

Sean Culkin

PG, CHG

SUMMARY

Mr. Culkin is a consulting professional with more than 17 years of experience on diverse range of projects. He is a California registered professional geologist and certified hydrogeologist who leverages his skills in quantitative hydrogeology to support private industry, public sector, and legal clients. His experience includes site characterization, water resources management, project management, conceptual site model development, soil and groundwater remediation, remedy optimization, property development, and regulatory compliance. He has developed a solid track record of successful project execution and has provided technical guidance and oversight for numerous projects throughout the United States. Mr. Culkin has extensive experience with advanced groundwater modeling techniques and has used models to support remediation system design, coastal hazard analysis, dewatering operations, and basin-wide resource management planning for groundwater and surface water supplies. Sean also continues to provide expert services for challenging litigation efforts.

EXPERIENCE

UPLAND HYDROGEOLOGY CONSULTING

President and Lead Hydrogeologist
Mar 2024 – Present

INTEGRAL CONSULTING, INC.

Consultant, Hydrology & Geosciences
Aug 2017 – Mar 2024

HYDROMETRICS WRI (NOW MONTGOMERY & ASSOCIATES)

Senior Hydrogeologist
Mar 2015 – Aug 2017

AMEC EARTH & ENVIRONMENTAL (NOW WSP)

Hydrogeologist
Dec 2007 – Feb 2015



CONTACT

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PROFESSIONAL REGISTRATIONS

Geologist: CA, DE, NC, NY
Hydrogeologist: CA

Small Business Enterprise (SBE):
California DGS, LA Metro

EDUCATION

The Pennsylvania State University,
2007
MS, Geosciences

Johns Hopkins University, 2005
BA, Earth and Planetary Sciences

PROFESSIONAL AFFILIATIONS

Groundwater Resources
Association of California
National Groundwater Association
Association of California Water
Agencies
Association of Environmental and
Engineering Geologists



PROJECT EXAMPLES

WATER MANAGEMENT

Groundwater Study for a Power Generation Facility, California

Lead hydrogeologist for an assessment of available groundwater resources for this power station. Worked with geotechnical engineering teaming partners to characterize the local geology and groundwater flow system to make updates to the existing site conceptual model. Developed potential water supply alternatives and provided recommendations to the utility client.

Water Resources Management, Olympic Valley, California

Project manager and lead groundwater modeler supporting the local public utility client and associated private property developers, including developments undergoing environmental impact studies. Represented the client at public-facing meetings. Performed groundwater model calibration and utilized the updated model for long-term planning operations for the client. Successfully developed criteria for estimating long-term maximum groundwater supply within the valley that refined and improved on previous investigations. Provided review and evaluation of local hydrogeology to assist developers with construction dewatering and excavation for a large resort hotel.

Groundwater Resources Management, Santa Cruz County, California

Project management and technical oversight for a group of public clients utilizing a shared groundwater resource within Santa Cruz County. Coordinated with environmental impact report team of consultants and agencies for a planned groundwater replenishment project within the basin. Authored documents pursuant to the California Sustainable Groundwater Management Act (SGMA) that resulted in acceptance of basin boundary modifications by the California Department of Water Resources and promoted sustainable groundwater management through basin consolidation. Led construction of groundwater-surface water models in conjunction with the U.S. Geological Survey and made presentations to the basin Technical Advisory Committee. Developed and ran site-specific flow and transport models to evaluate impact of seawater intrusion, resulting in updated SGMA management objectives for the basin that improved on previous methods.

Groundwater-Surface Water Study, Santa Cruz County, California

Led groundwater pumping well, stream/aquifer interaction, and sampling investigations in response to state and Coastal Commission inquiries in Santa Cruz County, resulting in successful resolution with the state for the agricultural landowner.

Coastal Groundwater Discharge Study, Big Island, Hawaii

Developed SEAWAT groundwater models to simulate groundwater flow and seawater intrusion dynamics in a coastal volcanic aquifer system. These models were used to assess the ecological risk of heated wastewater discharged to the offshore habitat. This work was performed in support of discharge permitting for a proposed bioenergy facility.

