

# Irucka Embry, EIT

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## Experience

**Principal**, November 2007 – Present  
EcoC<sup>2</sup>S  
Nashville, TN

Performing data mining, data cleaning and munging & exploring data visualization techniques on a variety of data stored in Microsoft Excel/Libre Office Calc spreadsheets, MariaDB/MySQL databases, and text files using R.

Doing R developer tasks for clients and/or myself, including the creation and maintenance of R packages for CRAN (`iemisc`, `iemisdata`, `ie2misc`, `ie2miscdata`, `USA.state.boundaries`, and `install.load`). Writing unit test code for functions within the `iemisc` package.

Fulfilling R programming tasks for clients – see notable projects – & myself – the creation and maintenance of R packages {the main R package is a collection of R functions that cover 1) statistical analysis [RMS, coefficient of variation (CV), approximate and relative error, range, harmonic mean, geometric mean], 2) engineering economics (benefit-cost, future value, present value, annual value, gradients, interest, periods, etc.), 3) geometry (sphere volume, right triangle calculation, area of a polygon), 4) civil & environmental/water resources engineering (Concrete mix design for normal strength concrete, conversion of Kentucky and Tennessee surveying coordinates to geospatial coordinates, Manning's n, Gauckler-Manning-Strickler equation, and conversion of Construction fractions to decimals), 5) a version of linear interpolation for use with NAs, 6) GNU Octave/MATLAB compatible trigonometric functions in degrees, & 7) GNU Octave/MATLAB compatible size, numel, and length functions.}.

Began creating an edible forest garden ecosystem on formerly fallow land on our maternal family farm in 2013, with Obiora Embry of EConsulting<sup>TM</sup>. We use an eclectic mixture of biologically-based techniques (agroecology, agroforestry, agrohomeopathy/biodynamic and organic agriculture, companion planting, permaculture, and soil food web dynamics) to restore the health and vitality of the land. With Obiora, presented to agricultural conference attendees about the food growing & soil health building practices that we use.

Provided Consulting Services [Agricultural Best Management Practices (BMPs), Budget Creation, Grant Writing, Survey Development & Water Quality] for Cherokee Historical State Resort Park of Aurora through the National Association of State Departments of Agriculture (NASDA) Foundation-Environmental Protection Agency (EPA) Historically Underserved Farmers Grant.

Supplied design, maintenance, and planning services for clients to grow good food for themselves & pollinators and other wildlife.

Used various teaching strategies to help students better understand mathematics (Algebra I & II, Trigonometry, and Geometry), Beginner through Intermediate Spanish, Biology, General College Chemistry, and High School Physics.

Researched many effective sustainable design solutions to solve stormwater problems, including green roofs, grassed swales, bioretention/bioinfiltration facilities (including rain gardens), rainwater harvesting (rain barrels), etc. as a member and the Web site designer for the ASCE (American Society of Civil Engineers) - EWRI (Environmental & Water Resources Institute) Sustainable Design Water Pollution Engineering Committee (SDWPEC) – now the ASCE-EWRI Sustainability Committee.

Produced various 2-D designs in CAD software (solar shade placement, rain garden, hoop house interior, & garden layout and design).

### **Notable Projects**

- Wrote R scripts and functions to download and harmonize (UN) Multiple Indicator Cluster Survey (MICS). [<https://bitbucket.org/ow2Bj8Zlm0aWqX/dhsharmonisation/src/master/MICSharmonisation>].
- Made R scripts and functions to visualize the ecological interactions between viruses and bats based on their location.
- Developed a R package to perform fuzzy matching on two large data sets to be merged together.

### **Transportation Project Specialist**, December 2016 – July 2021

Tennessee Department of Transportation (TDOT) Environmental Division Ecology and Permits Office, Permits Section  
Nashville, TN

Was responsible for obtaining environmental permits associated with water resource alterations to waterbodies (creeks, rivers, springs, streams, wetlands, and wet weather conveyances), impacts to potential sinkholes, and stormwater management [National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit] for transportation projects from federal and/or state environmental agencies, including the U.S. Army Corps of Engineers, TDEC, and the Tennessee Valley Authority (TVA).

