HUMBOLDT STATE UNIVERSITY

ASCE
Student Chapter American Society of Civil Engineers

ERE MESSENGER

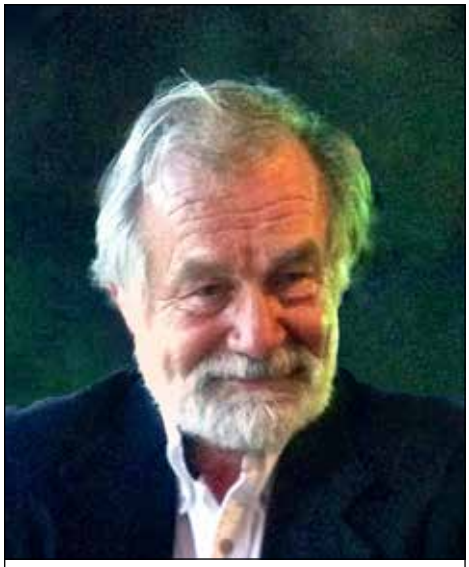
Environmental Resources Engineering

VOLUME 28, NUMBER 1 FALL 2018

Remembering the "First" HSU Engineering Program

by Allan M. Baird, PE, HSU BSCE 1970
Principal Engineer, AM Baird Engineering, Fortuna, CA

I was born and raised in Humboldt County, and I entered Humboldt State College (HSC) in Fall 1964 with a major in Civil Engineering. I graduated in Spring 1970. The Civil Engineering Program changed to Natural Resources Engineering in Fall 1967, and soon after, to Environmental Resource Engineering. However, because I had signed a graduation contract with a major in Civil Engineering prior to the name changes, my degeree is in Civil Engineering. It was also near this time that the college name was changed to what it is today: Humboldt State University (HSU).



Allan Baird, PE, HSU BSCE 1970

I had a heavy course workload at HSU, while also participating in gymnastics, archery, tennis, and wrestling. My engineering instructors were very good teachers, and I especially remember Jim Roscoe, Bill Schenler and Loren Anderson. Professors Roscoe and Schenler were directly responsible for providing the guidance I needed to get through my upper division classes.

There was a distinct camaraderie in the Engineering department in those days, and we had a very active Engineering Club. I was president for two years, and we participated every spring in a huge campus-wide celebration called Lumberjack Days. We competed in a number of events, including bed races, chariot pulling, and log rolling. We also built a "dunk tank" that we used to raise funds.

In Fall 1967, the university switched from the semester system to the quarter system, which created a wrinkle for me in general physics. I was supposed to take three semesters, but had only two semesters and one quarter. Fortunately, HSU accepted this slight discrepancy in meeting my requirements. During my last two quarters, Fall 1969 and Winter 1970, I completed my upper division class requirements and graduated by taking 39 quarter units in two quarters.

Engineering Club crew on winning run in the bed race during 1969 Lumberjack Days. Allan Baird is in front row, right, yellow shirt.

My first job after graduating was with the state of Washington in the Walla-Walla Bridge Division. I recall at one point there were perhaps ten HSU engineering graduates working in the Bridge Division at the same time.

Fast forward to 2018, and I am licensed as a Professional Engineer

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FROM THE EDITORS

Hello from the Messenger staff! We hope you enjoy this Fall 2018 edition.

Student Editors
Kelsey Burrell
Benjamin Goldberg
Steven Hopper

Faculty Advisor
Mike Anderson

Design and Layout
Mike Anderson
Leslie Scopes Anderson

Printing
HSU Marketing & Communications

ERESA@humboldt.edu

www.facebook.com/hsu.eresa

ERE Messenger online:
http://engineering.humboldt.edu/messenger

"Engineering is the art of modeling materials we do not wholly understand, into shapes we cannot precisely analyze, so as to withstand forces we cannot properly assess, in such a way that the public has no reason to suspect the extent of our ignorance."

Dr. A.R. Dykes (1917-1997) British Institution of Structural Engineers

Alumni Profiles

Nathan Lohse
BS ERE 2010
Chief Operating Officer
Western Weather Group, Inc.
Chico, CA

My path to HSU and the ERE program was circuitous, to say the least. I first explored HSU while in high school, with the idea that someday I might be a forester. Procrastination led to my missing the opportunity to attend a four-year university directly after high school. Instead, I attended Sierra College in Rocklin, California, taking whatever general education courses I could get into. After one semester and failing several classes, I joined the U.S. Coast Guard.

My military service initially took me to Kodiak, Alaska, and then to St. Petersburg, Florida. Finishing my enlistment, I decided to stay in Florida and begin coursework at Edison Community College in Ft. Myers.

I moved back to California after several semesters and started again at Sierra College. I progressed through all the general education requirements, as well as many of the major requirements for engineering majors at California state universities. I originally planned to apply to the Civil Engineering program at CSU, Sacramento, but on a whim I applied to Humboldt's ERE program instead. I was accepted, and I began my studies at HSU in Fall 2007.

