Association of Pacific Coast Geographers Annual Meeting October 16–19, 2019 Flagstaff, Arizona: Abstracts for Oral Presentations and Posters

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Oral Presentation Abstracts

Heather R. Agnew, hagnew@fullerton.edu, *California State University, Fullerton*.
"Oh! Well, That Makes Sense!": A Critical Take on Mapping the Opioid Epidemic in the United States. Maps depicting the scope and impact of drug overdoses and drug overdose deaths in the United States inspire a number of theories as to why the problem is occurring more intensely in some areas and not others. The problem appears worst in the former manufacturing areas and is equally bad in the Appalachian region. Themes of poverty and deindustrialization are at the root of studies on so-called "deaths of despair" where "cumulative disadvantage" drives increasing mortality rates among non-Hispanic whites, and educational attainment and under/unemployment structure poor health outcomes (Case and Deaton 2015, 2017). The trouble is, maps that visualize the phenomenon fuel speculation as to the causes of overdoses and overdose deaths in areas hardest hit. Often, this speculation is driven by geographic assumptions about populations and regions. These assumptions steer the researcher toward uncritical reasoning that ultimately asks, "What narrative makes sense for this place and others just like it?" Yet, rather than rely on assumptions drawn from mapped demographic data, I argue that an emphasis on institutions, or the lack thereof, has greater analytical purchase. Reflecting on maps in high-profile studies; interviews with public health stakeholders in drug-affected regions; and, data from the Commonwealth Fund, my project critiques policy and public health studies that rest upon recognizing clusters of population characteristics, rather than focusing on how the presence or absence of institutions in these locations plays a significant role in shaping public health outcomes.

Clark Akatiff, cpakatiff@yahoo.com, *Palo Alto, California*.
True or False: Is there a West Coast Geography that Is Distinct and Radical? The Case for True. It is submitted that geography, as an art and science, has evolved along the Pacific Coast of North America in a unique and innovative direction, especially in respect to radical geography. This is accounted for by three factors. First is the peripheral location of the Pacific coast in relationship to European and Asian cultural hearths; it is submitted that geographical determinants play a role in these matters. Secondly, the "schools" which developed in the great universities of the West are explored as exemplars. And finally, the powerful movements for preservation and liberation and the individuals who have exemplified these movements are visited.

Gabriel Angulo, gangulo2@toromail.csudh.edu, *California State University, Dominguez Hills*; **Raju Bista**, rbista1@toromail.csudh.edu, *California State University, Dominguez Hills*; and **Parveen K. Chhetri**, pchhetri@csudh.edu, *California State University, Dominguez Hills*. **Tree-Ring Climate Response of Two Dominant Sub-Alpine Species (Fir and Birch) from Western Nepal**. The fir *(Abies spectabilis)* and birch *(Betula utilis)* are the dominant species of the sub-alpine forest of the Nepal Himalayas. Studies have been carried out to understand the tree-ring growth patterns of fir and birch. However, no previous studies have been recorded from the Dhorpatan Hunting Reserve (DHR), western Nepal. Therefore, a total of sixty tree-ring cores were collected from thirty trees (two for each species), at elevations ranging from 3,300 to 3,500 m along. Morphometric features such as the diameter at breast height (DBH), tree height, and canopy diameter were also collected. We applied standard dendrochronological procedure to prepare tree-ring cores. Visual cross-dating and the COFECHA statistical program were used to cross-check for any measurement errors. Cubic spline detrending methods in ARSTAN software were used for the standardization of ring width to remove non-climatic signals. Standard chronology generated by ARSTAN was used for analyzing the ring-width pattern and climate response analysis. We developed 131-year (1885–2015) and 205-year (1810–2015) chronology of fir and birch, respectably. Abies growth was mostly stable between 1930 and 1960 and begins to sharply fluctuate from 1960 to present, showing narrow rings in 1965, 1967–1973, and 1999–2001. No significant increase in birch growth has occurred in the past few decades. Rather, the chronology fluctuated with time, showing narrow rings in 1968, 1985, 1999, and 2011, and wide rings in 1959, 1979, 1994, and 2007.

Jasmine Arpagian, jarpagian@sdsu.edu, *San Diego State University*. **Competing Commons: Affordable Housing and Cultural Heritage in Bucharest, Romania**. This presentation is about the practice of squatting residential historic buildings in Bucharest, Romania. Similar to other global cities, Bucharest is experiencing a shortage of affordable housing. Several families consider the practice of informally occupying vacant space to be the most suitable housing alternative, given their socioeconomic circumstances. In some cases, these structures are officially recognized historic monuments. This issue highlights the juxtaposition of two competing notions of the commons: a right to housing, and a right to access and enjoy cultural heritage. In 2018, the local administration started an intensive program to rehabilitate vulnerable structures, with the goal of rehabilitating all structures with high seismic risk. The data for this section are the minutes from Bucharest's City Council meetings. Research questions are grounded in my field observations and conversations with some of the city's squatting residents. I use computer-assisted qualitative data analysis software to code meeting minutes and compare the council's discussions about providing housing for disadvantaged households and the preservation

of cultural heritage, in terms of frequency, length of discussions, variety of related issues discussed, and the degree of productive exchange among council members. To what extent and in what way does the city council discuss affordable housing and the protection of the city's built cultural heritage? Field observations suggest that a number of these structures that will be rehabilitated are informally occupied by disadvantaged families. The original group of buildings in the rehabilitation project are located in the historic center of the city, where many of the squatting residents are located. How does the city's rehabilitation program affect squatting families?

Daniel D. Arreola, daniel.arreola@asu.edu, *Arizona State University*. **The Mexican Restaurant Menu as Cultural Geographic Signature**. The restaurant menu can be a valuable source of geographic information. This research illustrates how historic menus give insight to the cultural geography of Mexican restaurants in the U.S. Data from a private collection of several hundred menus is mapped to show regional differences in the popularity of Mexican restaurants. A survey of selected menus from this collection suggests how Mexican restaurants during the 1930s–1960s use menus to create an historic association with an enterprise, employ design aesthetics to promote an ethnic theme, communicate location expansion of a business, and develop a marketing strategy for regional food dishes and naming.

Christopher A. Badurek, christopher.badurek@cortland.edu, *SUNY Cortland*. **Assessment of Effectiveness of UAS Drone Training in GIS Technology Education**. This SUNY IITG-funded project supported students in upper-level, GIS-related courses with training on Unmanned Aerial Systems (UAS), also commonly called drone technology, with application to STEM disciplines. It also integrated GIS data processing to meet the growing demand of UAS-savvy GIS workers. The first learning objective was to enable students to articulate the foundation knowledge requirements for safe operation of UAS and demonstrate ability to control a training-quality UAS. The second learning objective was to enable students to demonstrate ability to process GIS data collected from UAS for use in data analysis in STEM application areas. Students demonstrated learning through successful completion of lab exercises, including answering questions on data processing and quality of graphics produced. Results indicate significant learning on UAS technology, as evidenced by pre- and post-course content Likert-scale surveys. In addition to evidence of acquisition of content, students also reported high interest in taking additional UAS-related courses and in attempting the FAA Drone Pilot Certification Exam. Full results from in-course surveys and student work focused on direct UAS operation and GIS analysis of drone-collected data are presented to inform other GIS educators on lessons learned in integrating GIS and UAS education.

Sabrina A. Barlow, sabrinaabarlow@email.arizona.edu, *University of Arizona*. **Spaces of 'Res'ball and Geographies of Health**. Building off recent scholarship on social determinants of health among indigenous peoples, this presentation will explore the possibility of conceptualizing 'Res'ball as a site for building healthy communities among Native peoples in the contemporary United States. I will explore current debates on social determinants of health among Native Peoples and consider the extent to which this scholarship prioritizes the reinvigoration of traditional cultures as the primary avenue for building healthy Native communities. I argue that this focus, while important, can overlook important spaces and sites of health and community in contemporary Native Country. This presentation will outline a research project to explore individual and community experiences with 'Res'ball tournaments in Bishop, California, and Reno, Nevada, using participant observation and individual interviews with both players and spectators. I hypothesize that basketball as a "modern" cultural practice—to some extent imposed from the outside—has been reappropriated in the form of 'Res'ball to become a distinctively Native American cultural space that promotes wellness.

Jessica R. Barnes, jessica.barnes@nau.edu, *Northern Arizona University*. **Spaces and Subjectivities of Platform Economies: An Autoethnography of Airbnb Hosting**. Digital platforms for peer-to-peer transactions that facilitate interactions and exchanges between strangers have helped create a multibillion-dollar market for short-term vacation rentals, leading to major upheavals in labor markets and the tourism sector and impacting access to affordable housing in numerous communities. Work via these platforms exemplifies many of the problematic tendencies associated with neoliberalism. Yet, there is also potential for peer-to-peer interactions to facilitate greater connection, creating more equitable distributions of value, giving individuals greater control over their work, and providing a potential source of income for those underserved by formal employment. The purpose of this research is to better understand problematic aspects of hosting and identify practices that further social transformations toward more just, equitable, and sustainable communities. I examine subjectivities related to Airbnb hosting by identifying intersecting and conflicting values, motivations, and practices. I draw on autoethnography and participant observation of my experiences hosting accommodations for more than two thousand guests in my house in Flagstaff, Arizona, USA, through the Airbnb platform. I also conduct a discourse analysis of guest reviews and social media and platform-generated discourses and policies. This research illustrates how qualitative and embodied research methods such as autoethnography can be useful to understanding the messy nature of performing emotional labor in the platform economy while managing work-life balances within the home.

Steve Bass, stbass8@gmail.com, *Mesa Community College* (retired). **Landscape Interpretation from the Breakdown Lane**. Twenty-five miles is a good day's walk. The same distance can be traversed in less than three minutes on a commercial jet. Yet there is a dramatic difference in the experience. From a window seat of an airliner, drainage patterns and agricultural land uses are evident. On foot, one can dip one's toes in the drainage and taste the agricultural produce. The choice of whether to travel on foot, by bicycle, auto, or airliner (not an exhaustive list) is dependent upon the experience desired. This talk will focus upon landscape observations made while traveling by foot and by bicycle.