Reviewed water resource information provided by the TDOT Ecology Section and transportation engineering plans to determine potential water resource impacts, permit requirements, and the type of permits needed.

Reviewed project design plans and provided assessments of the proposed impacts that specify changes which are required to the plans to meet all the environmental requirements necessary for permit application.

Identified and located on construction plans the proposed impacts to jurisdictional water resources in the form of a permit assessment to describe the extent of the construction-related impacts and any required mitigation for the proposed project impacts.

Attended field review meetings to address environmental requirements and concerns.

After receiving revised project plans, reviewed them to ensure all environmental issues have been addressed prior to permit application.

Compiled supporting documentation from several different sources to prepare a permit application, including reviewing the mitigation plan provided by the TDOT Mitigation Office and the Stormwater Pollution Prevention Plan.

Addressed comments and/or concerns from the regulatory agencies after submitting permit applications to them; draft or compile e-mail responses and appropriate documentation; coordinate with regulatory agencies to help ensure timely permit actions.

Following permit issuance, reviewed the permits for errors; distributed the permits to TDOT personnel; and when construction impact changes were necessary, reviewed documentation provided by construction personnel, resolved environmental issues, and/or applied for permits/permit modifications.

Updated the database with relevant information regarding the receipt of permits, plans & project-related communication with other TDOT personnel, regulatory agencies, etc. Upload project documents to the online file storage system.

Coordinated with TDOT Design and Operations (Maintenance and Construction) to provide clarity of permit requirements and resolve environmental issues identified during the construction phase of TDOT projects.

Coordinated and/or consulted with staff from various TDOT areas: Design and Operations (Maintenance and Construction), the Environmental Division {Environmental Analysis Office, Environmental Mitigation, Ecology Section, other staff in the Environmental Permits Section}, Right-of-Way (ROW) Division, Structures Division Hydraulic Design Section, and Roadway Design Division to accomplish project objectives (obtaining permits and maintaining environmental compliance during the construction phase of the projects).

Maintained a comprehensive, current knowledge of applicable laws/regulations; maintain an awareness of new trends and advances in the civil & environmental engineering profession; read professional literature; attend workshops, conferences, and training sessions.

Designed a new Microsoft Access database for our office.

Wrote R scripts and functions to convert between engineering survey coordinates in Tennessee and Kentucky.

Wrote R scripts and functions to replicate data analysis steps that would normally be performed in Microsoft Excel/LibreOffice Calc spreadsheets.

**Adjunct Professor**, August 2016 – August 2019

August 2015 – December 2015

August 2013 – December 2014

Tennessee State University (TSU) Civil and Architectural Engineering Department

Nashville, TN

Prepared students to take the NCEES Fundamentals of Engineering (FE) Examination through teaching test-taking strategies and effective methods to solve a variety of engineering problems.

Mentored both undergraduate and graduate students with regards to both academic and career goals.

Instructed students in the Theory of Structures I (Structural Analysis) course, which is about the analysis of statically determinate and indeterminate structures.

Taught Structural Testing Laboratory, which is about the design and testing of concrete mixes.

Instructed students in the Freshman Engineering Seminar course which introduces the following topics: Personal and Engineering Ethics (including discussing current issues such as the Fukushima Daiichi and Daini nuclear power plant explosions & the General Motors parts recall), the path to PE licensure, Problem solving, computer programming with R and MATLAB/GNU Octave, Data Analysis & Visualization with R, Statistics and Probability (including the analysis of product failure rates), Engineering Economics, and Communication.

Participated in Department meetings and made improvement recommendations to the Department Chair.

## **Scientist II**, July 2013 – July 2015

Cherokee Nation Technology Solutions, LLC (CNTS)  
Nashville, TN

Worked on assignment for the USGS Lower Mississippi Gulf Water Science Center, Tennessee Office (formerly the Tennessee Water Science Center) assisting them with data management and analysis & computer modeling.

Created and provided R Trainings for both Tennessee State University students/faculty & USGS colleagues to help them learn the R programming language.

Performed data mining, data cleaning and munging & explored data visualization techniques on a variety of data stored in Microsoft Excel spreadsheets and text files using R.

Wrote many R functions (similar to Microsoft Excel macros) to clean and compile data stored in Microsoft Excel spreadsheets.