Climate Change Protection Investigation, City of Alameda, California

Lead hydrogeologist on a multi-disciplinary team of engineers and coastal specialists. Assisting the City to determine design levels of protection, conceptual designs, and cost benefit analyses related to sea level rise and flooding vulnerability. Provided analysis and calculations of local groundwater dynamics to assist surface water model development. Project ongoing.



Flood Control Investigation, College of Alameda, Alameda, California

Flood control management alternatives investigation for proposed new construction on Bay Farm Island, Alameda. Evaluated local groundwater systematics within the 100-year floodplain. Constructed site-specific groundwater models to evaluate shallow groundwater flow under anticipated flood conditions, and supported development of flood control infrastructure design, including surface and subsurface flow barriers and drainages.

LITIGATION SUPPORT**Expert Services for Settlement and Tilting of a High-Rise Development, San Francisco, California**

Lead expert hydrogeologist on a team of geotechnical and structural engineers supporting litigation related to a high-profile residential development in downtown San Francisco. Constructed site-specific 3-dimensional geologic models as well as groundwater models for analysis of local hydrogeology and the impact of construction dewatering on the building. Gave formal presentations of technical findings to mediation groups. Quickly developed a detailed conceptual site model of the downtown San Francisco groundwater basin. Worked with geotechnical engineer partners to develop a detailed time history of subsurface material property changes in the vicinity of the building. These efforts contributed to a favorable settlement for the property developer.

Natural Resources Damages Assessment (NRDA), Hanford Site, Washington State

Provided expert opinions in support of the Department of Justice (DOJ) for the Hanford NRDA case. Assessed the extent of damages incurred by Trustees as a result of groundwater contamination stemming from historical activities at this former nuclear production complex, particularly as they pertain to use of the site for managed aquifer recharge. Authored expert analysis and documentation in response to Trustee damage assessments, and worked with the Department of Energy to develop detailed analyses of potential fate and transport pathways for recharged water in the Hanford Aquifer. Case ongoing.

Comingled Groundwater Plume, Confidential Location, Delaware

Provided expert opinion for allocation of damages from a large, comingled groundwater plume where the municipal water supply had been impacted by metals. Developed a detailed time-history of plume migration from multiple source areas using empirical and groundwater model data sources. Made recommendations to counsel for refined allocation metrics and authored associated technical documentation.

Microplastics Fate and Transport Evaluation, Confidential Location, Northern California

Provided opinions on the fate and transport of microplastics from telecommunications infrastructure based on research and site investigation. This expert work resulted in a favorable outcome for the telecom client to continue project planning and construction.

Portland Harbor Superfund Site, Portland, Oregon

Produced expert reports for the allocation process at this large multi-parcel Superfund site. Worked with counsel to refine a complex fate and transport conceptual site model of interconnected surface water and groundwater pathways. Developed a detailed analytical model for estimating mass loading of key contaminants from surface water runoff to the harbor.



PFAS Litigation Support, Various Confidential Locations, United States

Provided technical analysis of PFAS fate and transport in the vicinity of various industrial facilities and large municipal water suppliers. Reviewed hydrologic data and developed analytical models to calculate riverine contaminant flux time histories. Updated and utilized site-specific groundwater models to evaluate fate and transport, as well as remedy alternatives, for PFAS from historical production facilities.

Property Development Litigation, Seattle, Washington

Analyzed the impact of numerous construction dewatering projects on groundwater flow and contaminant transport from multiple sites in the vicinity of an urban redevelopment project. Performed groundwater drawdown and capture analysis. The revised hydrogeologic conceptual model supported expert testimony on site contamination transport history.