Daniel Beene, dbeene@unm.edu, *University of New Mexico*; **Yan Lin**, yanlin@unm.edu, *University of New Mexico*; **Joseph Hoover**, joseph.hoover@msubillings.edu, *Montana State University, Billings*; and **Zhouming Liu**, dawnmoon@unm.edu, *University of New Mexico*. **Abandoned Uranium Mines in the Navajo Nation: How Do We Responsibly and Ethically Model Risk?** There are more than five hundred abandoned uranium mines (AUMs) within the Navajo Nation, the majority of which are unremediated and continue to impact the health and quality of life of the Navajo people. Previously, we developed an index of exposure potential using available environmental data for the entirety of the Navajo Nation. This process enabled us to explore the interactions between complex environmental processes across the Nation. However, we also concluded that the large area of interest and use of available environmental data influenced our conceptualization and calculation of the risk index surface. Building on these experiences, we are now working in partnership with a Navajo community, Dine' College, Northern Arizona University, and Montana State University, Billings, to implement a research study with the objectives of: (1) determining the potential for livestock exposure to AUM waste; (2) uptake of uranium and other metals in livestock tissues; and (3) the human health risks of consuming meat and organs from livestock that graze in the AUM-impacted watershed. While we are in the early stages of the new project, we are confronted by our limitations from the previous study, which necessitate that we appropriately address compounding error and uncertainty of the spatial models. By addressing this propagation, we seek to report our results to community members in a way that effectively communicates methods, error, and meaning in a culturally relevant and appropriate way. This paper discusses the proposed methodologies we will employ to address these questions and the limitations that remain.

Kris Bezdecny, kbezdec@calstatela.edu, *California State University, Los Angeles*. **Teaching Population Geography Using *A Christmas Carol***. Most contemporary population theories have their groundings in economic theory. As such, people tend to be thought of in the abstract, as objects, in discussions about population geography. In the classroom, this can lead to a disconnect between the theory of

population geography and the concrete implications and consequences of adopting a particular population geography model. This disconnect becomes even more acute when people are treated in the abstract in much of the contemporary sociopolitical thought surrounding climate change. One approach to grounding population geography is through introducing two of the main population theories used in geography, (neo) Malthusian population theory and critical population theory, through the 1984 film adaptation of Charles Dickens' *A Christmas Carol*, starring George C. Scott. Using Ebenezer Scrooge as a stand-in for the economic and sociopolitical landscape of population arguments, students map key ideas and concepts related to each of these population theories, deconstruct terms such as "overpopulation," and reflect on the implications of each approach for the people who have been (and would be) directly impacted. This presentation will summarize the activity used, its strengths and challenges in implementation, and its pedagogical usefulness and implications.

Darren Bingham, drb386@nau.edu, *Northern Arizona University*; **Bo Stevens**, bs527@nau.edu, *Northern Arizona University*; **Richard Rushforth**, richard.rushforth@nau.edu, *Northern Arizona University*; and **Benjamin Ruddell**, benjamin.ruddell@nau.edu, *Northern Arizona University*. **Most Food in the United States Is not Consumed "Locally." But What and Where Is Local?** The demand for "local food" by U.S. consumers has grown markedly over the past several decades. However, concomitant to this growth in demand has been the growth in confusion over what constitutes a local food. Is a local food defined by geographic, political, social, economic, or biophysical boundaries? Using commodity flow data, this paper evaluates food flows within the U.S. at multiple scales through lenses of distance and political boundaries to highlight the nuances in the local food discussion. This study found that the weighted mean distance of farm-based food flows travels 157 miles, while manufactured, or processed, food traveled 312 miles. Less than five percent of all food flows, including farm-based and processed food, travel fewer than ten miles, a common local-food distance cutoff. If we define *local* using a county boundary, fifty percent of counties source less than fifty percent of food locally. At the county level, processed food is more often more local than farm-based food, but this trend is reversed for the metropolitan area and state geographic scales. The value intensity ($/ton) of food increases with distance or both farm-based food flows and processed food flows. However, processed food has a higher value intensity compared to farm-based food, reflecting additional value-added processing steps in the supply chain. This means that expensive farm-based commodities move shorter distances to be processed. Big cities, large states, and densely populated counties were more often found to have more local farm-based and processed food supply chains. Therefore, context matters in defining local food. A more nuanced approach

to local food would incorporate aspects of supporting local food production and economic development across multiple steps of the food supply chain.

Raju Bista, rbista1@toromail.csudh.edu, *California State University, Dominguez Hills*; **Krishna B. Shrestha**, *University of Bergen, Norway*; and **Parveen K. Chhetri**, pchhetri@csudh.edu, *California State University, Dominguez Hills*. **How Does the Stand Structure of Treeline-Forming Species Shape the Treeline Ecotone in Different Regions of the Nepal Himalayas?** In the Nepal Himalayas, most treeline studies have focused on changes in recruitment pattern, radial growth, and treeline position in response to climate changes. Very few studies have investigated the changing pattern of stand structure, such as basal diameter, crown cover, and height in response to climate change. In the present study, we analyzed the stand structure characteristics of *Abies spectabilis*, *Betula utilis*, and *Pinus wallichiana* across the treeline ecotone of the study areas in Eastern, Central, and Western Nepal. Altogether, eight transects (20 m*(50–220 m)) across the treeline ecotone were established. All the individuals within each transect were enumerated and classified into three height classes—trees (> 2 m), saplings (0.5–2 m), and seedlings (< 0.5 m)—and the morphometric features (basal diameter, crown cover, and height) of each individual were measured. Tree-ring cores were collected from the base of the trees, and the age of the seedlings and saplings was determined using the branch whorl count method. Elevation and geographical coordinates were collected for each tree species individual with the use of a handheld GPS. We found species-specific and site-specific stand structure dynamics. Site-specific stand structure dynamics explains why treelines do not respond uniformly to increasing temperatures.

Joseph Bogart, jwb244@nau.edu, *Northern Arizona University/USFS Rocky Mountain Research Station*; **Jackson Leonard**, *USFS Rocky Mountain Research Station*; Erik Schiefer, *Northern Arizona University*; and **Amanda Stan**, *Northern Arizona University*. **Effects of Repeat High Severity Fires on Headwater Streams Along the Mogollon Rim**. This study analyzes the recovery process of stream biology and geomorphology after multiple disturbances, including the Dude Fire (1990), Highline Fire (2017), and subsequent flooding events. Data collected after the Highline Fire was compared to data collected before and after the Dude Fire. This allowed for a long-term examination of recovery after the Dude Fire and how the Highline Fire affected this process. Five streams along the Mogollon Rim in central Arizona were included in this research. Three streams were impacted by the Dude Fire and two of those were impacted again in the Highline Fire. Data collection includes geomorphology transect surveys, pebble counts, water quality, flowtography, macroinvertebrate samples, water quality samples, and NAIP imagery vegetation analysis. Results could have management implications for small headwater streams prone to post-fire flooding.

Geoffrey A. Boyce, boycege@earlham.edu, *Earlham College Border Studies Program*. **Immigration Policing and the Dispossession of U.S. Household Wealth**. From the cost of bond, to attorneys' fees, to the loss of wages and resources to maintain remittances, entanglement in the U.S. immigration removal system generates numerous financial costs that disseminate across extended family and social networks. Based a survey of households in Tucson, Arizona, impacted by processes of immigration detention and deportation, this paper explores immigration policing as a particular instrument of financial dispossession; the strategies used by households to manage and respond to policing-induced financial hardships; the impacts of these strategies on short- and long-term decision-making related to debt, employment, and residential circumstance; and the downstream repercussions for health, education, economic opportunity, and housing security.

Jonathan Bratt, jdbratt@asu.edu, *Arizona State University*. **Socioaesthetic Life and Urbanist Ethics in Tianjin, China**. The ever-deepening process of urbanization, in China as elsewhere, demands consideration and recognition of the social values adequate to contemporary urban life. How do we evaluate whether a city is livable or equitable for all? One set of urban values pertains to socioaesthetics, the ways in which sociality occurs aesthetically. Everyday urban life is suffused with indirect, embodied sensory interaction between people engaged in various activities. In Western urbanist discourse, socioaesthetic qualities such as "vibrancy" or "liveliness" are often upheld as valuable elements of urban public space, with urban design and planning increasingly oriented toward catalyzing the emergence of such qualities in streets, parks, and other public places. China has its own long history of socioaesthetic discourse, with values such as *renao*, *xuanhua*, and *fanhua* appearing in Chinese-language texts going back more than a thousand years. The pertinence of such values in contemporary urban public life, however, has received sparse scholarly attention. While socioaesthetic interaction is a largely unavoidable facet of daily public life in China's densely populated cities, new modes of design and planning are emerging, modes that ignore or disrupt the potential for this interaction in favor of isolating urban forms such as superblock towers-in-the-park gated communities. At the same time, new forms of consumption are pushing leisure activity into private and quasi-private spaces. My project critically evaluates socioaesthetic interaction as an element of contemporary urban public life, drawing on both fieldwork in the city of Tianjin and analysis of urban planning texts.