I was older than most of my classmates, and my primary focus at HSU was getting my coursework finished in a timely manner and moving on to start my career. Consequently, I did not get involved in many extracurricular activities related to ERE. This is my biggest regret from my time at HSU, aside from not picking up fly fishing (enormous opportunities in the area). I did accept a position as a research assistant for former ERE Assistant Professor Dustin Poppendieck, who was studying air pollution associated with fuel-based lighting in developing countries.

My first job out of HSU was as an application engineer for FAFCO, Inc, the oldest solar thermal company in the US. Their primary focus was solar pool heating panels, but they had recently entered the domestic water heating market and needed an engineer to help facilitate the sales of these systems. With FAFCO, I traveled around the country helping our clients solve problems and apply the technology that we developed. I worked there for four years, and then joined my father-in-law's company, Western Weather Group in Chico, California, with the intent to work toward ownership of the company.

I am currently the Chief Operating Officer of Western Weather Group. We provide weather instrumentation and weather forecasting to a wide range of industries. The data that our instrumentation provides drives the mathematical models used by many engineers. We work with many of the state agencies that ERE grads work for. I am reminded of something Prof. Robert Willis told our Systems Engineering class: the primary job

Alumni Profiles

description of an engineer can be boiled down to "an efficient distributor of limited resources." At Western Weather Group, we provide our clients with data to make decisions on how to efficiently distribute their limited resources, be it irrigation water, manpower, or crops. The best part of my job is applying the problem-solving and critical thinking skills that I developed through the ERE coursework.

As an employer of scientists and engineers, my advice to ERE students is to get involved in as many extracurricular activities and internships as possible, because not all lessons are learned in the classroom. Applying the skills you learn in the ERE program to real-world scenarios through internships and club activities speaks volumes to potential employers.

Randi Field
BS ERE 1999
Hydrologic Engineer
U.S. Bureau of Reclamation
Mid Pacific Region
Central Valley Operations
Sacramento, CA

When I left home for college, I felt I was lacking purpose and direction. It took me a few years to figure out that I needed to do something meaningful to me. My hometown, like many small towns along the California coast, was under a building moratorium, and we couldn't add any new homes with septic systems because we relied on groundwater for our drinking supply. Community meetings became heated, residents stressed, and state fines were threatened. This was personal for me, and I decided to take on solving the problem as a professional goal. I had been studying an engineering discipline that I didn't connect with at another university, and I decided to switch to the ERE program at HSU.

Once at Humboldt, I found my niche in water resources, computational analyses, groundwater simulation, and optimization. I used my "hometown problem" wherever I could in homework assignments, sizing bio-reactors, tertiary wetlands, and imagined groundwater contamination plumes. This was my period of commitment, getting involved, becoming a part of the engineering community and building my "tool box" for the future. I became connected to water and water-related issues. Serendipitously, my housemate was a part-time Trinity River rafting guide and frequently invited me on trips when a seat became available on a guided trip.

Prior to graduation, I started working for the U.S. Forrest Service at the Redwood Sciences Laboratory in Arcata. I worked with watershed research scientists supporting projects in the area and honing my knowledge about environmental data, electronic sensors, data collection, data sanitization, and data management. I enjoyed this work and research, and it motivated to me pursue a master's degree in Civil and Environmental Engineering at UC Davis, which I completed in 2007.

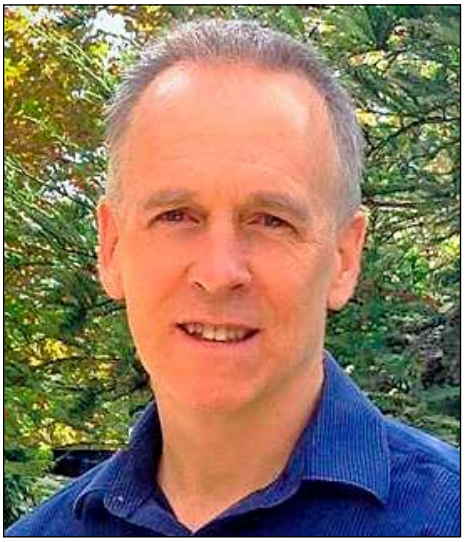
In 2001, I started working for the U.S. Bureau of Reclamation in the Planning Division in Sacramento. I was part of a team responsible for system-wide planning, modeling development, and application for the Federal Central Valley water project in California. This type of modeling can assess water delivery, reservoir storage conditions, and ability to meet regulatory and environmental obligations under historical hydrology or some altered future climate conditions. I frequently worked on teams with other agencies, and some of my colleagues working for the California Department of Water Resources on the State Water Project are also ERE graduates!