Wrote R functions to perform lookup ups between tables (similar in scope to VLOOKUP in Microsoft Excel).

Displayed data using pivot tables in R (similar to pivot tables in Microsoft Excel).

Used MariaDB/MySQL to create and manage a database from a Microsoft Excel spreadsheet containing numerous tabs for easier data analysis in R.

Extracted tabular data stored in Portable Document Format (PDF) documents to create a geographic map in R.

Developed computer models, in R, based off of models created in Microsoft Excel spreadsheets, to calculate the water-surface forced evaporation and long-term average hydroelectric-reservoir evaporation for surface-water based (lake, pond, and river) thermoelectric power plants.

Verified the location of Southeast National Pollutant Discharge Elimination System (NPDES) wastewater discharge locations in ArcMap for inclusion in the SPARROW (SPAtially Referenced Regressions On Watershed attributes) model. Researched EPA databases to confirm the presence of site locations.

Created R scripts and/or functions to aid in the computation of sediment concentrations and loads at 12 Tennessee Department of Transportation (TDOT) streamflow stations for which turbidity and sediment data are available.

Produced R scripts and/or functions to calculate the mean and median depth at approximately 5,000 USGS stream gaging stations.

Programmed and troubleshooted R codes while using the Exploration and Graphics for RivEr Trends (EGRET) R-package [which includes the water-quality method Weighted Regressions on Time, Discharge, and Season (WRTDS)] for the analysis of seasonal changes in nutrient loading and stream flow for South Carolina sites used in the SPARROW model. Suggested recommendations for reducing the nutrient loading from agricultural sectors by using biologically-based farming techniques.

**Physical Science Technician**, May 2012 – April 2013

August 2011 – September 2011

USGS Tennessee Water Science Center

Nashville, TN

Performed data mining, data cleaning and munging & explored data visualization techniques on a variety of data stored in Microsoft Excel spreadsheets and text files using R.

Created maps in ArcMap to display the temporal seasonal variations for the South Carolina region using results from the USGS SPARROW (SPAtially Referenced Regressions On Watershed attributes) dynamic model.

Programmed and troubleshooted R codes while using the Exploration and Graphics for RivEr Trends (EGRET) R-package [which includes the water-quality method Weighted Regressions on Time, Discharge, and Season (WRTDS)] for the analysis of seasonal changes in nutrient loading and stream flow for South Carolina sites used in the SPARROW model.

Assisted Vanderbilt University's School for Science & Math in their research project at Mammoth Cave National Park, Kentucky.

Traveled to the Mammoth Cave National Park to collect groundwater and surface water samples.

Traveled to the Hardeman County Landfill to collect mulch samples from the bioreactor. Hardeman County Landfill is the home of an unlined dump with a groundwater plume of carbon tetrachloride and other dense non-aqueous phase liquids (DNAPLs).

Performed geochemical analysis of water samples from both Mammoth Cave and Hardeman County Landfill.

Studied the desorption properties of the bioreactor mulch samples from Hardeman County Landfill.

Studied the sorption properties of ordinary mulch covered with water gathered from Hardeman County Landfill.

Analyzed the desorption properties of the bioreactor mulch samples from Hardeman County Landfill using a gas chromatography (GC) instrument.

Analyzed the sorption properties of the ordinary mulch covered with water from Hardeman County Landfill using a GC instrument.

Performed a literature search on alternative remediation strategies for the Hardeman County Landfill (composting, bioremediation, mycoremediation, etc.).

Edited part of the report: "Evaluation of Sediment, Surface-Water, and Pore-Water Chemistry and Mussel Populations in the Clinch, Powell, Emory and South Fork Cumberland River Basins in Tennessee, Virginia, and Kentucky, 2004-2005".

Edited the Tennessee 2011 Science Center Health Table 3-5.

**Graduate Student Researcher**, January 2011 – August 2012

TSU Civil and Environmental Engineering Department

Nashville, TN

Explored data visualization techniques on a variety of data stored in Microsoft Excel spreadsheets using GNU Octave/MATLAB.

Researched the fate and transport mechanisms of contaminants in karst aquifer systems. Specifically, this research involved the development of mathematical models and methodologies to model biodegradation of contaminants in surface water, streams and groundwater.