Monika P. Calef, mcalef@soka.edu, *Soka University of America*; **Jennifer I. Schmidt**, jischmidt0@gmail.com, *University of Alaska Anchorage*; and **Anna Varvak**, avarvak@soka.edu, *Soka University of America*. **Developing a Continuous Vegetation Cover for the Municipality of Anchorage, Alaska**. The Municipality of Anchorage (MOA) is home to nearly forty percent of residents in Alaska, covers

nearly two thousand square miles, and ranges in elevation from sea level to nearly eight thousand feet. Wildfire risk is a major concern and has increased with climate change and urban growth. Specifically, changes in soil, the landscape, and vegetation affect wildfire risk but can only be analyzed with a continuous vegetation dataset that tracks major vegetation types through time. Nothing like it exists currently. However, field surveys were conducted in parts of this area in 1997 to 1999 (Guyer 2000), 2001 (Jorgenson 2003), and 2003 to 2007 (MOA). The latter data was then combined with photo plots for an automated classification of Landsat ETM imagery. Last but not least, the North American Land Change Monitoring System published a 30 m-resolution land cover map for all of North America in 2010. The problem is that each of these datasets uses vastly different definitions for vegetation categories. Additionally, the large number of vegetation categories adds too much complexity to soil dynamics modeling and wildfire risk assessment. We are therefore statistically testing a list of ancillary datasets to identify predictors for vegetation types in the MOA dataset. Once we have developed a suitable statistical model, we will cross-validate it with other field data. Ultimately, we need to reassign existing vegetation classes to the following major vegetation types critical to wildfire risk and soil dynamics: black spruce, deciduous/coniferous mixed forest, deciduous forest, wetland, shrubs, low vegetation, snow/ice/barren, recently disturbed, and urban.

Jacquelyn R. Chase, jchase@csuchico.edu, *California State University, Chico*; and **Peter Hansen**, pzhansen@csuchico.edu, *California State University, Chico*. **Displacement after the Camp Fire**. Our team is studying the evolving displacement of survivors of the Camp Fire in Butte County. On November 8, 2018, the Camp Fire consumed most of the town of Paradise and the rural community of Concow. Other foothills areas lost hundreds of homes and suffered fatalities, as well. More than 50,000 people were evacuated and more than 14,000 residences destroyed. We have created maps that capture the address-level locations where people have moved but that also reflect the "churning" of the population in the first months after the disaster. Our data is based on USPS National Change of Address database (NCOA) queries, and data that allow us to visualize and understand patterns of displacement by demographic characteristics such as original location at the time of the disaster, ownership/renter status, income, home value, family structure, and age, all of which can serve as indicators of vulnerability and differentiation of the population. The granularity of the data allows us to decipher, within the flows of people in and out of the Camp Fire zone, who has stayed at close range, who has moved further away, and who has returned to the burn footprint. Our maps thus illustrate the upheaval of communities at scales not normally reported by FEMA, the Internal Revenue Service, and other government agencies more concerned with the balance of exodus than with the fate of specific subgroups of the population. We

will produce an increasingly complete picture of displacement as more survivors submit new change-of-address forms.

Melanie Colavito, melanie.colavito@nau.edu, *Northern Arizona University*. **Assessment of Community Wildfire Protection Plans in Arizona and the Western U.S**. One mechanism with which communities at risk from wildfire have addressed planning and adaptation to wildfire are Community Wildfire Protection Plans (CWPPs), which were created in 2003 as part of the Healthy Forest Restoration Act. CWPPs are required to include measures to reduce hazardous fuels, reduce structural ignitability, and increase collaboration and outreach. Communities across the Western U.S. have used a wide range of approaches for developing CWPPs, with varying outcomes. This presentation will provide results from a study that assessed CWPPs in Arizona and other western states. It will include results from an assessment of CWPP effectiveness in Arizona, results from a survey of CWPP program strategies in other western states, as well as lessons learned and recommendations for effective CWPP development, implementation, and management.

Stephen F. Cunha, scunha55@gmail.com, *Humboldt State University*. **Meet Denali**. At 6,190 m (20,310 ft) high, Denali is an enormous tectonic stake that dominates interior Alaska. North America's highest summit is also one of the largest and probably the coldest mountain on Earth. At 64° north latitude, it's also one of the most glaciated. Snow and ice blanket seventy-five percent of Denali's surface area. This presentation will include: (1) a visual library of glacial and post glacial landforms, (2) the tectonic explanation for this highly discordant peak, and (3) an accounting of the many and controversial changes in nomenclature.

James L. Cunningham, james45@email.arizona.edu, *University of Arizona*. **The Selection and Use of Climate Information in California's Urban Adaptation Plans**. Urban climate adaptation solutions are often predicated on knowledge of climate change impacts. This requires city managers and environmental planners to engage in novel ways of gathering data, using scientific information, and dealing with uncertainty. This research seeks to understand (1) the ways that California cities select and utilize climate science in their adaptation plans, and (2) how these choices may influence adaptation solutions. This study employs a content analysis of California's city-level 2012–17 climate adaptation plans, supplemented with interviews carried out with plan authors and contributors. Results suggest that decisions related to climate science are informed by the relationships that city managers have with environmental consulting companies, researchers at local universities, and regional adaptation networks. Further, within the researched plans, climate information is largely used to frame generalized threats to cities and their inhabitants, supplementing the "no regrets" solutions that dominate California's urban adapta-

tion solutions. One notable exception is the use of sea-level rise models, which are more directly integrated into projected and ongoing adaptation projects, at times presenting barriers to adaptation action. Findings of this project speak to the state of urban adaptation in California and contribute to ongoing debates surrounding climate change and urban planning.

Department of Geography and Environmental Studies, *University of New Mexico*; and **Department of Geography**, *New Mexico State University*. **A New Ph.D. Program for New Mexico**. This poster presents the nation's newest Ph.D. program in geography, the New Mexico Joint Doctoral Program (NMJDP) in Geography, which is offered collaboratively by New Mexico State University (NMSU) and the University of New Mexico (UNM). The NMJDP is slated to launch in fall 2020 after almost a decade of planning and program design, and we are excited to announce this new program to the geography community. The New Mexico Joint Doctoral Program in Geography is designed to meet training and research needs identified by New Mexico's employers in the geospatial, environmental, and cultural resource domains. The program will leverage existing geography-related resources at UNM and NMSU to develop a nationally competitive Ph.D. program. Building on the strengths of the two universities' longstanding geography departments, the joint doctoral program will recruit and train the next generation of resource managers, policy thinkers, geospatial innovators, professional scientists, and academic leaders who are needed to solve complex contemporary problems in dynamic environments, with a focus on Geographic Information Science & Technology (GIS&T). Our innovative joint-program structure combines both theory and practice, offering students a unique opportunity to develop both academic and practical expertise that crosses conventional disciplinary boundaries.

David A. Diaz, davd.diaz.122@my.csun.edu, *California State University, Northridge*. **Proximity to Biomass Burning Events, Differences in Concentrations and Composition of Fine Particulates and Increased Morbidity Rates**. Research shows that climate change is increasing the occurrence of wildfires all around the world, posing a great risk for people who are geographically located near wildfire hotspots. During biomass burning events, there are greater concentrations of toxic airborne pollutants released, including fine particulate matter and dioxin, which poses a great health concern for susceptible groups (Anjali Haikerwal et al. 2015; Peng Lin and Jian Zhen Yu 2011). Studies reveal that increased concentrations of fine particulates lead to more hospital visits and an increase in morbidity rates. (Zachary S. Wettstein et al. 2018). While many studies research the health impacts of wildfire smoke on human health, few studies research the concentration and chemical composition of the airborne pollutants released at varying distances from these episodes. Even fewer studies examine the hazard involved in living near wildfires

and its associated morbidity. This study attempts to define the relationship between proximity to wildfire episodes in California and associated morbidity by examining public records of asthmatic hospital emissions, examining filter concentrations near wildfire episodes, and tracking real-time data of ambient air quality during times of wildfire episodes. Collected filter samples will be sent to a lab to determine their chemical composition and concentration of fine particulates. This study anticipates finding an increased correlation between asthmatic hospital emissions during times of wildfire episodes compared to times of no wildfires. It also anticipates finding higher concentrations of fine particulates near wildfire events compared to fine particulate concentrations at further distances.

Dennis J. Dingemans, djdingemans@ucdavis.edu, *University of California, Davis*. **California's Wheat Boom as an Economic and Regional Stimulus**. Wheat stimulated California's economic and regional development. This presentation examines the period of wheat's spread and increasing share of California's agricultural output. The first serious wheat regions occupied the modest valleys that ring San Francisco Bay. Then Central Valley counties dispelled the perception that only riverside lands were fertile. The typical grain farm was quite large but that was true also for eastern grain lands. Innovative mechanization was adopted rapidly at the farm level, served by rapidly established centers of manufacturing such as Stockton. Wheat was "the glamour grain" for its role in delicious cuisines, for its associations with the ancients, and for its power in driving economic development. The agricultural census for this era, especially the 1880 volumes, detailed in numbers, maps, and narratives the biology, history, and global economy of wheat. The dozen "county histories" for California circa 1880 depict the wheat harvest as their number one topic. Wheat Kings earned that label for being big but also for being bold. San Francisco speculators strove to "corner the market" for flour, wheat, ocean-going vessels, and even wheat sacks. Two decades of vigorous railroad construction wove the networks of grain trains to the wheat fleet. The weakening and then collapse of European wheat and flour markets for California grain after 1880 coincided with local anti-railroad sentiment. Despite the loss of wheat production, its legacy was a set of resources that allowed the state to transition successfully to an agriculture of higher-value crops and greater diversity.

Coline Dony, cdony@aag.org, *American Association of Geographers*; and **Atsushi Nara**, anara@sdsu.edu, *San Diego State University*. **AAG Geography Student Recruitment and Career Resources Workshop**. As AAG President David Kaplan recently outlined, there is a pervasive need among geography departments to actively recruit students into geography programs. Often students do not declare a geography major until after it is "discovered" in their sophomore or junior years of college, leaving little time to advise and hone student abilities. A large contributing

factor to late major declarations is the lack of prior knowledge of geography from a student's K–12 education in the U.S. Departments may face challenges in knowing what resources are best to use to encourage students to join their program, and in advising them on career options once students are involved in geography majors. This workshop is meant to address these challenges, thus participants in this workshop will

1. familiarize themselves with AAG efforts to bolster K–12 education in the U.S.
2. learn about the AP Human Geography program and connecting to AP classrooms as a potential pipeline for recruiting students to geography
3. explore AAG and other materials currently available to assist in student recruitment
4. gain knowledge of career resources currently available for geography students
5. discuss in small groups actionable plans to move forward with their own department recruitment strategies
6. become aware of funding opportunities that can support collaboration with K–12 and geography education research

Ronald I. Dorn, ronald.dorn@asu.edu, *Arizona State University*. **Understanding a Dramatic Turnaround in Enrollment: The ASU Experience in Physical Geography**. Introduction to Physical Geography is a lab science course taken by all majors in the School of Geographical Sciences & Urban Planning, as well as many non-majors. Our largest class for decades, enrollment began to plummet as student behaviors changed. The old model of faculty in-person lectures and TA in-person labs led to a fifty percent decline in enrollment. After meeting with advisors and focused groups of students, enrollment is now up over 250 percent from the low point and still climbing. This presentation focuses on how we are teaching the online version of our class, because it is the online course that is singularly responsible for the enrollment increase. We believe that it is a mix of a unique assessment strategy and innovative online learning tools that now draws students to physical geography and continues to populate our majors.

