ANDREW CALDERWOOD, PhD

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SUMMARY

- Civil and Environmental Engineering education provided a strong focus on the physics and applications of water resources engineering which was rounded out by hydrology classes focusing on larger scale natural resources and numerical modeling
- Strong understanding of the foundational concepts, equations, and numerical methods used to model groundwater flow and transport
- Contributed to the development and use of monitoring and numerical methods to study of groundwater-surface water interaction on the local and regional scale

TECHNICAL SKILLS

- **Data Visualization:** Cleaning, restructuring and plotting of both spatial and time series data in R and Python
- **Field work:** Planning, installing, and maintaining sensors to monitoring the soil zone, groundwater, and in-stream conditions to monitor hydrologic conditions or support the measurement of the the effects of project implementation such as on-farm recharge
- **Groundwater-surface water modeling:** Building groundwater-surface water models in the MODFLOW framework from publicly available data sets using Python to improve model adaptability and reproducibility
- **Geospatial analysis:** Analyzing and transforming geospatial data in R, Python, QGIS and ArcGIS with an emphasis on reproducibility through programming in Python and R
- **Numerical methods:** Experience reviewing FORTRAN 90/95 code (e.g. the MODFLOW family of codes) to understand the internal function of code and comfortable to make minor changes to existing FORTRAN codes for MODFLOW to test new methods

WORK EXPERIENCE

Larry Walker Associates **California**
Project Engineer *October 2021 to Present*
- Applied groundwater flow models to assist GSP Annual Reporting and research studies
- Assisted preparation of bi-annual and annual groundwater quality monitoring reports to fulfill regulatory reporting requirements.
- Data management and visualization of environmental monitoring data to inform GSP Annual Reporting and Managed Aquifer Recharge benefit monitoring

Larry Walker Associates **Davis**
Groundwater Intern *Nov 2020 to Sep 2021*
- Developed a groundwater flow model to create historical and projected water budgets for GSP completion
- Data management and visualization of groundwater level data to inform water level trends and surface water-groundwater interconnection
- Worked with stakeholders to develop groundwater flow model scenarios to test recharge project scenarios
- Stream gaging and installation of field equipment for stream and groundwater monitoring

Hydrologic Sciences Graduate Group **UC Davis**
Graduate Student Researcher *Aug 2019 to June 2023*
- Developed HYDRUS 1D models to estimate potential recharge from a managed flooding project
- Installed sensors to capture stream stage and stream wave arrival times and other various sensors to capture on-farm recharge
- Installed environmental sensors and managed data collection of groundwater level, soil moisture, temperature and conductivity, and stream flow to study the impacts of agricultural Managed Aquifer Recharge
- Developed a groundwater-surface water model covering the lower Cosumnes River region to investigate stream-aquifer interaction and floodplain recharge
- Analyzed heterogeneous geologic realizations under varying flood types to quantify the ideal range of levee setbacks for groundwater recharge

Graham Fogg Lab **UC Davis**
Research Assistant *Mar 2018 to Aug 2019*
- Updated and organized continuous groundwater level data
- Managed pressure transducers in the field and install telemetry equipment
- Programmed and plotted data to create short reports on the field site such as evapotranspiration

Thomas Harter Lab **UC Davis**
Research Assistant *Oct 2017 to Mar 2018*
- Researched government websites for state well codes regarding the annular seals of wells
- Organized well codes into a comprehensive spreadsheet
- Created criteria to sort the data based on commonalities

Hydrologic Engineering Center, USACE **Davis**
Research Assistant *Jul, Sep 2017*
- Digitized historical river depth cross sections
- Performed quality control on cross section data
- Created an Excel VBA program to quantify the occurrence of scours at a set depth

EDUCATION

Ph.D. in Physical Hydrology **UC Davis**
Hydrologic Sciences Graduate Group *Mar 2024*
- Research area: Surface water-groundwater interactions
- Committee: Helen Dahlke, Laura Foglia, and Graham Fogg
- Related coursework: SSC 107 Soil Physics, HYD 269 Theory of Groundwater Modeling, HYD 274 Application of Groundwater Modeling, ECI 273 Water Resources Systems Engineering, HYD 298 Inverse Modeling, HYD 243 Water Resources Planning and Management, ECI 240 Water Quality

B.S. Civil Engineering **UC Davis**
Department of Civil and Environmental Engineering *Jun 2019*
- Specialization: Water Resources
- Related coursework: ENG 103 Fluid Mechanics, ECI 141 Engineering Hydraulics, HYD 144 Groundwater Hydrology, HYD 146 Hydrogeology and Transport, ECI 142 Engineering Hydrology, ECI 146 Water Resources Simulation

TEACHING AND MENTORING EXPERIENCE

- September 2021, 2022, 2023, 2024 - Short course teaching on Groundwater Modeling Theory and Applications
  - Taught students to use ModelMuse to develop an example groundwater flow model while explaining the hydrogeological conceptual model. Prepared detailed instructions in a Word document and PowerPoint presentation formats for student reference.
  - Demonstrated the use of ModelMuse to explore an existing groundwater model and interpret its results
- Spring 2020, 2021 - Teaching Assistant for ESM 108 Environmental Monitoring
  - Taught students about the application of Arduinos in environmental monitoring
  - Held office hours to assist students on homework
  - Created three homework assignments to teach data analysis, applications of excel and environmental monitoring
- Fall 2019 - Reader for HYD 144 Groundwater Hydrology
  - Held office hours to explain foundational and advanced concepts of groundwater hydrology to undergraduate students
  - Graded student homework assignments and exams

PUBLICATIONS

Calderwood, A.J.; Pauloo, R.A.; Yoder, A.M.; Fogg, G.E. Low-Cost, Open Source Wireless Sensor Network for Real-Time, Scalable Groundwater Monitoring. Water 2020, 12, 1066.

CERTIFICATIONS

State of California Certified **Engineer-in-Training** since June 24, 2020 - Certificate No. EIT 171128

AWARDS

- Jaime Amorocho Memorial Fund Scholarship

CONFERENCE PRESENTATIONS

- American Geophysical Union Fall Conference 2022. Oral Presentation. Setting Bounds on Levee Setback Distance to Optimize High Flow Pathway Use for Groundwater Recharge
- American Geophysical Union Fall Conference 2021. Lightning Poster Presentation. Modeling the impact of levee setback on groundwater recharge and stream flow and temperature for ecosystem and anthropogenic needs
- American Geophysical Union Fall Conference 2020. Poster Presentation on Modeling the Impact of Levee Removal on Groundwater Recharge Using Robust Floodplain Data – a Case Study of the Cosumnes River

OTHER SKILLS

Communication Software Latex/Overleaf, Microsoft Word, Excel, and PowerPoint
Programming Languages Python, R, FORTRAN (F90), MATLBAB, and Excel VBA
Professional Software QGIS, ArcGIS, AutoCAD
Numerical Modeling MODFLOW, UCODE2014, Hydrus-1D, MODPATH
Languages English: Native. Spanish: Advanced writing and intermediate speaking. French: conversational.