare social and ecological tradeoffs across feasible options.

Environmental Causation Determination

Dr. Deines determines whether and how human activities cause measurable environmental impacts, including water withdrawals, invasive species introductions, contamination by emerging chemicals such as 6PPD-quinone (a tire-derived compound toxic to some salmon), and large-scale infrastructure development such as data centers, as well as dam operations and removals. He applies weight-of-evidence frameworks and counterfactual analysis to evaluate alternative explanations and isolate the contribution of specific stressors to observed ecological change.

This work is particularly valuable in complex, multi-stressor settings where causation is contested, such as interstate water disputes, spill litigation, and regulatory proceedings involving cumulative impacts. Dr. Deines has contributed to causation analysis in matters before the U.S. Supreme Court, federal district and local courts, and state matters.

Forensic Environmental Data Analysis

Dr. Deines uses statistical, spatial, and computational analysis to test environmental claims, identify patterns and inconsistencies in ecological data and analyses, and evaluate alternative explanations for observed conditions. His analytical toolkit includes R-based statistical modeling, bioinformatics and chemoinformatics, geospatial analysis, mechanistic population simulation, and carefully governed AI-enabled analytics — all within transparent, reproducible workflows designed for peer and legal review.

Dr. Deines has applied these methods to scrutinize opposing expert analyses, identify data errors and methodological inconsistencies, and develop independent quantitative assessments in high-stakes regulatory and litigation settings. He has presented on emerging tools in environmental assessment at conferences on litigating natural resource damages and at Society of Environmental Toxicology and Chemistry (SETAC) North America annual meetings.

Expert Witness Deposition and Testimony

Dr. Deines has provided deposition testimony in a genetic intellectual property matter concerning the parentage of disputed agricultural strains and whether they included patented genotypes. Drawing on his genetic experience with invasive species hybridization, he evaluated the appropriateness of the opposing party’s applied statistical analyses.

He also supports legal clients through deposition preparation and in-person assistance to examining attorneys in multiple matters involving NRDA, ESA, and fisheries class-action litigation.

Technical Methods

- Ecology and fisheries methods: Individual-based and matrix-based population simulation, data-limited population assessment, environmental DNA (eDNA) and meta-barcoding, population viability analysis
- Ecotoxicology: Ecological risk assessment, dose-response and concentration-response modeling, sediment triad, California's Sediment Quality Objectives (SQOs), species sensitivity distributions, causal analysis, physiologically based pharmacokinetic (PBPK) modeling
- Statistics and data: R statistical computing, web and document scraping, meta-analysis, geospatial analysis, causal inference, AI-enabled analytics
- Regulatory: Endangered Species Act Section 7 consultation, Oil Pollution Act Natural Resource Damage Assessment, Net Environmental Benefits Analysis Clean Water Act 303(d)

Academic Credentials & Professional Honors

Ph.D., Biology, University of Notre Dame, 2013

B.S., Environmental Science, Western Washington University, 2003

Licenses and Certifications

Certified Fisheries Professional by the American Fisheries Society

Professional Affiliations

King County Bar Association, Board of Directors - New Lawyer Division

American Fisheries Society, member since 2013

Ecological Society of America, member since 2011

Publications

Reiss R, Loccisano A, Deines A, Kim M, Nallani G, Chandrasekaran A, Whatling P. A physiologically-based pharmacokinetic/pharmacodynamic (PBPK/PD) model for the insecticide dimethoate. Xenobiotica 2023; 53:5, 382-395.

DeVleeschower A, Deines AM, Goldberg J, Pasko SR, Barnes MA. Developing a recipe for success: commentary on Seaman et al. (2021) “Eating invasives: chefs as an avenue to control through consumption". Food, Culture & Society 2023. DOI: 10.1080/15528014.2023.2230785.

O'Reilly K, Lahvis MA, DeVaull GE, Deines AM. A comparative plume study of DRO, GRO, Benzene, and MTBE: implications for risk management. Groundwater Monitoring 2021; 41:58-64.

Staveley J, Green JW, Nusz J, Edwards D, Henry K, Kern M, Deines AM, Brain R, Glenn B, Ehresman N, Kung T, Ralston□Hooper K, Kee F, McMaster S. Variability in non-target terrestrial plant studies should inform endpoint selection. Integrated Environmental Assessment and Management 2018; 14(5):639-648.