Alexandria Drake, ajdrake1@asu.edu, *Arizona State University*; and **Lily K. Villa**, lkpierce@asu.edu, *Arizona State University*. **Applied Geography Training for Empowered Youth Leaders: Geographic Methods for Citizen Science**. There is a growing area of literature on geography and participatory action research suggesting that young people can benefit developmentally while helping their communities with community-based research. However, how do young people perceive their experiences with community-based research, and how can their efforts build their confidence to make change in their communities outside of research? In order to explore young people's self-efficacy in community action research and their educational development, a transdisciplinary team of graduate students partnered with a

county-sponsored youth program to train eighteen high-school students from low-income neighborhoods on geographic research methods. Program participants were trained on developing a research question, designing a survey, and using different mapping tools for community assessments. This study evaluated knowledge gained and self-efficacy in using the presented research methods for youth-led participatory action research. Findings suggest that training young people on geographic research methods for community action research increases their self-efficacy to impact their community. Moreover, they are more likely to use these methods in the classroom and in their personal and professional lives. Not only does training in geographic methods benefit youth, but this research shows that partnerships between research institutions and local government has the potential to influence future generations of researchers.

Michelle DuBreuil, mdubreuil@sdsu.edu, *San Diego State University*. **Haitian Transnational Migrants and Identity Construction in Tijuana, Mexico, and Montreal, Canada**. This ethnographic project will a recount a tale of two cities—Tijuana, Mexico, and Montreal, Canada—through the eyes of recently arrived Haitian migrants. Filmed interviews with Haitian adults and groups over a period of a year will document how these transnational migrants construct new identities and social networks. Haitians in Tijuana, which prior to 2015 had no Haitian presence, face a different set of challenges than those Haitians arriving in Montreal, Canada, which has received Haitian migrants since the coup of François "Papa Doc" Duvalier in 1957. Remittances from those who fled Haiti, the world's first black-led republic and today the poorest country in the western hemisphere, make up thirty-nine percent of Haiti's GDP. The broader implications of this project are manifold. According to the United Nations, international migration has risen twenty percent since 2015, spurred by global poverty, conflict, and severe natural events. This will be the first comparative study to explore how Haitian transnational migrants construct new identities and social networks in familiar and unfamiliar host countries. The longitudinal aspect of this project will facilitate capturing how geopolitics, U.S. border and migration policy, and public sentiment influence these migrants' lives and perceptions. Text analysis of participant interviews will highlight key differences in the migrant experience of these disparate Haitian communities. Knowledge gained by this research can inform policy and ultimately enhance inclusion of marginalized populations as the reverberation of globalization, industrialization of agriculture, and climate change force more people to leave their homeland.

Rachel M. Ellis, rme96@nau.edu, *Northern Arizona University*; and **Denielle M. Perry**, denielle.perry@nau.edu, *Northern Arizona University*. **A Confluence of Anticolonial Pathways for Indigenous Sacred Site Protection**. The confluence of the Little Colorado and Colorado Rivers is an Indigenous socio-ecological landscape

revolving in large part around water resources. Substantial surface and groundwater use within the Little Colorado River (LCR) basin threatens the water sources of the confluence, springs in the LCR basin, and specifically the sacred Hopi Sipapuni. To address Hopi concerns about diminished flows of sacred springs, we engaged in praxis through collaborative, reciprocal, community-based research processes. Through the lens of anticolonial theory, we ask: Can federal policies be employed in an anticolonial pursuit of water and sacred site protection? How do Indigenous grassroots organizers envision protection and work to re-Indigenize water management? Semi-structured interviews with Indigenous community organizers and federal land managers were coupled with policy analysis of the National Historic Preservation Act/Traditional Cultural Properties and the ongoing LCR Adjudication. Findings point to multifaceted, complex, and contradictory themes that elucidate the impacts of colonization on this problem and the degree to which solutions can be anticolonial. Criteria were generated for anticolonial protective pathways that highlight the centrality of reciprocal relationships, Indigenous Knowledges, and meaningful inclusion. While details about protection pathways for the confluence and Sipapuni are many, the salient finding is that the struggle for water protection in the LCR is the struggle for protection of inherent Indigenous rights.

Kaylyn K. Ells-Hoʻokano, kaylyneh@hawaii.edu, *University of Hawaiʻi at Hilo*; and **Drew E. Kapp**, dkapp@hawaii.edu, *Hawaiʻi Community College*. **Using Modern Mapping Technologies to Elevate Awareness of Ahupuaʻa (Traditional Land Divisions) of Puna, Hawaiʻi**. The Puna Ahupuaʻa Awareness Project is an initiative that aims to heighten the consciousness of Puna residents of our ahupuaʻa—traditional Hawaiian land divisions. Puna is comprised of roughly sixty ahupuaʻa. Our project looks into how these ahupuaʻa are arrayed, their patterns, locations, shapes, sizes, and names. Because of the forces of modern development, many residents have little regard for the Hawaiian place names and cultural identities of the areas. We feel it is a crucial time for the Puna community to strengthen our cultural awareness of our respective ahupuaʻa. Our increased awareness provides the opportunity to continue breathing life into the traditional, indigenous ahupuaʻa names. It is imperative to create a bilingual map for the community of Puna including both ʻŌlelo Hawaiʻi and English text. The awareness project is incorporating modern mapping technologies including recent satellite imagery, current land use and vegetation, major environmental features, the Kīlauea-Maunaloa geologic boundary, bathymetry, towns, roads, and the most current lava flows of the 2018 Kīlauea eruption. Future work for the project includes the creation of an online interactive ahupuaʻa map, the composition of a mele (chant) honoring the ahupuaʻa, and the physical marking of ahupuaʻa boundaries of Puna.

David Folch, david.folch@nau.edu, *Northern Arizona University*. **Characterizing Poverty within the U.S. Population: A Multidimensional Approach**. For decades the United States has measured poverty based on income and household size. More recently, the notion of "poverty" being strictly a measurement of a family's ability to purchase necessities is being challenged. In this paper we follow the recommendations of Stiglitz, Sen, and Fitoussi (2009) and others to use a capabilities approach to measure poverty. This approach advocates looking at an individual more holistically, and trying to capture his or her ability to lead a full functioning life. Expanding the definition of poverty from one dimension to multiple implies that tradeoffs need to be considered. High values along one dimension can potentially compensate for low values on another. We capture these tradeoffs empirically by applying a self-organizing map (SOM) to 1.5 million individuals from the U.S. Census Bureau's annual Public Use Microdata Sample (PUMS). This methodology allows us to divide the U.S. population into multiple poverty clusters, each with its own characteristics. We repeat this approach annually from 2008 to 2017 and test the stability of clusters across the years. Having multiple poverty clusters allows for a more refined characterization of poverty spatially (both within and between regions) and for policy purposes (targeting policy to different types of poverty).

Daniel Foley, df467@nau.edu, *Northern Arizona University*; and **Mark Manone**, mark.manone@nau.edu, *Northern Arizona University*. **Increasing Geospatial Literacy in Geoscience Education with Integrated ArcGIS Pro Modules**. Geospatial thinking integrated with the use of Geospatial Technologies such as Geographical Information System (GIS) technology has an important role to play in advancing geoscience education. However, in most geoscience curriculum, geospatial thinking and technology do not play a direct role in learning objectives through practical applications. This poses a problem as geoscience students may graduate without the technological skills to be competitive in a twenty-first-century workforce. Therefore, the objective of this research is to provide a framework to increase geospatial literacy for geoscientists by integrating geospatial technology directly into geoscience education beginning in introductory college-level geoscience courses. This is designed to give students the ability to take major geoscience concepts taught in two dimensions and apply it to three-dimensional space, while developing a new way of thinking to form geospatial literacy. A goal of this study is to provide students the skills to develop enhanced geospatial thinking awareness and improved technological skills by taking a constructivist learning approach early in their academic career. To enhance geoscience education, it is suggested that students use ArcGIS Pro, the most up-to-date version of Esri GIS software with great 3D visualization potential implemented into geoscience education. This research will highlight some of the capabilities of ArcGIS Pro in investigating major geoscience topics and geologic

hazards, with a sense of place-based focus applicable to introductory college-level geology and physical geography curricula.

Lauren Fritzsche, fritzsche@email.arizona.edu, *University of Arizona*. **Contesting Islamophobia through a Feminist Ethic of Care**. Contestations over the meanings of belonging, identity, race, and religion have become amplified in response to refugee resettlement in Missoula, Montana. Expressions of Islamophobia are one way community members have reacted to refugee arrivals since 2016. This article explores the various ways Islamophobia is articulated within the community and challenged by local organizations and community members. Organizations (Soft Landing Missoula & Standing Alongside America's Muslims) and residents actively seek to create a welcoming community in Missoula by pushing back against instances of Islamophobia and other forms of backlash toward refugees. Drawing on qualitative research conducted in Montana in 2017 and 2018, this article centers on the work of community members and local organizations as they challenge narratives and enactments of Islamophobia through education, outreach, and local partnerships. Utilizing a feminist geopolitical framework and focusing on a feminist ethic of care, this article explores what articulations of Islamophobia reveal about belonging and exclusion, and how we can strive to create more welcoming and caring communities.