In 2005, I joined the Operations office where I am currently working. My position supports real-time reservoir management where I provide operational outlooks or forecasts for reservoir storage conditions, river releases, water allocation, and seasonal water temperature management to protect endangered fisheries. My office manages operations of Shasta, Trinity, Whiskeytown, Folsom, and New Melones reservoirs. I frequently work with regulatory agencies, the agricultural community, and fishery agencies to balance water resources needs in the system. If this type of work is intriguing to you, join Professor Beth Eschenbach's ENGR 445 class, which makes a field trip to my office and includes a presentation on Central Valley Project operations.

My advice to current ERE students is to choose something meaningful and follow it. Although in the beginning I thought I would be modeling groundwater for my small hometown, instead I have ended up helping manage one of the largest water resources projects in the state and the country.

I also try to connect to the water and see the resources in action outside of work. This summer I completed a 65-mile canoe trip down the Sacramento River, and I also met a goal to float a portion of every river system that my office manages!

Alumni Profiles



Chris Malone, PE
BS ERE 1990
Principal Engineer
West Yost & Associates
Davis, CA

Back in the early 1980s, when I was starting to think about what I wanted to do when I grew up, I encountered an article with a title along the lines of "Lesser Known Colleges and Universities of Higher Quality." One of the institutions mentioned was Humboldt State University. That article planted a seed in me that would reach fruition a few years later.

I started out at a junior college in my home state of New Jersey, and after three semesters decided that I wanted to make the jump to a university. I had the notion at that time that I wanted to get a degree in environmental engineering, and when I looked for programs with similar sounding titles, sure enough, there was Humboldt again. Unfortunately, moving to California and paying out-of-state tuition was beyond my means, so I stayed in New Jersey and enrolled at Rutgers University in Piscataway.

Suffice it to say, Rutgers was definitely not an ideal institution for me: huge class sizes, professors who didn't care about teaching, and a geographic setting that was the furthest thing from being worthy of postcard status – exactly the opposite of HSU. As I tried to plan my escape, I stumbled on a program called the National Student Exchange, which allowed students to go out of state for a year without paying out-of-state tuition. At that time, there were three participating universities claiming to have environmental engineering programs, and Humboldt was one of these. I concluded at that point that attending the ERE program at HSU was my destiny. There was simply no other possible interpretation.

I signed up to make the jump to HSU, and in August 1986, I arrived in Arcata, sight unseen. It was a leap of faith, and one that I have never regretted. Technically, the intent of the National Student Exchange was for students to return to their school of origin after one year, but I had no intention of leaving Humboldt that quickly. I took the requisite steps to establish California residency, and I settled in for the long haul.

My time at Humboldt was punctuated with high points, struggles, and life lessons – all in all, a typical collegiate story. At no point did I ever second-guess my decision. Life in Arcata in general, and the ERE program in particular, were formative experiences for me, and when I moved away to start my career, a big part of me regretted leaving Humboldt County.

Since then, I've managed to carve out a niche in the water resources engineering consulting world, while largely managing to steer clear of marketing and management, two topics that most engineering schools don't warn you about.

For my first several years after graduation, I worked at Larry Walker Associates, a water quality consulting firm in Davis, California. In the middle of my tenure there, I took an 8-month trans-continental travel sabbatical to explore some national parks and other attractions that I had never seen – places like Yosemite, Kings Canyon, Yellowstone, Tetons, Arches, Canyonlands, Bryce, Zion, etc., plus points east. I enjoyed the trip so much, I did another one four years later that was even more extensive. I opted to change jobs after that trip, and ever since then I have been with West Yost Associates, a water resources engineering firm headquartered in Davis.

One of the more interesting projects I've worked on in my career was the Davis Woodland Water Supply Project, which involved the cities of Woodland and Davis converting their longstanding shallow and intermediate-depth groundwater supplies to a surface water supply from the Sacramento River. A large part of my role on that project was planning and structuring the water supply portfolios of both cities to be resilient against severe, prolonged drought conditions. After a great deal of initial political resistance (mostly in Davis), the project has now been fully operational for two years, and as far as I know, no one is complaining. The project wasn't cheap, but the water quality benefits were immediate and very significant. I still have a role on some of the routine technical management activities of the project.

In my spare time, I like hiking and making music. I play drums in a Tom Petty tribute band, Great Wide Open, which my old ERE pal Mike Anderson (aka "Professor Mike") and his wife Leslie recently came to see. I am also in two variety cover bands, and one of these, Water Hammer, is the house band at work.

And, of course, I try to make it back to my old HSU stomping grounds whenever I get a chance. Ω

Geoscientists Without Borders

by Margaret Lang, ERE Professor

This past July, a group of Geology and Environmental Resources Engineering students under the supervision of Jasper Oshun (Geology) and me (Margaret Lang, ERE) traveled to Zurite, Peru to conduct hydrologic research and assist the town with irrigation system improvements. Zurite is in the Cusco region of Peru, and is located approximately an hour northwest of Cusco at an elevation of 12,000 feet, making fieldwork a little more challenging than normal. This trip was the first site visit for a 2-year project.