Deines AM, Bunnell DB, Rogers MW, Bennion D, Woelmer W, Sayers MJ, Grimm AG, Shuchman RA, Raymer ZB, Brooks CN, Mychek□Londer JG, Taylor W, Beard TD Jr. The contribution of lakes to global inland fisheries harvest. Frontiers in Ecology and the Environment. 2017; 15(6):293-298.

Deines AM, Wittmann ME, Deines JM, Lodge DM. Tradeoffs among ecosystem services associated with global tilapia introductions. Reviews in Fisheries Science & Aquaculture 2016; 24(2):178-191.

Woelmer WM, Kao Y, Bunnell DB, Deines AM, Bennion DH, Mark W, Brooks CN, Sayers MJ, Banach DM, Grimm AG, Robert A. Assessing the influence of watershed characteristics on chlorophyll a in waterbodies at global and regional scales. Inland Waters 2016; 6:379-392.

Lynch AJ, Cooke SJ, Deines A, Bower S, Bunnell DB, Cowx IG, Nguyen VM, Nonher J, Phouthavong K, Riley B, Rogers MW, Taylor WW, Woelmer WM, Youn S, Beard TD Jr. The social, economic, and ecological importance of inland fishes and fisheries. Environmental Reviews 2016; 24(2):115-121.

Deines AM, Bunnell DB, Rogers MW, Beard TD Jr., Taylor WW. A review of the global relationship among freshwater fish, autotrophic activity, and regional climate. Reviews in Fish Biology and Fisheries 2015; 25(2):323-336.

Sayers MJ, Grimm AG, Shuchman RA, Deines AM, Bunnell DB, Raymer ZB, Rogers MW, Woelmer W, Bennion DH, Brooks CN, Whitley MA, Warner DM, Mychek-Londer J. A new method to generate a high-resolution global distribution map of lake chlorophyll. International Journal of Remote Sensing 2015; 36(7):1942-1964.

Deines AM, Bbole I, Katongo C, Feder JL, Lodge DM. Hybridization of native Oreochromis species (cichlidae) and the introduced Nile tilapia (O. niloticus) in the Kafue River, Zambia. African Journal of Aquatic Science 2014; 39(1):23-34.

Wittmann, ME, Jerde CL, Howeth JG, Maher SP, Deines AM, Jenkins JA, Whitledge GW, Burbank SR, Chadderton WL, Mahon AR, Tyson JT, Gantz CA, Keller RP, Drake JM, Lodge DM. Carp in the Great Lakes region: establishment potential, expert perceptions and re-evaluation of experimental evidence of ecological impact. Canadian Journal of Fisheries and Aquatic Sciences 2014; 71(7):992-999.

Deines AM, Bee CA, Jensen R, Lodge DM. The potential tradeoff between artisanal fisheries production and hydroelectricity generation on the Kafue River, Zambia. Freshwater Biology 2013; 58(4):640-654.

Deines AM, Mahon AR, Chadderton WL, Jerde CJ, Russell J, Small F, Norris A, Thuesen P, Mysorekar S, Lodge DM. Detection of feral tilapia populations using a novel environmental DNA surveillance method. Final Report. Australian Government Invasive Animals Cooperative Research Centre, 2013.

Lodge DM, Deines AM, Gherardi F, Yeo DCJ, Arcella T, Baldridge AK, et al. Global introductions of crayfishes: evaluating the impact of species invasions on ecosystem services. Annual Reviews in Ecology Evolution and Systematics 2012; 43: 449-472.

Deines AM, Chen VC, Landis WG. Modeling the risks of nonindigenous species introductions using a patch-dynamics approach incorporating contaminant effects as a disturbance. Risk Analysis 2005; 25(6):1637-1651.

Select Presentations

Barnes M, Deines AM, Goldberg J, Pasko S. Webinar: Developing a Recipe for Success: Can Public Harvest Control Invasive Species? Invited. North American Invasive Species Management Association. October 14, 2026.