Steven R. Gehrke, steven.gehrke@nau.edu, *Northern Arizona University*; **Armin Akhavan**, arminakhavan@northeastern.edu, *Northeastern University*; **Qi (Ryan) Wang**, q.wang@northeastern.edu, *Northeastern University*; and **Timothy G. Reardon**, treardon@mapc.org, *Metropoli*. **A Cycling-Focused Destination Accessibility Tool to Support Regional Bike Network Connectivity**. Many cities in the United States are working to become more "bike friendly" through the provision of new bike infrastructure to help them realize their envisioned bike networks. These efforts are supported by recent evidence associating a low level of traffic stress facilities with increased cycling activity rates and co-benefits related to the economy, environment, and public health. However, not every mile of bike infrastructure will provide the same value; prompting planning agencies with finite financial resources to look for empirically driven methods for evaluating what projects will provide the greatest network connectivity benefit and how disparate projects can complement one another to produce a more complete bike network. In Cambridge, Massachusetts, construction of the proposed Grand Junction Pathway (GJP)—a shared-use path for cyclists and pedestrians—is anticipated to produce myriad benefits for its residents and the Boston region's labor force. To recognize the extent of these benefits, this study introduces the Cyclist Routing Algorithm for Network Connectivity (CRANC) as an accessibility oriented, decision-support tool. This open-source bike planning tool considers the routing preferences of different cyclist types as well as trade-offs in travel time and level of traffic stress in modeling the

potential changes in destination accessibility that may result from different scenarios of citywide and regional active transportation network expansion. The outcome is an identification of how the GJP will fit within these larger visions of bike network connectivity by improving accessibility to regional employment opportunities for Cambridge residents and to labor force for the city's employment sites.

Katherine M. Georges, Katherine.Georges@student.csulb.edu, *California State University, Long Beach*. **Behind the Practice: Drought and Decision-Making by Tulare Basin Farmers**. Drought in California has forced agricultural growers and non-growers alike to conserve water, yet a disconnect exists between these farmers and the general public's understanding of agricultural practices and water use. This disconnect is exemplified in the recent protests against Tulare's former mayor, as he criticized agricultural practices and water use in the predominantly agricultural county. There is a need for understanding the Tulare basin farming perspectives and their business practices. This study examines what factors influence these farmers' decisions, and how they view their own practices in the context of drought and ground water regulations. This study hypothesizes that farmers show proactive responses during a drought when water prices are high, and reactive responses in between droughts, when water use is less of an economic strain. This project uses Robbins political ecology and Douglas and Wildavsky's risk culture to analyze the farmers' network hierarchies and rationales, and the culture of risk surrounding drought in these communities. The study uses both quantitative and qualitative methods through online surveys, interviews, and ethnographic inquiry of both local farmers/managers/operators and the local water districts that serve these farmers to compare perspectives. Through these methods, this project attempts to bridge knowledge gaps between growers and non-growers by bringing a greater understanding of farming practices and the farmers' day-to-day decision making. By understanding why and how these farmers choose their practices and their views on drought regulations, non-growers can better work with agricultural regions for proper water management for the state and future droughts.

Fiona Gladstone, fgladstone@email.arizona.edu, *University of Arizona*; and **Diana Denham,** ddenham@pdx.edu, *Portland State University*. **Challenging the Hegemony of Corporate Food: Embodied, "Good Sense" Critiques of Capitalist Agro-Food Systems in Oaxaca, Mexico**. Mexico is in the grips of a public health crisis related to its changing food system, characterized by dramatic increases in diet-related illness. Ideas on how to reverse these trends stretch from top-down nutrition education to demands for regulation of the food and beverage industry. Taking a different approach, this paper focuses on the perspectives and practices of rural Oaxacans, drawn from qualitative research conducted in seven rural Oaxacan communities over six years. We find an emergent critique of the contemporary

capitalist food system rooted in embodied engagements with food production, preparation, consumption, and community history. We analyze these findings through the lens of Gramsci's theory of "good sense," understood as the critical-thinking basis for revolutionary transformation among subaltern classes. We situate this theory within literature on embodied knowledge and visceral politics, suggesting that such ideas and perceptions have a potential to challenge the hegemony of the corporate food system in Mexico.

Xi Gong, xigong@unm.edu, *University of New Mexico*. **Industrial Air Pollution and Low Birth Weight: A Case-Control Study Using Big Geographic Data**. Most previous studies examining associations between maternal exposures to air pollutants during pregnancy and low birth weight (LBW) in offspring focused on six criteria air pollutants. The relationship between non-criteria air pollutants and LBW is understudied and requires greater coverage. This study investigated associations between maternal residential exposure to industrial air pollutants during pregnancy and LBW in offspring using a case-control study design that included 94,106 term LBW cases and 376,424 controls. It covered seventy-eight air pollutants common to both the Toxics Release Inventory and ground air-quality monitoring databases in Texas during 1996–2008. The modified Emission Weighted Proximity Model (EWPM), calibrated with ground monitoring data, was used to estimate maternal residential exposure to industrial air pollutants during pregnancy. Binary logistic regression analyses were performed to calculate odds ratios reflecting the associations of maternal exposure to industrial air pollutants and LBW in offspring, adjusted for potential covariates and corrected for multiple comparisons. Relative to the non-exposed reference group, maternal residential exposure to benzene, benzo(g,h,i)perylene, cumene, cyclohexane, dichloromethane, ethylbenzene, ethylene, mercury, naphthalene, n-hexane, propylene, styrene, toluene, and zinc was found to have significantly higher odds of LBW in offspring. When the estimated exposures were categorized into four different groups (zero, low, medium, and high) in the analysis, eleven of the fourteen air pollutants remained as significant risk factors. Results indicate that maternal residential proximity to industrial facilities emitting any of the fourteen pollutants identified by this study during pregnancy may be associated with LBW in offspring.

Steven M. Graves, steve.graves@csun.edu, *California State University, Northridge*. **Fast Food Access and Child Health in Los Angeles**. In 2005, the City of Los Angeles passed a ban on new fast-food establishments in parts some neighborhoods, in an effort to improve health outcomes, especially in African American neighborhoods. Several studies have examined the effectiveness of such measures, with mixed results. This study analyzes ten years' of data from more than one thousand elementary schools in Los Angeles County. Hotspot maps of average Body Mass

Index scores are used as a proxy for neighborhood fitness levels. Regression analyses are used to measure the probable relationships between various levels of access to fast-food restaurants, ethnicity, income, and other demographic variables. Results and implications for food policy are discussed.

Kerry E. Grimm, kerry.grimm@nau.edu, *Northern Arizona University*; and **Andi Thode**, andi.thode@nau.edu, *Northern Arizona University*. **Relationship between Scientist Engagement with Boundary Organizations and Knowledge Coproduction with Managers: A Case Study of the Southwest Fire Science Consortium**. Wildfire's complexity requires strategies developed from diverse disciplines and perspectives. However, bringing together various groups can be challenging. Boundary organizations, such as the Southwest Fire Science Consortium (SWFSC), have been established to bridge scientists and managers with the goal of both increasing science used in management decisions and communicating to scientists what information managers need. Work has examined boundary organizations' roles both in bringing together scientists and managers and knowledge coproduction. Less research has examined scientists' level of engagement with boundary organizations and their personal experiences with knowledge coproduction activities. We interviewed scientists who have interacted with SWFSC at varying levels of engagement (low-high). We examined the relationship between their level of engagement in SWFSC and their involvement in knowledge coproduction activities. Scientists more highly engaged with SWFSC reported greater experience with knowledge coproduction activities. Findings indicate that interacting with boundary organizations, such as SWFSC, might play an important role in fostering knowledge coproduction in scientists. In other cases, scientists who value knowledge coproduction were attracted to working with boundary organizations. In changing ecological and political conditions, knowledge coproduction can lead to improved approaches for managing forests and fire.

John Harner, jharner@uccs.edu, *University of Colorado, Colorado Springs*. **Shaping Colorado Springs**. *Shaping Colorado Springs* is an exploration into the personality of this city. This book project is a historical geography that analyzes the major movements that shaped the built environment and created a sense of place. I identify eight themes that have fundamentally shaped the city: development of its water infrastructure; the concentration of tuberculosis sanatoriums; locally based railroads; gold mining and processing from Cripple Creek; spa resorts and the growth of both the recreation and sports economies; the military-industrial complex; a libertarian political culture; and politically active evangelical Christians. These eight big themes drove development of the city during different eras, shaped the built environment, and created a place identity that today defines Colorado Springs. Throughout all of the historical eras, however, Pikes Peak has been the consistent icon for image-

making promotion, and the city's relationship to the mountain is the fundamental source of its very identity.

John Harrington, Jr., johnaharringtonjr@gmail.com, *Independent Scholar, Bay Center, Washington*. **Differing Perspectives on the Character of Human-Environment Geography**. In characterizing the breadth of geographic thinking, we have: Five Themes (Natoli), Four Traditions (Pattison), Four Geographic Advantages (Hanson), Three Crosscutting Themes (Murphy), and Two Identities (Turner). Economics has been branded as "the dismal science"; perhaps geography should be labeled as the "multiple personality disorder" science (and art [Hart 1982]). Even for one aspect of geographic thought, human-environment thinking, we have multiple labels. Perhaps due to the use of the species name, the old label of man-land has been replaced with human-environment, nature-society, the ecological perspective, environment and society, or environmental/societal dynamics. Not only are there multiple "new" labels, there are different modes of thought regarding how to characterize the relevant subject matter within human-environment geography. This paper addresses the variety of conceptualizations, documenting important contributions moving forward from Pattison and Glacken. The discussion contrasts one characterization that is common in the geography education community, with its three components of: (a) the study of distributions and patterns, (b) the important role of settings and places, and (c) how changes in one place are interconnected with changes in other locations versus an historically grounded alternative that identifies: (1) the idea of a divinely designed earth (environmental perception), (2) the idea of environmental influence on people (hazards), and (3) the idea of human influence on the environment (human impacts).