The project started when Jasper Oshun invited me to co-write a grant to Geoscientists Without Borders (GWB) for funding to improve the irrigation system serving Zurite, and to better understand the local hydrology. Thus, this GWB-funded project has a scope that includes both research and service components. In addition to funding the students and research effort, the grant includes matching funds for the town to purchase materials needed for improvements to their irrigation system. We selected Zurite for this project because Jasper has been visiting and working with the Zuriteños for more than a decade and is committed to finding additional ways to assist the community.

ERE graduate students Peter Duin and Malia Gonzales, and undergarduates Jillian Freiheit and Laurel Smith, also made the trip. The ERE contingent was primarily responsible for meeting with the local irrigation system managers to identify their needs and help plan for extending the irrigation canal system. We assessed and surveyed the proposed new canal segments and attempted to identify the sources and inter-connections between the water sources and the irrigation canal system. This was not an easy task considering the presence of inter-basin transfers, parallel and criss-crossing channels and evidence that some short-term, shovel-driven modifications are occasionally practiced.

Another grueling task involving our entire group was a week spent completing a seismic refraction survey of the upper watershed to investigate the depth of soil and estimate subsurface water storage. Dr. Kristine Keating, a geophysicist from Rutgers University, joined us for 10 days to lead this effort. Our crew completed 1.3 kilometers of geophone lines on steep slopes at elevations just under 14,000 ft. It must be some kind of record!

The research opportunities in the project area are unique, and very important to understanding seasonal water balances in the puna grasslands of the high Andes. These landscapes experience rainfall patterns similar to California, with distinct wet (~October-April) and dry (~May-September) seasons. They also provide the water supplies and irrigation water for local subsistence and small agriculture needs. The ability of these puna-dominated watersheds to seasonally store subsurface water is not well understood or characterized. Zurite's source watershed, the Ramuschaka, also offers a unique research opportunity because a significant portion of the upper watershed has been recently replanted with native tree species. We installed rain and stream gages in the upper watershed and plan to calibrate a watershed model to evaluate the potential impact of this vegetation cover change on the watershed's water balance and availability of water for Zurite.

The students involved in the project are currently analyzing the data collected this past year and preparing for our return visit next summer. The ERE students are modeling the canal system extensions using HEC-RAS and developing materials and cost estimates; developing rating curves for some of the larger irrigation system control boxes; and developing a coupled groundwater-surface water model of the upper watershed. Ω

ERE students preparing to survey a diversion box and irrigation canal in the upper Ramuschaka watershed near Zurite, Peru

Balancing ERE and Athletics

by Jocelyn Barber, ERE Junior, and Karsten Hayes, ERE Senior

Is it possible to balance a serious athletic commitment with the ERE major? Here are two accounts.

Jocelyn's Story

My athletic career began in the fifth grade when I joined the track team at my elementary school in Idaho. I fell in love with the people and the structure, and I was encouraged to move on to cross country in High school. I had a wonderful high school experience thanks to cross country and track, because it gave me friends and introduced me a different kind of structure and discipline that school lacked.

I transferred to a junior college in Portland and ran on a full ride scholarship. At this point in my life I obsessed over competing in races and I built a solid group of friends. Once my time at junior college was over, it was extremely difficult to figure out whether I needed to leave my running career in the past and focus on school, or if I should try to juggle both.

Jocelyn Barber at 2016 SFSU Gator Invitational

Once I found HSU, I realized that I could run for the cross country team as well as pursue the ERE degree, but it was difficult to balance the two. For instance, I had to select the right lab times to avoid missing practice or practice on my own so as not to compromise classes. I avoided joining clubs, volunteering, getting a job, and attending tutoring sessions, because I had virtually no free time and was exhausted from training.

Although I enjoyed the collegiate athlete lifestyle at Humboldt, not to mention the beautiful scenery and convenient running trails, something had shifted in my mental state. I still enjoyed competing, but I realized that academics needed more of my attention. I tried to push these thoughts to the back of my mind, but this only decreased the quality of my performance at practice. I began to worry a lot about school, and every runner knows it is impossible to perform when you're in a stressed state. Despite this stress, I was able to fight for my place in top seven on the cross country team, as well as make it to finals at the conference meet in track. However, I was not doing so well in my ERE classes. The following summer, after concluding that college is for learning, I decided to sacrifice my running career for my academic career. To this day it was one of the hardest decisions I have ever had to make.

I found that I can still feed my hunger for competition with myself in the ERE program just by solving a math problem or figuring out how to compile a code. I also like to rock and tree climb and snowboard, and I was not able to do those things as a collegiate athlete. Although remaining a collegiate athlete wasn't the right fit for me, I learned the biggest life lesson during competitions: never give up. It is much easier said than done, but when I would reach my breaking point in a race and feel the urge to give up, I would access another part of my mind that would relentlessly refuse to quit. Without my ability to find this mental state, I would not be as far in the ERE major as I am today, and I have running to thank for that. It is possible to juggle sports and the ERE program, but if it becomes challenging there are ways to compensate for something you choose to sacrifice, and it may even be a better fit. Last year was my first year attending college without being a student athlete, and I am proud to say that the school year went smoothly. This year I plan to get more involved with ERE program clubs and the Campus Center for Appropriate Technology (CCAT) volunteering opportunities, as well as make time for rock climbing and snowboarding!