Deines AM. Use of Artificial Intelligence in NRD Assessments: Use of AI for Geospatial and Satellite Analysis, Ecological Modeling, Economic Valuation, and Reporting and Compliance. Invited. Law Seminars International Presents: The 19th Annual Santa Fe Advanced Conference on Natural Resource Damages. Santa Fe, NM. September 24 & 25, 2026.

Deines AM. Errors in data and analyses persist in spite of transparency measures. SETAC North America

46th Annual Meeting, Portland, Oregon, November 16–20, 2025.

Deines AM, Gill A, Pitt J. Community toxicology- estimating sensitivity using eDNA meta-barcoding results. SETAC North America 46th Annual Meeting, Portland, Oregon, November 16–20, 2025.

Deines AM, Yu Q, Lilly LL, Swann M, Morrison AM. Anywhere but here: conditions supporting recruitment of endangered Klamath basin suckers. American Fisheries Society Annual Meeting, San Antonio, Texas, August 10-14, 2025.

Deines AM. Emerging tools in assessment. The Tenth Advanced D.C. Conference on Litigating Natural Resource Damages, Washington DC, April 24-25, 2025.

Menzie CA, Morrison AM, Kleven M, Deines AM, Yu Q, Duncan B, Ryan S. An integrated approach to cumulative impact assessment in support of projects and actions within delineated environmental justice areas. Presented at SETAC North America 44th Annual Meeting, Louisville, KY, November 12-16, 2023.

Deines, AM, Paulsen SC. A critical review of temperature guidelines used for 303d listing of steelhead streams in California. California-Nevada AFS Annual Meeting, Online only, March 1 – 5, 2021.

Deines AM, Kashuba R, Morrison AM, Newcomer-Johnson T. Questions remaining in the quest to quantify ecosystem services. Society of Environmental Toxicology and Chemistry, North America 42nd Annual Meeting (SciCon4), November 14–18, 2021.

Deines AM, Staveley J, Huggett D, Terneus M. Non-target dung fauna population model to evaluate environmental impacts following use of an active pharmaceutical ingredient (API) in cattle. Society of Environmental Toxicology and Chemistry, North America 40th Annual Meeting, Toronto, Ontario, Canada, November 2019.

Deines AM, Goodfellow WL. The Salton Sea: a real-life experiment of extreme freshwater salinization. Society of Environmental Toxicology and Chemistry, North America 39th Annual Meeting, Sacramento, CA, 4-8 November 2018.

Deines AM, Palmquist K, Morrison AM. Global status and risk of non-native fish aquaculture. American Fisheries Society 148th Annual Meeting, Atlantic City, NJ, August 19-23, 2018.

Deines AM, Morrison AM, Menzie CA. Environmental flows: evaluating long-term baselines for hydrological regime change in the Southern United States. American Geophysical Union Fall Meeting, San Francisco, CA, December 12-16, 2016.

Deines AM, Bunnell DB, Rogers MW, Bennion DH, Woelmer W, Brooks CN, Grimm AG, Raymer Z, Sachs MJ, Schuchman RA, Beard TD Jr. New estimation method for global freshwater fish production. Global Conference on Inland Fisheries, FAO Headquarters, Rome, Italy, January 26-28, 2015.

Deines AM, Bunnell DB, Rogers MW, Beard TD Jr., Taylor WW. Global patterns of inland fisheries and primary production using meta-analysis. American Fisheries Society, Little Rock, AK, September 8-13.

Deines AM, Bee CA, Jensen R, Lodge DM. Influence of fishery effort and damming on Kafue River, Zambia fishery production. Ecological Society of America Annual Meeting, Austin TX, August 7-12, 2011.

Project Experience

Fisheries Ecology

Dr. Deines has led and supported fisheries ecology assessments across the western United States, the Gulf of Mexico, and internationally, evaluating fish population responses to flow alteration, oil spills, temperature change, and invasive species. His project work spans regulatory proceedings, litigation support, and proactive environmental planning.