Lisa M. Butler Harrington, lbutlerh@ksu.edu, *Kansas State University*; and **John A. Harrington, Jr.**, johnaharringtonjr@gmail.com, *Independent scholar*. **Willapa Bay, Washington: Historical and Contemporary Management Concerns**. This paper illustrates environmental conditions and challenges facing Willapa Bay, Washington, and its surroundings. Key stresses in some rural areas of the more developed world are related to the tension between local resource conditions, broader political control, and conflicting perceptions of threats and related management options. This research provides a review of relevant science, state regulatory actions, and local viewpoints expressed in the media and elsewhere. The focus is on management of two invasive aquatic species: ghost shrimp *(Neotrypaea californiensis)* and cordgrass *(Spartina alterniflora)*. Control of both to maintain oyster farming has depended on the use of pesticides, but local views of the safety and need for pesticide use vary. Views of resource users (e.g., oyster farmers) can conflict with those of ecotopian urban dwellers who affect state policies developed at some distance from the locale. Findings indicate that understandings of the environment and produc-

tive use of natural resources differ, with both "sides" often identifying themselves as environmentalists. Increasing social/cultural "distance" from the countryside for a majority of the population limits an understanding of ecological functioning and rural resource conditions. There are substantial differences between resource-dependent rural residents and urban residents and policymakers.

Taren Hayward, taren.hayward@gmail.com, *California State University, Northridge*. **Wildfires and Fireweed in the Canadian Rockies**. Wildfires in the Canadian Rockies are essential for the development and regrowth of forests. They speed up the process of breaking down dead trees and plants, bringing more nutrients into the soil and facilitating new growth. After a burn, the geography of the forest's plants will change. There is a decrease in invasive weeds, diseased species, and insects that can cause damage to the forest. The indigenous plants are given a chance to redevelop, particularly when the upper canopy of the alpine level is burned. This allows the subalpine to receive more direct sunlight, which aids in regrowth. In 2017, the Kenow Wildfire started in British Columbia, Canada, and traveled over the provincial border into Alberta, burning a large section of Waterton Lakes National Park. After the fire, a new abundance of *Epilobium angustifolium*, commonly known as fireweed, developed. This is a native species to the area and, according to the *Ecological Land Classification of Waterton Lakes National Park, Alberta*, by Achuff, Wallis, Wershler and Riddell (2002), fireweed only covered approximately zero to five percent of the plots of shrubbery land that were surveyed in 1998. After surveying three shrubbery plots of land like the ones previously studied, it was discovered that in August 2019, after the fire, *Epilobium angustifolium* covered around forty-five percent of the plots. The growth of the native species *Epilobium angustifolium* after the wildfire shows the positive effects it has on the geography of the plants in a forest.

Ryan Heintzman, ryan.heintzman@asu.edu, *Arizona State University*. **Preliminary Insights into Teaching Geography with Interactive Geovisualizations: San Francisco Peaks Lightning**. A collaborative effort between physical geographers at Arizona State University and the Two Bent Coppers Sole Proprietorship resulted in the development of an interactive lightning geovisualization game. Students control a character who can walk and jump over a thirty-meter DEM landscape of the San Francisco Peaks volcanic field of northern Arizona. Lightning simulations of cloud-to-ground lightning during August strike various locations. Students can adjust the camera angle and location to focus on nearby strikes or strikes in a portion of the geovisualization. A teleportation function allows them to jump to specific destinations in the landscape (e.g., Sunset Crater, Humphrey's Peak, Inner Basin) to investigate lightning strike distributions. This geovisualization allows students to carry out research to test the hypothesis/urban legend that lightning strikes favor the

tops of mountains, as well as learn about the North American Monsoon. A qualitative survey administered to the class of students who completed this physical geography laboratory in an online setting revealed that out of 119 comments, 85 were positive and 34 critical. Positive responses mentioned enjoying the interactive and visual style of the lab and novelty of the geovisualization compared to other lab modules. Common phrases used to describe positive experiences were: interesting (27), cool/great (21), fun (17), and interactive (7). Students with critical feedback discussed the difficulty of using the geovisualization, and the unwelcome change from traditional text and figures for lab exercises. Common critical phrases students used to describe the geovisualization were: difficult to use (13) and time consuming (8).

Martha L. Henderson, geowildfire@msn.com, *High Desert Museum*. **Crawfish Festivals in the Pacific Northwest**. Crawfish food festivals in the Pacific Northwest include the oldest festival in the United States and newly created festivals. This paper investigates the increasing number of crawfish festivals in Oregon and Washington, using George H. Lewis's rationally constructed food festival theory. An introduction to crawfish consumption in the region recognizes the role of recreationally caught crawfish from prior to white settlement through the current era. In the past twenty years, the number of crawfish festivals has risen to nine. Managers of these festivals were asked a series of questions that explore the preference for communities and private groups to instigate festivals. The source of thousands of pounds of crawfish was also explored. As identified by Lewis, festivals are attributed to specific social goals. The rationally constructed food festival theory can be altered to include generational changes in the role of an iconic species in regional identity.

Katherine J. Heslop, kheslop@nevada.unr.edu, *University of Nevada, Reno.* **Pastures of Plenty: The Columbia River Ballads of Woody Guthrie**. Franklin Roosevelt's 1932 presidential campaign speech in Portland, Oregon, presented an abstract idea for federal electric-power development as a progressive response to the hard times of the Great Depression. Ideological concepts were conveyed to denote a federal "Promised Land" of socioeconomic utopianism centered on Columbia River development. As part of New Deal policy (c. 1933–39), federal agencies attempted to persuade citizens of the Pacific Northwest to accept a new, tangible landscape and culture imbued with technocratic regionalism to define a Columbia Valley Authority (CVA). The Bonneville Power Administration (BPA), as part of this campaign, employed folk singer Woody Guthrie to write Columbia River ballads—twenty-six songs in twenty-eight days—celebrating the Columbia River, hydroelectric dams, and government projects for a 1941 promotional film. Guthrie's lyrics dramatized the Dust Bowl refugees' plight through dystopic, transformative, and utopic landscapes, accepting Roosevelt's populist premise: a Promised Land would redeem working people and create a thriving landscape more fair and just for all. These songs pointed

to Guthrie's deep connections to migrancy and the forgotten man. With so much of the country in upheaval, Guthrie's apparent devotion to the populist cause was due to profound human dislocation rather than a subversive challenge to the American way of life. After the December 1941 attack on Pearl Harbor and the United States entry into World War II, Guthrie's work was shelved while the BPA refocused its priorities on promoting hydropower for defense industries, as Guthrie's work would later resurface in the 1949 federal film, *The Columbia*.

Robert Hibberd, rhibberd@email.arizona.edu, *University of Arizona*; and **Arthur C. Nelson**, acnelson@email.arizona.edu, *University of Arizona*. **Transit Station Effects on Multifamily Rents and Demographic Profiles in Historically Disinvested Redlined Neighborhoods 2002–2016**. Redlining practices that began in New Deal-era America led to disinvestment in poor and minority urban neighborhoods. Subsequent efforts at reinvestment have produced mixed results. Transit stations have attracted unprecedented investment and lending in these places. Transit Oriented Development has been known to significantly attract public economic development efforts and private investment. This paper seeks to evaluate economic development and reinvestment in redlined neighborhoods in various cities across the United States that have previously seen relatively intractable challenges in reinvestment efforts. Major conflicting theoretical trends, such as that between Environmental Justice and the implications of gentrification, have impeded a clear picture of the outcomes of transit expansion in poor neighborhoods. Results have varied across metropolitan areas and by transit system modes (e.g., commuter rail, light rail, streetcar) between ongoing inability to attract needed reinvestment and gentrification-driven displacement of poor residents. We employ an exploratory analysis of shifts over time of people, jobs, and land value using chi-square and location quotient-based evaluation of change, following up with hypothesis evaluation through principal components and spatial autoregressive modeling with historical context and policy document exploration to flesh out the outcomes of transit station construction and neighborhood land-use change and intensification across the years spanning the timeline before, during, and after the Great Recession, 2002–16. We hypothesize that station-area outcomes will vary by transit mode and age, metropolitan area, and demographic profile, and that neighborhoods in the greatest decline will have attracted the lowest level of investment.

Alexander G. Hibbert, alexander.hibbert.554@my.csun.edu, *California State University, Northridge*. **The Progression of Sustainable Development through Student Voluntourism in Costa Rica**. In 2015, all United Nations member states adopted the 2030 Agenda for Sustainable Development, which identified seventeen Sustainable Development Goals that will, if effectively implemented, address many social and economic issues. These issues include things like reducing poverty and

hunger, improving health, and progressing education, while simultaneously addressing climate change and preserving forests and oceans. Tourism, if done properly, has the potential to address nearly all seventeen goals, but is explicitly linked to at least four of them: create jobs and promote local culture and products; sustainable development impacts for sustainable tourism; sustainable management of resources; and partnerships to attain these goals. The research presented explains how two volunteer trips to Costa Rica met or did not meet these goals. The analysis is based on personal experiences/participant-observation, pre- and post-trip surveys of the participants, interviews with organizers, group leaders, and other students. Findings suggest that the design and overall intent of the trips had these goals in mind by way of various activities that took place.

Shelby E. Hockaday, shockaday@nevada.unr.edu, *University of Nevada, Reno*.
Western Water Law: A Guide to the Doctrine of Prior Appropriation. The doctrine of prior appropriation governs water rights and water supply in the U.S. West. Owning a water right establishes the amount and timing of water that an owner has rights to, which can vary in times of shortage. The infographic poster titled "Western Water Law: A Guide to the Doctrine of Prior Appropriation" illustrates the basic ideas behind prior appropriation in a straightforward, visual format using icons and simplified language to provide a comprehensive overview to the general public and those who are unfamiliar with western water law. Visual communication is an effective method in conveying complicated legal processes, as it helps to focus the audience on the main points of a law without overloading on legal jargon, using credible methods for ethical visualizations. The flow of information, with fun graphics embedded, guides the eye from one point to the next, grouping similar concepts together (known as chunking) and emphasizing the concepts at the top and bottom of the infographic (known as the serial position effect), as those are the most memorable to the audience. "Western Water Law: A Guide to the Doctrine of Prior Appropriation" incorporates these techniques to visualize the basics of water law in an easy-to-follow format.