Karsten's Story

Growing up, I tried basketball, baseball, tennis, football, and cross country. I enjoyed working out with a team and meeting people, but these sports didn't hook me, and I finished high school without participating in any team sports. I remained active and did independent sports like running, swimming, and snowboarding, but I lacked a competitive mindset, and that carried over to my academics. Mental toughness is a huge part of competitive sports, and the length to which I push myself mentally in school is often linked to how hard I push myself physically. I found my ideal sport-school balance when I came to Humboldt and joined the Men's Crew team my freshman year. I have been an avid rower ever since.

When I started rowing, I was just looking for something to give me a break from classes and get me outside and active. However, after experiencing the intensity of racing during my

first year, I became super competitive and centered my life around rowing. The feeling of eight guys working at our limits in unison to overpower other boats is unlike anything else.

I scheduling my classes so I would not miss our 5-8 PM weekday practices or the extra weight training and conditioning outside of practice. My commitment and drive to steer the team in a more competitive direction led me to become the team vice-president during my second year, and president during my third year. Many people turn away from the sport because they assume we wake up every day at the crack of dawn to row, but that's not the case at HSU. In fact, I would gladly wake up at 4:30 every morning if it meant that we wouldn't have to deal with the late-afternoon wind. The number-one factor preventing us from rowing is high wind speeds, and we have swamped more than one boat when the wind suddenly picked up and threw white caps at us.

It is very challenging to stay on top of engineering schoolwork while spending 20+ hours a week training, and I've had to sacrifice time in other aspects of my life, including precious sleep. I have not participated in clubs, or work a job during the school year, and I sometimes regret this. But, this may be the only time in my life I'll get to row competitively. I've found that the easiest way to meet the combined demands of academics and athletics is to arrive on campus at 8 AM and not go home until after practice at 8 PM. Once I get a routine going, it is fairly easy to finish schoolwork as well as do what makes me happy.

At this point in my career, I would be willing to take a hit at school in my studies if it meant keeping up with my training regimen. Last year my pair partner, Liam Dooley (also an ERE student), and I placed third in the doubles event at the Western Intercollegiate Rowing Association (WIRA) Championships. This year, in my final year at HSU, I aspire to travel to Georgia and become a national champion. Ω

Karsten Hayes (left) and pair partner, Liam Dooley, on their way to third place finish at 2018 WIRA Championships on Lake Natoma in Rancho Cordova, CA

First HSU Engineering

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(Civil C23681), and I own a successful consulting business, A.M. Baird Engineering and Surveying, Inc., located in Fortuna, California. I opened my business in June of 1978 (40 years ago!), and did a lot of survey work for the Forest Service retracing government surveys, and soon proceeded to do structural work on designs of homes and commercial buildings. I've done several three-story motels, including the electrical, plumbing and structural design work. I have acquired a varied background in Civil Engineering expertise, including structural design and construction for residential homes and commercial developments, onsite waste water disposal system designs, soils reports, environmental compliance, subdivisions, grading plans, and many more too numerous to mention.

I have also been very active in the local community and beyond, having served as president of Rotary Club of Fortuna, president of the Fortuna Chamber of Commerce (twice), past director of the HSU Alumni Association, president of the Highway 36 Association, and president of the California-wide Native Sons of the Golden West.

Over my forty years in business, I have hired more than 30 ERE graduates out of HSU, and nearly all have gone on to get their Civil Engineering licenses. Presently, I have three ERE graduates with EIT's, and one licensed civil engineer, Matt Pearson, who just celebrated his 20th year with us. I strongly encourage all my engineers to take the PE exam as soon as they can, find out what they are lacking if they do not pass, get that experience in the office, and retake the exam.

The ERE Department produces engineers who are able to learn independently and are very knowledgeable about environmental topics, which is helpful to the permitting processes many of my clients need. Working with my firm also gives them a broader background and exposure to civil and structural design that helps them prepare for the PE exam.

HSU was a great school when I attended, and based on my experience with current ERE graduates, I am sure it still is. I look forward to continuing to work with ERE graduates. Ω

Joe Ryan Brings a Semester of Organic Chemistry, HAZWOPER, and More to ERE

by Joe Ryan
ERE Visiting Lecturer, and
Professor, Environmental Engineering
University of Colorado, Boulder
Boulder, CO

I have always enjoyed listening to old, scratchy recordings of Woodie Guthrie singing "This Land is Your Land," and I usually skip to the next artist on the playlist after being reminded about the big country between California, the Redwood Forest, and the New York island. I grew up in northern New Jersey, where my dad commuted to work as an accountant for a textiles firm in the city, so I know New York, but only once had I seen redwoods still standing, not nailed to a deck.