REMEDIATION**U.S. Army Corps of Engineers Site Remediation, California and Nevada**

Developed a portfolio of work at current and former military facilities through a longstanding partnership with 8(a) contractors and the U.S. Army Corps of Engineers, including Fort Ord, Sharpe Army Depot, Riverbank Army Ammunition Plant, and Hawthorne Army Depot. Provided modeling and overall technical hydrogeologic support for current and planned remediation efforts, as well as coordination with regulatory agencies on behalf of the client. This work has included construction of calibrated flow and transport models within several regional aquifer systems, and the use of models for optimization of extraction/injection well networks for chlorinated solvents and metals. These efforts successfully informed efficient remedial strategies and redesign.

Former Wood Treating Facilities, Various Locations, United States

Lead hydrogeologist for characterization of former wood treating sites in a variety of geologic settings, including riparian, coastal, and shallow karst environments managed by court-appointed trustee. Developed site characterization work plans for feasibility studies and data gaps analyses. Prepared technical documentation on the fate and transport of dense nonaqueous-phase liquid and remediation feasibility. Developed site-specific groundwater models to assess fate and transport of PAHs and support remedy alternative design. Provide strategic and technical support of existing consultant teaming partners.

RCRA Corrective Action, Confidential Client, Brunswick, Georgia

Used density-dependent groundwater transport modeling to assist project team's reinterpretation of the conceptual site model for offsite migration of VOCs for a revised corrective action. Updated previous consultant's model to more accurately simulate coastal aquifer dynamics. Used particle tracking and transport/attenuation models to support offsite plume characterization and impacts to local water supply.

Agricultural Well Profiling, Chico State University Farm, California

Performed ambient and dynamic down-hole flow logging at wells on an organic farm that had been impacted with chlorinated solvents. Calculated groundwater and contaminant mass flux within the well boreholes. Characterized well construction and hydrostratigraphy through video logging. Oversaw pump reinstallation and well maintenance. The resulting analysis provided the basis for successful ongoing well operations to maintain groundwater availability at the farm.



Perchlorate Plume Remediation, San Francisco Bay Area, California

Provided technical oversight for the characterization and remediation of a sedimentary basin contaminated with perchlorate that included impacts to private and municipal water users. Characterized basin hydrostratigraphy and contributed to conceptual model development via sonic core logging, aquifer pumping and injection tests, monitoring of a basin-wide transducer network, pneumatic slug testing, and lateral/vertical plume delineation from a network of nested monitoring wells and domestic pumping wells. Characterized basin groundwater flow, as well as groundwater-surface water interactions, via chemical and isotope analysis. Developed the conceptual design and performance estimates for an innovative remediation well network via analytical solutions, flow and transport modeling, and model optimization techniques. These efforts significantly reduced client implementation costs. Led the team that designed and implemented an efficient groundwater monitoring network to meet stringent regulatory requirements. Developed a regional groundwater flow model to support treatment system design and remedial optimization. Performed statistical analysis for evaluating an approved natural attenuation remedy for a portion of the basin. These efforts contributed to substantial reduction of monitoring time and expenditure by the client and successful remediation of private water supply wells.

Groundwater Remediation, North Hollywood Operable Unit, San Fernando Valley, California

Contributed to ongoing updates to the basin conceptual site model via well log analysis/correlation and evaluation of depositional histories. Acted as team leader for extensive hydrogeological field investigation, including aquifer testing, slug testing, and down-hole electromagnetic flow logging. These analyses, along with review of available well logs, contributed to a successful update of the conceptual site model and remedial strategy. Delineated contaminant distribution of chlorinated solvents, metals, and 1,4-dioxane through geostatistical interpolation that filled significant data gaps and improved understanding of plume delineation.

Former Chemical Production and Storage Facility, Newark, California

Led groundwater monitoring program on dynamic, multi-consultant site with ongoing in situ remediation of chlorinated solvents. Responsible for RCRA regulatory compliance and was lead author on report deliverables. Oversaw aquifer testing and characterization, including short-term pumping tests and slug tests. These tests provided relatively low-cost, efficient characterization of aquifer properties of contaminated areas with minimal waste generation that contributed to in situ remediation design.