Charles F. Holloman III, cholloman@una.edu, *University of North Alabama*.
Sources of Visitor Information in United States National Parks. Visitors to national parks derive information about what and where to visit from a variety of sources, including guidebooks, visitors centers, brochures, and, increasingly, from social media and online sources. Is social media becoming the most important source of information for park visitors? What implications do shifts in information sources have for park managers? My study investigates how tourists acquire and use information about national parks and park activities, focusing in particular on Great Basin National Park in Nevada. This site was selected because of its remoteness, meaning that visitors do not casually visit without advanced planning. Using both

field interviews with park staff and online surveys, my results suggest that though social media is becoming an important source of park information, visitor centers and park rangers are still a primary source of park information for most visitors.

Edward Jackiewicz, ed.jackiewicz@csun.edu, *California State University, Northridge*; and **Emma Franck**, *California State University, Northridge*. **Lifestyle Migration in Belize and the Transformation of Local Spaces**. Research on lifestyle migration continues to evolve as these movements become more geographically diverse. This form of movement has emerged as an important aspect of social and economic development in many so-called "less-developed countries." As an increasing number of individuals from more-developed countries seek less-expensive and more-exotic locales to relocate, challenges are sure to follow. This research explores this growing phenomenon in three locations in Belize, a country that has been touted as one of the most desirable for these lifestyle migrants. The paper argues that these three destinations—Ambergris Caye, Caye Caulker, and Corozal—are attractive for different reasons, are at different phases of their evolution, and that the reaction of locals also varies by destination.

Philana A. Jeremiah, paj@email.arizona.edu, *University of Arizona*. **Integrating Geographic Information Systems (GIS) with Sustainability Planning in Eleuthera, Bahamas**. Islands in the Caribbean region are continually challenged to address critical development issues, whether they are economic, land use, or environmental. Approximately ten years ago, a local Non-Government Organization (NGO) hosted a discussion with a diverse group of concerned residents and community leaders to discuss the development of the southern part of the Bahamian island of Eleuthera, Lighthouse Point. Local and national government officials identified this area for major economic development. However, given the history of failed large-scaled economic development projects and the potential for physical damage to the island, community leaders and residents convened to create a plan for environmental sustainability. These concerns prompted community leaders to be open to exploring alternative models and tools for regional planning within the context of economic, social, and environmental development. The purpose of this research project was to explore the willingness of NGOs in the Bahamas to utilize Geographic Information Systems (GIS) data as an analytical tool for addressing environmental sustainability issues. Introducing Geographic Information Systems (GIS) for understanding natural and human impact on island ecosystems. Mixed methods were used to develop a conceptual framework for describing needs, actions, and desires towards achieving environmental sustainability goals. Results highlighted the need for NGOs to consider the use of GIS technology as an analytical tool for achieving SDG goals.

Garrett L. Johnson, garrett.l.johnson@asu.edu, *Arizona State University*; and **Brandon Mechtley**, *Arizona State University*. **Idiotic Resonances: Uncanny Valley of the Sun**. Idiotic Resonances is a set of rhythmanalytic (Lefebrvre 1992) practices attuning to the excesses and entropies of complex systems. In this iteration, "The Uncanny Valley of the Sun," we surf along the infrastructure of the "infernal city of Phoenix" (Mchugh and Kiston 2018) via footage and field recordings gathered in the urban desert. All of the sonic material was taken directly from our car stereos, which were tuned to 530 kHz AM. Since this frequency band is unoccupied by broadcasts in most of the U.S., what is heard are fluctuations of the electromagnetic field caused by natural and (more commonly) anthropogenic electrical activities. In so doing, we turn information theory on its head; signal becomes noise and noise becomes signal. In this practice, we assume the point of view that is ostensibly of highest import to the city's planners: the automobile. Coupling with the car, we explore modes of embodiment usually ignored in movement discourse. As day turns into night, rigid objects blur to gradient. Likewise, the radio makes no such distinction between outside and inside, environment and (automotive) body. Some sonic gestures can clearly be attributed to exterior phenomena (e.g., light rail power lines, neon signs, traffic lights) or processes interior to the car (wiper blades, headlights, AC, power steering), but there are no clear lines between them; there are no discrete "notes." The authors will share reflections and excerpts from their improvisatory drive-along, jamming with the urban infrastructure and entering into new grooves and entrainments with the contours of the EMF spectrum. We have created video and sound installation as an apparatus for sharing this practice. The sounds can be heard on DIY parabolic speakers that hang overhead; this normally inaudible sound field is also made haptic by the bass-transducer installed in a cannibalized van seat. The installation becomes a touchstone evoking the performative technology of cosmopolitical idiocy (Stengers 2016), which interrogates the relationship between scientific empiricism, military grade engineering, profit-driven corporate actors, and public health.

Geoffrey M. Johnson, gmj@uoregon.edu, *University of Oregon*; and **Daniel G. Gavin**, dgavin@uoregon.edu, *University of Oregon*. **Co-Producing Paleofire Insights into Forest Ecosystem Management**. Fire history is considered crucial background information for managing fire and ecosystems affected by fire, yet, empirically, paleofire data and theory remain difficult to reconcile with modern forest-management practices. Recent efforts to understand the lack of uptake by fire management communities have highlighted differences in the dimensions of paleofire data and modern fire data, as well as the importance of forging connections between resource managers and scientists. To guide investigation of this problem, I ask: In what ways do long-term perspectives on fire pertain to land and resource management issues facing local and regional organizations in the Pacific

Northwest? To provide context for knowledge co-production in this context, I interviewed resource managers and paleofire science workers to find common epistemic ground. Complicating this science-policy nexus, legally mandated historical range of variability (HRV) considerations do not necessarily include paleo-perspectives. To the extent that these perspectives are represented in the professional networks of management agencies and organizations, they may be utilized better in defining HRV. I find that resource management professionals express a need for fire history but frequently lack the resources to integrate an existing paleofire understanding of fire regime. We suggest that capacity problems are likely to affect smaller organizations more profoundly, indicating unequal access to fire history information across stakeholders. This may exacerbate knowledge politics around fire at a crucial moment for management in the West and places an increased burden of instigating knowledge co-production on paleofire researchers.

Drew E. Kapp, dkapp@hawaii.edu, *Hawai'i Community College*; and **Kaylyn Ells-Ho'okano**, kaylyneh@hawaii.edu, *University of Hawai'i at Hilo*. **Elevating Ahupua'a Awareness: Reclaiming Traditional Geographies in Puna, Hawai'i**. For many residents of the moku or district of Puna on the Island of Hawai'i today, identification with place is understood and expressed through the subdivision, typically a grid of substandard roads superimposed on the landscape half a century ago, now with a rapidly growing number of dwellings, but with scant regard to traditional Hawaiian land divisions and resource zones, rarely honoring and employing indigenous place names of the areas. In response to this disconnect between kānaka (people) and 'āina (land), we join others in refocusing on identification with ahupua'a, the traditional, sustainable Hawai'i land division that typically trends mauka-makai, from the uplands into the sea, a foundational element of Hawai'i geography, culture, and society. To contribute to the elevating of ahupua'a awareness, as a first step we conducted research on traditional geographies of Puna and produced a bilingual map in 'Ōlelo Hawai'i and English highlighting the roughly sixty ahupua'a of which Puna is comprised. We also incorporated landscape and shoreline changes in 2018 resulting from Kīlauea volcanic activity, which is of great cultural significance in Puna. Our intent is to strengthen affiliation for Puna residents with their respective ahupua'a, promote use of indigenous place names, and celebrate the dynamic nature of the moku. We have used our academic and community networks, together with social media, to widely distribute this free resource depicting a place for which we have much aloha, a place that is our home.

Alder Keleman Saxena, alder.keleman-saxena@nau.edu, *Northern Arizona University*. **Layers, Patches, and Potatoes: On the Emergence of Feral Agro-Ecologies in the Bolivian Andes**. This paper considers a paradox: while agrobiodiversity is often celebrated as a potential source of resistance to novel pests and diseases,

recent reports from Andean farming systems suggest that, under changing climatic conditions, native potato varieties are exhibiting increased susceptibility to pests, presenting a new challenge to agrobiodiversity conservation. Drawing from recent writing on "feral ecologies," this paper rethinks and historicizes previous human-ecological analysis of this phenomenon, which emphasized climate change as a key determinant of these conditions. The current paper considers these systems through a multispecies lens, thinking through layers of socio-[agro]-ecological history that have enabled the emergence of tizón temprano *(Alternaria solani)* as a threat to the diversity of potatoes within their home range. Specifically, in the case of Colomi, Bolivia, it considers the role of agrarian reform in the 1950s; the construction of a major highway through the region in the 1970s; the popularization of formally bred potato varieties in commercial agriculture; the fates of fungi, like *Alternaria*, under conditions of accelerated international trade; and the "patchiness" of climatic patterns in the Andes, both historically and as an emerging phenomenon. These factors lay the groundwork for a "feral" form of co-becoming, which effectively favors both fungi and formally bred potato varieties, while minor varieties become increasingly difficult for farmers to cultivate. The paper concludes by considering how thinking with "feral" creatures might help to de-center narratives—both of past harm and of future progress—that assume the possibility of human mastery over planetary systems.