One day, I let the rest of the Woodie Guthrie album play, and heard his other famous song about California, "Do Re Mi." He sang "California is a garden of Eden, a paradise to live in or see," so when I had a sabbatical from the University of Colorado Boulder come around this year, I thought I should get a closer look at this paradise. On top of that, our daughter is a third-year student here at Humboldt State, studying criminology in the Sociology department. She also plays volleyball for the Lumberjacks, and she thought it would be nice to have a couple of extra fans in the stands.

Once we decided that we'd be "beatin' the hot old dusty way to the California line," I remembered that we've had a couple of HSU students come to our program in Colorado for graduate school, and they always spoke highly of the ERE program. I'm just coming off six years of running a $12 million research project funded by the National Science Foundation to study the effects of oil and gas development on populated areas, and there seem to be quite a few faculty here at HSU who have focused on the tricky junction between science and policy, which is something I need to learn more about.

To live here for the fall semester, we figured that we'd need to rent a house, so we'd better find some way to make some money to pay the rent. I contacted ERE Chair Beth Eschenbach, and we worked out a couple of courses I could teach and co-teach. I'm doing the lectures for ENGR 351

SERC NEWS

Happenings at the Schatz Energy Research Center

The Solar+ Project at the Blue Lake Rancheria

The Solar+ Project at the Blue Lake Rancheria hit high gear this summer, with activity across our research and design areas. Our engineering designs came into form as a 60 kilowatt PV array installed at the Rancheria's "Playstation 777" fueling station and convenience store. Later this year we will install control devices, switchgear, and other microgrid components. As we learn more about microgrids through the course of this project, we are also developing tools for identifying the best opportunities for future deployment and how to target R&D. – *Peter Alstone*

Preparing for a Cleaner Transit Future

Planning the future of public transit in Humboldt County requires integrating targets for a zero emission bus fleet. Humboldt Transit Authority (HTA) is considering using electric buses to meet state emission goals. A new CalTrans-funded project will develop a Climate Risk and Adaptation Report and an Electric Charging Infrastructure Report, which will be compiled into a Climate Resilient Electrified Transit Plan. This plan will enable HTA to understand charging infrastructure requirements and costs while integrating climate adaptation, resiliency, and emergency planning efforts.
– *Jerome Carman*

The Schatz Center Roof Goes Solar

On the last weekend of September, ERE and SERC alumnus Nate Coleman returned to HSU with a team of solar professionals to lead the installation of a photovoltaic array on the roof of the Schatz Energy Research Center. Dodging between downpours, and assisted by Center staff, students, and HSU Facilities Management personnel, the team heroically completed the installation in two days. Later this year, an array display will be installed outside the Center. Visitors will be able to see a live report of energy generated by the array, plus rooftop weather data that directly impacts array efficiency. The array display and data acquisition equipment is being funded by NorthCAT and HSU's HEIF program. – *Maia Cheli* Ω

"Introduction to Water Quality," and Prof. Margarita Otero-Diaz is doing the labs. I'm also teaching a version of ENGR 481 "Topics with Engineering Design" that pulls together environmental sampling and analysis, organic chemistry, and HAZWOPER (Hazardous Waste Operations and Emergency Response, a 40-hour course required by OSHA to work on a hazardous waste site). HAZWOPER is being taught by Sabrina Zink in Environmental Health and Safety, and students who pass the exams will get certified, which is something they can use to get a job. My wife, Martha, a ceramic and installation artist, got a position in the Art department as an artist-in-residence for the semester, and she has been able to do her work and interact with students and faculty in the Ceramics Lab.

Back home in Boulder, I teach similar courses: "Water Chemistry" for first-year grad students, "Environmental Organic Chemistry" for third-year undergrads, and "Environmental Sampling and Analysis" for fourth-year undergrads. I've been teaching and doing research at the University of Colorado Boulder since 1993, and when I started, our Environmental Engineering Program was a relatively small (five faculty) section of the Department of Civil, Environmental, and Architectural Engineering. Now, we have 19 core faculty and another 13 affiliated faculty in the Environmental Engineering Program, and we focus on water and air. We've got about 250 undergrads headed toward BS degrees and about 100 grad students pursuing MS and PhD degrees.

My big research projects over the years have included (1) colloids, (2) mercury, and, most recently, (3) oil and gas. For my MS and PhD research at the Massachusetts Institute of Technology, I spent a lot of time and ate a lot of delicious blueberries in the New Jersey Pine Barrens, where we found a site where a change in the groundwater chemistry mobilized tiny clay colloids by dissolving the iron oxide cement that held them to the sand grains. Colloids mobilized in this way can carry some hazardous contaminants, such as radioactive actinides, farther than we would expect.