Presented research findings, as a lead author, in six research conferences and, as a secondary author, in one research conference.

Traveled to Mammoth Cave to take discharge measurements before and during a storm for later analysis in a quantitative field dye tracer study.

Oversaw the design and set-up of a quantitative dye tracer study at Mammoth Cave.

Derived a residence time distribution (RTD) function based on the gamma distribution to better model non-ideal flow, in particular karst aquifers. This allows for the determination of the time that possible contaminants will move through a system. Knowing this time can aid in the remediation of pollutants through bioremediation and/or other natural attenuation strategies.

Performed data and graphical analysis in LibreOffice/OpenOffice.org Calc and GNU Octave, which included writing GNU Octave script and function files to apply the gamma derived RTD to laboratory and Mammoth Cave field data analysis.

Performed an extensive literature search on mathematical modeling of the RTD function and the fate and transport of contaminants in karst aquifer systems.

Along with other TSU/USGS-affiliated scientist and engineers, spoke to students at Cockrill Elementary School's Career Day in Nashville, Tennessee, about environmental education and our chosen profession.

**Project Engineer**, October 2005 – November 2007

Rutherford County Landfill

Murfreesboro, TN

**Summary:**

As an Environmental Project Engineer, responsible for the safety of the public, landfill contractors, and landfill staff while on the landfill property. Safety concerns included: air pollution (dust from the active landfill face, construction activities, and the release of methane gas due its highly combustible properties), noise pollution (heavy equipment used on the landfill property), landfill active face slope stability, landfill face haul road safety, etc. Responsible for assessing the environmental risk due to landfill operations (storm water discharge from construction areas,

active and closed landfill faces; litter and dust control; possible leachate contamination of the groundwater and/or leakage into the nearby Stones River). Reviewed the construction plans for the wet detention ponds designed by the Consulting Engineer, Trent Smith. Ensured that the wet detention ponds were constructed in accordance with the specifications and engineering plans. Maintained the wet detention ponds through visual inspection before, during, and after rainfall events that to ensure that the wet detention ponds operated as designed. Verified that the wet detention ponds were not discharging silty water to Stones River. In the instances where the detention ponds were discharge silty water, recommended and oversaw the implementation of check dams directly beneath the detention pond outfall and silt fence with backing around the contours of the detention ponds to correct the turbid water discharges to the Stones River. Performed quality control checks on the EPSC BMP techniques that were implemented weekly. When the techniques had failed or were failing, ordered replacement silt fences, straw bales, shot rock, and other items to remedy the situation. Oversaw the implementation of the EPSC BMPs by the landfill staff or made the corrections myself. Discussed potential code/regulatory potential violations with the TDEC DSWM Inspectors during the quarterly inspections. Ensured that the landfill was operating within the laws governing the Class I/III/IV and tire collection programs.

Directed, oversaw, and managed landfill operations and activities. The landfill included an active Class III/IV [construction/demolition (C&D), farming, landscaping, and land clearing wastes], a post-closure Class I [commercial, domestic, institutional, and municipal solid wastes], and a tire collection/storage/transfer facility.

Supervised and directed 4 full-time staff (2 heavy equipment operators, 1 office manager, and 1 mechanic) & 1 part-time personnel (heavy equipment operator); directed, supervised, and inspected work; processed employee concerns and problems (counseled and disciplined staff); encouraged, listened, and complimented staff; made hiring recommendations; and made salary raise recommendations.

Coordinated daily work activities; organized, prioritized, and assigned work; monitored the status of work in progress and inspected the completed work; consulted with staff; assisted with complex/problem situations; and provided technical expertise with supervision from the County Engineer. Developed work schedules to ensure adequate coverage; conducted staff training; reviewed, approved, and processed timesheets; maintained employee records.

Consulted with the County Mayor, other County employees (including other County Project Engineers, the retired Landfill Consultant, and other landfill staff), the Landfill Consulting Engineer, and worked with the County Engineer to review department operations/activities, review/resolve problems, receive advice/direction, and/or provide recommendations. Responded to complaints and/or questions related to department operations from the public (customers), other County employees, and/or TDEC DSWM inspectors/regulators.