Chemical Production Facility, El Segundo, California

Led the monitoring/reporting program for remediation of a chlorinated solvent site, and directed subcontractors. Used geospatial analysis to implement sampling frequency reduction for the monitoring well network and reduce costs. Characterized local hydrostratigraphy via well logs and an in-well transducer network. Assessed injection well operations for the West Coast Basin Barrier Project to address concerns about potential interaction with contaminants in coastal aquifers.

Industrial Facility, Torrance, California

Employed analytical element modeling to assist groundwater remediation system design. These models provided an efficient platform for design of injection/extraction well configuration and operations. Acted as groundwater monitoring and reporting program leader and directed the industrial client's offsite data management contractors, which resulted in substantial cost savings for routine analysis and reporting.



Brownfield Site Remediation, San Francisco, California

Characterized site geology, hydrogeology, and extent of solvent and metals contamination via direct-push sampling and logging. Oversaw an in situ bioremediation pilot study for enhanced reductive dechlorination that led to successful full-scale injection operations and eventual site closure and redevelopment.

GEOTECHNICAL**Construction Dewatering Projects, Various Locations, Los Angeles, California**

Oversaw all phases of planning, scoping, permitting (including NPDES), performance, and data collection associated with aquifer characterization to aid in dewatering design and subsurface construction plans. Analyzed pumping and slug test data to evaluate projected inflow during construction dewatering. Results of the investigations led to substantial improvements over the dewatering contractor recommendations and averted large future costs and engineering difficulties for the developer client. Utilized analytical element and traditional numerical flow models to evaluate the effects of dewatering systems on the local hydrogeology. Used models to perform forensic analysis to improve the clients' understanding of unsuccessful dewatering designs.

Transit and Utility Alignments, Los Angeles, California

Provided technical support for aquifer tests associated with dewatering activities for subsurface transit and utility alignments. These projects included the Westside Subway Extension, as well as water pipeline alignments.

SELECTED PUBLICATIONS AND PRESENTATIONS

Culkin, S. 2023. Monitoring and Modeling of Subsidence and Settlement from Groundwater Pumping, Millennium Tower Property, Downtown San Francisco Groundwater Basin. GRA Western Water Conference, September.

Culkin, S. 2019. Evaluating Saltwater-Freshwater Dynamics in Coastal Aquifer Conceptual Site Model Development and Groundwater Management. 29th Annual International Conference on Soil, Water, Energy, and Air, AEHS Foundation, San Diego, CA, March.

Culkin, S., Tana, C., and Williams, D. 2017. Proxy Measurable Thresholds for Seawater Intrusion, GRA SGMA Conference – Tools for Developing a GSP, May.

Culkin, S. 2016. Using Cross-Sectional Models to Develop Measurable Objectives for Saltwater Intrusion, California Water and Environmental Modeling Forum 2016 Annual Meeting, April.

Culkin, S. 2013. Use of genetic algorithm optimization for operational management of extraction wells within a mature groundwater plume, Monterey Bay, California, MODFLOW and More 2013.

Culkin, S. 2013. Hydrogeological characterization in the development of underground structures – Los Angeles Basin, California. 2013 Annual Meeting Program with Abstract, Association of Environmental & Engineering Geologists, Seattle, WA.



Chamberlain, W.C., Culkin, S., and Xu, X. 2012. Hydrogeologic Characterization in the Development of Underground Structures - Los Angeles Basin, California, *Environmental and Engineering Geoscience*, Vol 18, no. 3, pp. 295-308.

Culkin, S., Singha, K., and Day-Lewis, F.D. 2008. Implications of Rate-Limited Mass Transfer for Aquifer Storage and Recovery Efficiency, *Ground Water* Vol. 46, no. 4, pp. 591-605.

Culkin, S. 2007. Understanding aquifer storage and recovery efficiency in a clastic-limestone aquifer, Charleston, South Carolina. *Geological Society of America Abstracts with Programs*, Vol. 39. No. 1.

Culkin, S., and A.M. Franzese. 2004. Distinguishing between provenance changes and sorting effects on the Rb-Sr systematics in glacial and Holocene South Atlantic sediments. *AGU Fall Meeting Abstracts*.