The mercury research, which has been going since 1998, was spurred by a collaboration with George Aiken of the US Geological Survey, which has a laboratory on our East Research Campus. Mercury is a potent neurotoxin when it gets methylated (turned into H_3CHg^+) because methylmercury bioaccumulates. We've been looking at the binding of mercury by natural organic matter, which prevents methylation, using a host of sophisticated techniques (e.g., synchrotron-based x-ray absorption near-edge spectroscopy (XANES), extended x-ray absorption fine structure (EXAFS), and Fourier transform-ion cyclotron resonance mass spectrometry (FT-ICR-MS)).

For most of the past six years, I've been the faculty director of the AirWaterGas Sustainability Research Network (www.airwatergas.org), a collaboration of 27 researchers and more than 100 postdocs, grad students, and undergrad students working on assessing the environmental, economic, political, and health aspects of oil and gas development in more populated areas. The big goal was to collect more information about the effects and get it published so regulators can make better decisions about issues like setback distances, fugitive methane, and treatment. We've published 150+ papers, and we're now working on getting this information to the public in more accessible forms, which is a challenge. It's been a vexing, but exciting, intersection of science and policy.

Here in Humboldt, we've been, cycling, hiking, and watching volleyball, and Martha has taken up surfing, so hopefully that will give us adequate California credentials before we head back to Colorado in December. Thanks for hosting us for the semester! Ω

Joe Ryan at Argonne National Laboratory near Chicago, helping with work on the XANES to determine the oxidation state of sulfur in organic matter. The tricycles are available for navigating around the quarter-mile diameter ring of the cyclotron.

Summer Experience

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left over from the mining operation, was reinforced with lightweight cellular concrete that was poured in large lifts to save time. The area in front of the dam was built up with an earthen retaining wall, greatly reducing the likelihood of catastrophic failure.

Over the summer I assisted with a range of tasks, from filling out inventory spreadsheets to shoveling gravel and learning to drive a bobcat. I worked closely with ERRG's resident mechanical engineer, learning basic surveying techniques as we charted the path of the excavation. My most valuable experience was interfacing with the crew at the worksite. Many of them recounted their experiences working with engineers who had "never stepped foot out of the office" to "work in the dirt." They urged me to remember my experience on the ground with them so that my designs would be practical and easy to implement.

While I don't know if I'll go into the remediation sector after graduation, I really value my time learning what it's like to work on a large civil engineering project. I hope to apply many of the skills I learned on-site to future projects, no matter what they are!

Ben's Story:
Recycling Tires As Fuel

In Fall 2017, I decided that I needed to apply my studies to the real world or I would go crazy! I started by looking for local internships, such as at the Schatz Energy Research Center where I had been a docent. Frustrated after months of no luck in the local scene, I made a simple Google search for "Engineering Internships," which resulted in many interesting internship and REU (Research Experience for Undergraduates) opportunities all over the country. Over many hours I filtered out the ones I found most interesting. Using a generic cover letter with a few tweaks here and there, I applied to five of these, including an Environmental Engineering Intern position at Geocycle in Boulder, Colorado.

Within 15 minutes of submitting my application to Geocycle, I received a call from their Human Resources department inviting me to interview with them. I agreed, and so began a grueling interview process that lasted several months. The first interview went well, and I was slated for two more. However, executives at Geocycle travel on a regular basis, making it hard to schedule telephone calls, and several interviews were either cancelled or missed. But, I didn't give up, and I finally completed my third phone interview. I was accepted into the position, and then had to get to Colorado.

Geocycle is a subsidiary of the world's largest cement manufacturer and distributor, Lafarge Holcim. One of their goals is to redirect non-recyclable waste (mostly tires) for use as alternative or engineered fuel in cement kilns. The cement manufacturing process involves using temperatures over 2000°F in a tightly controlled chemical process that combines calcium, silicon, aluminum, iron and other ingredients. Coal is often used as a fuel to reach these extraordinary temperatures, creating harmful emissions in the process. By turning waste (such as recycled tires) with high energy potential into fuel, Geocycle is able to reduce annual greenhouse gas emissions equivalent to the output of more than 250,000 cars.

Over the summer, I was tasked with many projects. The largest of these was to increase the volume of waste tires we received in order to meet production quotas at the closest cement plant. To do this, I visited cement plants all over Colorado and Utah. I learned to conduct sales calls in a competitive business environment, and generally to navigate life in a corporate setting. I was able to secure eight new clients, including the city of Denver. I also worked on permits for a number of cities regarding proposed new waste processing facilities.