Performed project management and oversight; developed project conceptual drawings for the establishment of native vegetation in former borrow pit areas; used project designs and drawings developed by the Landfill Consulting Engineer; scheduled, coordinated, and oversaw construction activities; coordinated and supervised the daily activities of outside contractors; coordinated heavy equipment contracted services to accomplish landfill operation objectives.

Worked with the County Engineer, the Landfill Consulting Engineer, the Tennessee Department of Environment and Conservation (TDEC) Division of Solid Waste Management (DSWM) staff,

and TDEC Division of Air Pollution Control staff to request modifications to our permit(s). Irucka was responsible for coordinating the communication between all parties. 1) Reviewed the DSWM regulations regarding landfill cover. Discussed the possibility of using an alternative daily cover (wood chips) for the active C&D landfill footprint, but DSWM chose to keep soil as the daily cover. 2) Discussed the possibility of extending the working face area of the active C&D landfill due to the increase in C&D waste after the storm clean up. Worked with the County Stormwater Project Engineer to survey the proposed active area. Calculated both the remaining landfill capacity of the active face (based off the permit conditions) & the generated waste volume that could be stored in the proposed active area. Determined the number of years of active life for the proposed active area. 3) Reviewed the DSWM regulations for burning waste. Requested a permit modification to allow the open burning of landscaping debris and yard waste within an enclosed berm rather than burying it in the active C&D landfill.

Worked with the County Engineer, the Landfill Consulting Engineer, and TDEC DSWM personnel to correct our permit violations. One violation related to stormwater runoff entering the Stones River and the second violation was for waste in water outside of the permitted area. The County Engineer decided the remediation strategies, but Irucka directed the implementation of the solutions by the landfill staff and contract heavy equipment operators. In addition, Irucka was responsible for coordinating the communication between all parties.

Worked with the Landfill Consulting Engineer to replace a groundwater pumping well cap and a groundwater pumping system. Responsible for ordering the needed supplies from the vendors. Assisted the Landfill Consulting Engineer in the proper installation of the well cap & pumping system and components.

Worked with the County Engineer, the Landfill Consulting Engineer, Tennessee Wildlife Resources Agency (TWRA), and TDEC DSWM personnel to determine the appropriate area(s) for establishing native warm season grasses (nwsg) and bushes on former borrow pit areas to minimize the soil erosion (native vegetation have deep tap roots that hold onto soil particles better than short-rooted turf grasses) and for conservation purposes (habitat and food for wildlife). Decided the planting mixes and seeding rates, in conjunction, with the native landscaping consultants. Created CAD conceptual drawings for the placement of the native brush along with the appropriate firebreaks.

Coordinated the inspection and maintenance of the passive methane gas collection and control system. Repaired and/or replaced components of the passive methane gas collection and control system (batteries, guy wire, solar panels, etc.) either by myself or with the assistance of other landfill staff.

Managed the construction of a wet detention pond riser base and the installation of the riser & provided technical expertise in the reading of the Landfill Consulting Engineer's engineering plans and specifications.

Performed calculations to determine the size of the wet detention pond riser base. Managed the clean-up operations of the wet detention ponds, including pumping and resurfacing with appropriate rock fill.

Surveyed Rutherford County drainage inlet/outlet structures using a Leica GPS unit to gather GIS mass points as required by the EPA NPDES Stormwater Phase II program.

Reviewed Rutherford County subdivision hydrologic and hydraulic stormwater drainage design calculations; researched United States Geological Survey (USGS) and Tennessee Department



of Transportation (TDOT) drainage designs; performed hydrologic and hydraulic drainage calculation comparisons; reported findings to the County Engineer and Stormwater Project Engineer.

Coordinated the implementation of stormwater management and soil erosion prevention and minimization techniques; oversaw the continued remediation and soil erosion prevention and minimization of the landfill footprint; oversaw the application of stormwater management principles to prevent severe erosive conditions.

Maintained approved final contours and drainage systems of landfill site; maintained overall site conditions to prevent or minimize negative environmental impacts, which included dust, litter, fire, leachate release, waste release, groundwater contamination, soil erosion, and/or sediment release; corrected site conditions when negative environmental impacts occurred; ensured vegetative cover was present, where possible; approved, reviewed, and inspected both structural and non-structural best management practices (BMPs); and used soil erosion prevention and minimization & sediment control BMPs, e.g., vegetation, straw bales, straw blankets, geotextile silt fences, check dams, riprap, and native grasses.