- Evaluated temperature effects on Steelhead trout in Northern California in the context of Clean Water Act Section 303(d) listing considerations, analyzing whether observed thermal conditions met the scientific threshold for impairment listings. Subsequent expert Technical Review Panel supported client's position.
- Provided international plaintiffs with analysis and technical support assessing potential impacts to near-shore reef fish populations following a ship grounding and resulting oil spill, evaluating injury to fish assemblages and habitat.
- Supported plaintiffs in assessing the risk of harm to local trout populations resulting from water diversions in a small northern California stream system under California Civil Code.
- Provided analysis and technical support assessing potential impacts to California fishery populations from the Refugio oil spill (Andrews et al. v. Plains All American Pipeline, L.P. et al., U.S. District Court, Central District of California), evaluating exposure pathways and population-level consequences for affected species.
- Provided expert consultation to a major municipal entity on the ecological risk and population-level impacts of harmful fish invasions, informing management and policy decisions resulting in published guidance.
- Critically evaluated the sensitivity and possible health of wildlife and ecological effects of electric and magnetic fields (EMF) for submerged AC and DC distribution and transmission systems.

Endangered Species Act

Dr. Deines has supported ESA matters involving Pacific salmon, Steelhead trout, and other listed species across multiple regulatory and litigation contexts, providing scientific analysis that links human activities to species-level outcomes.

- Led technical support for ESA litigation involving Pacific salmon and emerging contaminants, developing population-level analyses to evaluate whether contaminant exposures constituted harm or take of listed species.
- Provided scientific support in a complex endangered fish species matter in southern Oregon and northern California, touching on ESA rules, tribal rights, and agricultural operations.
- Provided technical disclosures evaluating the impacts of proposed alterations of the managed flow regime to endangered salmon on the lower Snake and Columbia rivers, supporting energy industry clients in the Pacific Northwest. The clients were lead Defendant-Intervenor in National Wildlife Federation v. National Marine Fisheries Service (NMFS).

Natural Resource Damage Assessment

Dr. Deines has contributed to NRDA proceedings arising from some of the most significant environmental incidents in recent U.S. history, providing injury quantification, baseline analysis, and restoration scaling support.

- Provided scientific support for the Deepwater Horizon NRDA in the Gulf of Mexico, evaluating possible impacts to fish and fisheries populations and contributing to the scientific record supporting one of the largest natural resource damage settlements in U.S. history.
- Provided scientific support concerning net environmental benefits from coal ash closure alternatives at coal ash impoundment facilities in North Carolina, applying NEBA methodology to compare ecological tradeoffs across remediation options.

Environmental Causation Determination

Dr. Deines has evaluated causation in complex, multi-stressor environmental disputes — including interstate water allocation cases, oil spill litigation, and emerging contaminant matters — providing rigorous, defensible analyses of whether and how human activities caused measurable ecological harm.

- Provided analysis and technical support in Florida v. Georgia before the U.S. Supreme Court, evaluating the causal relationship between upstream water withdrawals and consumptive use and alleged adverse changes in freshwater and estuarine fish and invertebrate populations in Florida.
- Provided analysis and technical support assessing potential impacts to California fishery populations from the Refugio oil spill, evaluating the causal chain from pipeline release to fish population exposure and injury.

Forensic Environmental Data Analysis

Dr. Deines has applied advanced statistical and computational methods to evaluate environmental claims, scrutinize opposing analyses, and develop independent quantitative assessments in regulatory and litigation settings.

- Conducted data analysis using SNP microarray data in an expert witness matter involving cultivar intellectual property, applying genomic methods to determine whether the parentage of disputed fruit varieties included patented genotypes. Testified at deposition.
- Provided analysis of organic agricultural supply chain contamination by genetically engineered (GMO) constructs — including soy, cotton, and corn — using molecular detection methods to evaluate the extent and source of contamination.
- Provided vertebrate species identification (mammals, fish, birds) using next-generation sequencing and metabarcoding analyses, applying environmental DNA (eDNA) methods to detect and characterize species presence in complex environmental samples.
- Developed a matrix population simulation model to evaluate the environmental risk of excreted active pharmaceutical ingredient (API) effects on dung fauna in pastures, establishing a quantitative causal framework for regulatory risk assessment. Modeling results played a key role in clients permitting and marketing strategy. Led development of aquaculture system flow discharge and environmental exposure model to aid the FDA Center for Veterinary Medicine’s permitting of veterinary pharmaceuticals.