This internship allowed me to experience what life could be like after graduating with an ERE degree, all while enjoying the natural wonders of the Rocky Mountains! Ω

Ben Goldberg, after driving a mining truck through the stone quarry at the Florence, Colorado Lafarge Holcim cement plant

ERE Clubs Information Board

Compiled by Kelsey Burrell, ERE Senior

Organization	Fall 2018 Activities	Spring 2019 Planned Activities
ERE Student Association (ERESA) **Email:** *eresa@humboldt.edu* **Webpage (temporary):** *http://tinyurl.com/HSUERESA*	• Klamath Connection Welcome • Locker Raffle • Strawberry Rock Hike • Welcome Back Pizza • Pizza with Professionals • Handshake • Tentative YMG Collaborative Events • Fall Follies • ERESA Elections • Tentative ASCE Report Card	• Crab Feed • ASCE Workshop for Student Chapter Leaders (WSCL) in Honolulu, HI • Pizza with Professionals • ASCE Leadership Conference • ASCE Wastewater Treatment Comp • Ice Cream Social / ERE Awards Banquet • Mock Interviews • ASCE Order of the Engineer • ERE graduation Reception
Engineers Without Borders (EWB) **Email:** *humboldtewb@gmail.com* **Webpage:** *URL coming soon*	• 2018 EWB Regional Conference in SF • Domestic sanitation design project with AHHA in Eureka • Demonstration ram-pump • NCPC Jam fundraiser • Sponsored project presentations • I-Block party tabling	• AHHA domestic sanitation design project • La Manzanilla, Mexico data collection trip with NCPC • NCPC Homebrew Festival fundraiser • Sponsored project presentations • Demonstration ram-pump • Science night grade school outreach
Renewable Energy Student Union (RESU) **Email:** *resu@humboldt.edu* **Webpage:** *https://www.facebook.com/HsuRenewableEnergyStudentUnion/*	• GRID Alternatives webinar orientation • Blue Lake Rancheria microgrid tour • Solano wind farm tour • Sustainable Future Speaker Series • Solar Radiation Monitoring Station (SoRMS) • Prepare for 2019 California Solar Regatta	• Local residential solar installations with GRID Alternatives • Solar Radiation Monitoring Station (SoRMS) • Sustainable Future Speaker Series • Samoa biomass plant tour • Geysers geothermal plant tour • Shasta Dam tour • RESU Reunion • 2019 California Solar Regatta
Society of Women Engineers (SWE) **Email:** *swe@humboldt.edu* **Webpage:** *http://hsu.swe.org*	• Engineering Day at North Country Fair • Bowling Night • WE18 National Conference in Minneapolis • SWEshi • Movie Night with Professionals	• SWE Social • Mentor Meetup • Assist with MATHCOUNTS • Mentor Meet-up • Dinner Fundraiser • Girl Scout Day • Resume Workshop • WELocal Conf in Belleview, WA
Society of Hispanic Professional Engineers (SHPE) **Email:** *shpe@humboldt.edu* **Webpage:** *https://www.facebook.com/shpe.hsu/*	• Tostada Bar • Time Management Workshop • Fiesta Patrias • Networking Workshop • Bay Area Graduate Pathway to STEM • SHPE National Conference • Summer Experience Panel • Architecture AutoCad workshop • 5-Year course planning • End of the semester potluck	• Tostada Bar • Summer Experience application workshop • Civil Engineering AutoCad workshop • Celebracion Latin@ – Cesar Chavez & Dolores Huerta • SHPE Regional Conference • End of the semester potluck • ERE Graduation Party

What Did You Do Last summer?

by Steven Hopper, ERE Senior, and Benjamin Goldberg, ERE Senior

Would you like to land a productive summer job, internship, or research position related to the ERE major? If so, how do you go about it? Here are two short stories that cover different approaches and experiences.

Steven's Story: Environmental Remediation

At the beginning of summer 2018, I found myself suddenly without plans. Having put my eggs in baskets that hadn't come to fruition, I retreated to Sacramento to stay with family and formulate a plan. I frantically applied to job postings online, but quickly realized that most of them had been open to applications for quite a while, and I was late to the draw. I turned to a last-ditch effort: Google Maps.

I looked up every environmental engineering firm in the Sacramento area and began visiting them one by one, in person, unannounced. I gave each firm a pre-tailored cover letter and resume, and asked to speak with managers when I could. I did that for three days and heard nothing, but on the fourth day, luck was on my side.

Steven Hopper on the firehose at the Argonaut Mine sediment dam near Jackson, California. Dust suppression minimizes the spread of arsenic.

I visited Engineering Remediation Resources Group (ERRG), a company tucked away in a small industrial park bordered by highways, a petrochemical plant, and baked concrete. I poked my head into a darkened building with two lighted offices far in the back, and was greeted by the company's construction manager, Jason Gulbransen. I explained my situation and his face lit up; in fact, he told me, he and the regional manager had been discussing hiring an intern just before I walked in. They helped me with the application process, and I was accepted. I took a 40-hour HAZWOPER training course before starting.

ERRG's business is in the environmental remediation sector, with offices across the country and teams that travel to their more remote worksites. They take on a variety of government and private contracts, ranging from petrol tank leaks to military ordinance disposal. The project I participated in was at an EPA-regulated superfund site managed by the California Department of Toxic Substances Control. ERRG was contracted to retrofit a 50-foot-high sediment dam that held back several acres of arsenic-laced mine tailings. There was concern that the dam might fail in a 100-year storm event, covering the nearby town of Jackson in 15 feet of toxic sludge. The dam, made of poor-quality concrete and cables

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