Supervised the implementation of soil erosion prevention and minimization & sediment control devices. Oversaw the planting of native vegetation for soil erosion minimization, sediment control, and conservation.

Prepared the department budget with the County Engineer and Office Manager; made requests to modify budget line items; monitored expenditures to ensure compliance with the approved budget; reviewed and approved invoices and contractor payment requests with the supervision of the County Engineer; consulted with State finance auditors.

Provided budget amendments and the yearly landfill budget to the County Budget & Finance Committee.

Researched and analyzed submitted bids for annual contracts and other contracted services; negotiated contracts with vendors (equipment/vehicle purchases, heavy equipment repair, etc.) and contractors (concrete construction & heavy equipment rental and labor); specified conditions for both the vendor and contractor contract awards; and recommended the awarding of the annual heavy equipment rental & labor contract to the County Purchasing Committee. Compared the cost estimates for repairing heavy equipment versus 1) renting heavy equipment for landfill staff to operate or 2) adding an additional heavy equipment vehicle and operator to the heavy equipment contractor's contract.

Monitored the inventory of department equipment, materials, and supplies; ensured the availability of adequate materials to conduct projects and work activities; initiated orders for new/replacement materials.

Worked with the County Engineer and the County Inventory Department to sell surplus equipment.

Worked with the County Engineer to determine the structural requirements for a new, reinforced concrete shop floor with a water diversion drain and storm gate. Provided written monthly reports to the County Public Works Committee and provided reports to both the County Engineer and County Mayor.

Communicated with county officials, employees, inmate workers, other departments, regulatory agencies, environmental agencies, outside agencies, engineers, consultants, tire dealers, contrac-

tors, vendors, the public, adjacent Class I private landfill managers and staff, Williamson County Landfill directors and managers, and other individuals to coordinate work activities, review status of work, exchange information, resolve problems, and/or give/receive advice/direction.

Protected human and environmental health by minimizing air and water pollution that left the landfill site.

Maintained state-regulated tire collection/storage/transfer facility; maintained tire recycling program; and managed truck hauling operations.

Monitored and maintained the post-closure requirements pertaining to groundwater monitoring, methane gas dispersion, and the leachate collection system in environmental compliance with TDEC regulations; coordinated with TDEC regarding the closure/monitoring program; maintained and monitored the methane gas collection and control system; analyzed laboratory results of the groundwater assessment/monitoring program and methane gas dissipation processes reported by the Landfill Consulting Engineer; coordinated quality assurance and quality control of post-closure activities; conducted field & inspection audits to help develop and maintain landfill environmental compliance.

Ensured department compliance with the requirements of the Environmental Protection Agency (EPA), EPA National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II program, TDEC, state/federal regulations, and all other applicable codes, laws, rules, regulations, standards, policies and procedures; ensured adherence to established safety procedures; monitored the work environment and the use of safety equipment to ensure the safety of employees and other individuals; and initiated any necessary actions to correct deviations and/or violations.

Maintained standards of environmental compliance as set forth by federal/state environmental regulations and conservation regulations governing the operation of a Class III and Class IV landfill, the post-closure of a Class I landfill, tire collection/storage/transfer facility, and the stormwater management program.

Made available for TDEC DSWM inspectors the permits, records, warranties, and other required documentation pertaining to Class I, III, and IV landfill facilities & the tire collection program.

Ensured that gas, groundwater, inspection, and leachate monitoring records were made available for inspection by TDEC regulators.

Reviewed the groundwater and methane gas monitoring reports to ensure the landfill complied with state/federal environmental regulations. Submitted required information and reports to the state regulatory agencies within designated timeframes.

Maintained a comprehensive, current knowledge of applicable laws/regulations; maintained an awareness of new trends and advances in the environmental engineering profession; read professional literature; maintained professional affiliations [American Society of Civil Engineers (ASCE) Associate Member; ASCE - Environmental & Water Resources Institute (EWRI) Sustainability Task Committee Web site designer and maintainer; Solid Waste Association of North America (SWANA); Rutherford County Solid Waste Ad Hoc Committee; Rutherford County Paint Recycling Research Committee]; attended workshops, conferences, and training sessions.

## **Notable Projects**

- Groundwater pump removal and replacement
- Stormwater management for landfill
- Remediation of wet detention ponds
- Construction of riser for wet detention pond

## Volunteer Experience

**Volunteer for Science**, July 2015 – March 2021

April 2013 – June 2013

USGS Tennessee Water Science Center

Nashville, TN

Created and maintained R packages (`ie2misc`, `ie2miscdata`, `states2k`, and `FEWSR`) that contain miscellaneous USGS R functions [processing `.exp` and `.psf` files generated by the USGS PeakFQ program, statistical error functions, “+” dyadic operator for use with NA values, creating ADAPS and QW spreadsheet files from raw USGS National Water Information System (NWIS) files, calculating saturated enthalpy, etc.]. Wrote the functions while a CNTS USGS Contractor and/or USGS employee.

Performed data mining, data cleaning and munging & explored data visualization techniques on a variety of data stored in Microsoft Excel spreadsheets and text files using R.

Developed computer models, in R, based off of models created in Microsoft Excel spreadsheets, to calculate the water-surface forced evaporation and long-term average hydroelectric-reservoir evaporation for surface-water based (lake, pond, and river) thermoelectric power plants.

Programmed and troubleshooted R codes while using the Exploration and Graphics for RivEr Trends (EGRET) R-package [which includes the water-quality method Weighted Regressions on Time, Discharge, and Season (WRTDS)] for the analysis of seasonal changes in nutrient loading and stream flow for South Carolina sites used in the SPARROW model. Suggested recommendations for reducing the nutrient loading from agricultural sectors by using biologically-based farming techniques.

Troubleshooted R codes, as necessary, while using the EGRET R-package.

## Computer Skills

- Microsoft Windows and GNU/Linux (Operating Systems)
- Bash shell {Git, SSH}
- Microsoft Office Suite (Access, Excel, Outlook, PowerPoint, Word) and LibreOffice Suite (Base, Calc, Impress, Writer)
- R and GNU Octave/MATLAB
- MariaDB/MySQL (Database)
- ArcGIS (ArcMap), QGIS and R

- LibreCAD (2-D CAD)
- The GIMP, ImageMagick and Inkscape (Image Manipulation)
- Scribus (Desktop Publishing)
- HTML and CSS (Web site development)

## Education

Doctor of Philosophy in Engineering Program, Tennessee Technological University (August 2012 – January 2013)

Concentration in Environmental Engineering  
10 semester hours completed

*Master of Engineering*, Tennessee State University (August 2012)

Concentration in Environmental Engineering  
Overall Cumulative GPA: 4.00/4.00

Post-Baccalaureate Program, University of Kentucky (August 2004 – May 2005)

Civil and Environmental Engineering  
Overall Cumulative GPA: 3.58/4.00  
24 semester hours completed

*Bachelor of Science in Civil Engineering*, University of Tennessee, Knoxville (August 2004)

Concentration in Environmental Engineering  
Minor in Spanish

## Publications

Galanter, A.E., Gorman Sanisaca, L.E., Skinner, K.D., Harris, M.A., Diehl, T.H., Chamberlin, C.A., McCarthy, B.A., Halper, A.S., Niswonger, R.G., Stewart, J.S., Markstrom, S.L., Embry, I., and Worland, S., 2023, Thermoelectric-power water use reanalysis for the 2008-2020 period by power plant, month, and year for the conterminous United States: U.S. Geological Survey data release, <https://doi.org/10.5066/P9ZE2FVM>.

Irucka Embry, Victor Roland, Oluropo Agbaje, Valetta Watson, Marquan Martin, Roger Painter, Tom Byl, and Lonnie Sharpe, Derivation of a Multiparameter Gamma Model for Analyzing the Residence-Time Distribution Function for Nonideal Flow Systems as an Alternative to the Advection-Dispersion Equation, *International Scholarly Research Notices*, Volume 2013 | Article ID 539209, <https://www.hindawi.com/journals/isrn/2013/539209/>

## Professional Certification

Engineer-in-Training (E.I.T.) certified by the Tennessee Board of Architectural and Engineering Examiners