Marti L. Klein, mlklein@miracosta.edu, *MiraCosta College*. **Geography of Yellow Fever in Nineteenth-Century Veracruz, Mexico**. In the nineteenth century, it was generally agreed that yellow fever *(el vomito)* and the north wind *(el norte)*, afforded the city of Veracruz, Mexico, more protection than did the Mexican military, including the well-defended, relatively impenetrable Castle San Juan Ulloa. This opinion took into account the geography of the region, and ranged from derogatory assessments of the Mexican Navy to credible historical accounts of the havoc the wind and disease could wreak. The wind could cause significant damage to ships in the harbor, holding them at sea for days or weeks, and the disease could quickly debilitate a ship's crew, at sea or on land in the Port of Veracruz. The wind and the disease also influenced civilian travel, and the disease significantly impacted commerce in this strategic port. They were effective deterrents. Despite this, the population grew rapidly due to large waves of internal and international migration to Veracruz, providing workers but increasing the pool of individuals susceptible to the disease. This paper focuses on the disease. Fear of yellow fever was palpable in the journals, correspondence, and travel narratives of military, government, and scientific visitors, notably geographer Alexander Von Humboldt, as they approached Veracruz harbor, spent time in the city, and traveled overland in the region. It examines the geography of yellow fever, taking into account the

effect of the disease on migration, commerce, and travel, and compares personal perceptions of the disease to the risk the disease actually posed.

Solana Kline, skline@nevada.unr.edu, *University of Nevada, Reno*. **Recreation and Geographies of Non-Capitalism on Public Lands in the Reno/Carson, Nevada Areas**. In the United States, nationally designated public lands coexist with neoliberal national and dominant cultural norms that demand work and consumption from national citizens. The current capitalocentric approach to understanding and practicing economics lends a narrow focus for exploring actual existing economic diversity. In response to this, scholars express the necessity to bring focus to the myriad economies that coexist within, beside, outside, and in spite of neoliberal capitalism. Where does recreation situate within this type of capitalist system, especially recreation on public lands? Generally, this project looks at the ways the national forest lands serve as sites of economic and social pluralism. More specifically, it explores the non-capitalist economies of human and non human relationships (affect, knowledge, citizenships, identity) that are created on national forest lands through recreational access. Geographically, the research is focused on the no-fee, multi-use single-track trails of the Humboldt-Toiyabe National Forest in the Reno and Carson, Nevada, areas. Current project methods consist of participant-observation fieldwork, personal interviews, and historical research. Future methods are sensory related, such as Soundscapes and Photovoice.

Paul A. Knapp, paknapp@uncg.edu, *University of North Carolina, Greensboro*; and **Peter T. Soulé**, soulept@appstate.edu, *Appalachian State University*. **Increasing Wildfire Activity in the Western United States: Spatial and Temporal Linkages to Declining Arctic Sea-Ice Extent**. Annual wildfire activity in the western U.S. has increased substantially during the past two decades and has been coincident with declining Arctic sea-ice extent (ASIE). We examined relationships between monthly ASIE and annual wildfire activity for seven regions in the western United States during 1980–2015 to identify potential spatial and temporal linkages between ASIE, 300-hPa flow, and surface climatic conditions conducive to wildfire activity. Winter ASIE had significant ($p < 0.05$) negative relationships with annual wildfire area burned ($r = -0.39$ to -0.683), with the strongest relationships found in the Northern Rockies. We discovered teleconnections between ASIE and 300-hPa flow, temperature, precipitation, and soil moisture, using monthly values of ASIE and gridded monthly values for the climatic parameters. Specifically, strong relationships exist between January ASIE and upper-level flow in the current-year July over the Pacific Northwest and Northern Rockies. Reduced wintertime ASIE is teleconnected with increased ridging in summertime 300-hPa flow over the western U.S., resulting in warmer and drier conditions during peak fire season. While an increasing annual trend (> 36,000 ha) in area burned in the western U.S. since 1980

is temporally concurrent with decreasing ASIE over the same time frame, our study provides strong evidence linking these cryospheric changes in the Arctic to surface weather conditions in the mid-latitudes of North America conducive for wildfire.

Ryan Tuong An Koyanagi, rbkoyanagi@csu.fullerton.edu, *California State University, Fullerton*. **From the Marketplace to the Promenade: Gentrification and Place Ownership in Santa Ana**. The impact of gentrification on neighborhoods cannot be conceived of purely in terms of physical displacement. The physical displacement and exclusion of the incumbent population is accompanied and preceded by the psychic displacement and exclusion of the incumbent population. This is accomplished through a combined effort of municipal government and propertied interests rebranding space and effecting a transition in place ownership from the incumbent population to a quasi-imaginary privileged class. As this privileged class is not tied to race or ethnicity, younger and more-affluent members of the incumbent community's racial or ethnic group are just as likely to be party to the gentrification process. This article examines the correlation between the use of the Spanish-language and Latin American aesthetics in businesses in downtown Santa Ana, California, and how these businesses resist, contribute to, or adapt to the neighborhood's changing place identity.

Kangsan Lee, kangsan@email.arizona.edu, *University of Arizona*. **A Review of Photogrammetry Methods for Homogeneous Cultivated Land Using Unmanned Arial Systems**. The purpose of this study is to review digital image preprocessing methods for Unmanned Aerial Systems (UASs) acquired imagery to enhance the quality of reconstructing homogeneous fields such as harvested corn fields. The UASs are becoming popular for recreational use as well as commercial and academic purposes, including mapping topography. However, there are some data processing issues that need to be addressed in this discipline. This study reviews previously developed image-enhancement and image-matching algorithms, and compares which methods are useful to build a better Structure from Model (SfM) result, especially for a homogeneous field. Global- and local-scale level image enhancement methods were tested to compare the number of tie points. The local contrast enhancement tool, Wallis local adaptive filter, shows better tie points matching when compared to others. Moreover, it is also possible to combine a histogram match and Wallis filter to minimize the number of unclear matchings, because the overall minimum and maximum range of each image are modified. Thus, those preprocessing methods will be great ways to enhance the number of sparse point clouds. While commercial and open-source software are widely used, it is not enough to conclude that the data collection, processing methodology, and evaluation processes are not yet clearly defined. These days, a lot of UAS-related remote-sensing studies are rising, but they are

tested by trial and error. In this situation, understanding the theory behind the SfM process may help further develop their potential for further UASs-related studies.

Yan Lin, yanlin@unm.edu, University of New Mexico; **Daniel Beene**, dbeene@unm.edu, University of New Mexico; and **Zhuoming Liu**, dawnmoon@unm.edu, *University of New Mexico*. **Uncertainties in Spatial Accessibility: A Comparison of Street Network Data**. Two-step floating catchment area (2SFCA) methods that account for multiple transportation modes provide more realistic accessibility representations than single-mode methods. However, uncertainties in measures of spatial accessibility are often generated by differences in data and scales, then propagated and amplified throughout the analysis and modeling process. This study examined how uncertainty is generated by differences in street network data and by differences in the impedance coefficient in an impedance function using a multi-modal 2SFCA method. An empirical study on spatial access to primary care physicians in the city of Albuquerque, New Mexico, USA, was conducted to evaluate the uncertainty. We used four different street network datasets (ESRI North America Detailed Streets, ESRI StreetMap Premium, Google Maps and OpenStreetMap) to calculate travel time by car and bus. In order to observe the uncertainty in the output of multi-modal 2SFCA model, we applied multiple combinations of impedance coefficients in the model for each street network. We then evaluated the sensitivity of spatial access scores for car drivers, bus riders, and both cohorts to changes in street network data sources and the model parameters. We found significant variations in spatial access scores by car and bus among different street datasets. The variations were significantly associated with travel time and urban-rural location. Results from this study also show that the relative measure—spatial access ratio—demonstrated high agreement among results derived from different street datasets.

Elena Louder, elouder@email.arizona.edu, *University of Arizona*. **Conservation Narratives: Why Stories Matter for Sustainable Futures**. Narratives shape human understanding and underscore policy, practice, and action. From individuals to multilateral institutions, we act based on the stories we tell ourselves and each other. As such, narratives have important implications for biodiversity conservation. There have been growing calls from the conservation field for a "new narrative" to underpin efforts to address biodiversity decline, for example, calls for more optimism, or a more people-centered narrative. This review presents some of the main contemporary narratives from within the biodiversity space to reflect on their underpinning categories, myths, and causal assumptions. It establishes why narrative is important and offer perspectives from social science about the role of narrative in shaping human-nonhuman relations. Finally, the review indicates productive tensions, unanswered questions, and areas ripe for future research.

Renee Pualani Louis, mapdr@hawaii.rr.com, *Center for Indigenous Research, Science, and Technology, University of Kansas*. **Indigenous Rights: Future Possibilities for Successful Research Collaborations**. In 2016, I came to NAU as part of an NSF EAGER grant to collaboratively collect information on Indigenous research principles, protocols, and practices from Indigenous scholars. This presentation summarizes the Indigenous Research Guidelines to date developed from those collaborations and addresses both academic and other Western trained researchers as well as Tribal governments and their community members. An important characteristic of these guidelines is that the academic researchers were not the ones drawing the conclusions. These guidelines were identified from narrative summaries from interviews from four regions within the contiguous U.S. (Great Lakes, Pacific Northwest, Plains, and Southwest) and Hawai'i, and five community engagements in three regions within the State of Alaska (Central, Southeast, and Interior) and one in Hawai'i. It was the more than one hundred Indigenous community peoples who articulated important recommendations and novel approaches for improving research engagements between Western researchers and Indigenous communities.

Chris Lukinbeal, chris.lukinbeal@arizona.edu, *The University of Arizona*. **The Sonoran Landscapes of *Hombre* and Westerns as Topographical Events**. The Western film genre is a topographical event involving the prehension of landscape. Etymologically, topos references the description and representation of place. Westerns provide a topographical survey through events that are in touch with, and move through, the landscapes they inform. Westerns, however, present myopic social topographies: seen/scenes from the white male gaze, a lone topographer who leads a journey through space and negotiates events along the way. Cinema is the embodiment of the topographer's gaze that shapes the landscape through its representation of events. Through the novel and the film, *Hombre* (1961/1967) informs the stereotypes of Sonoran desert Westerns; a mix of image facts and fictions stretched across time and space. *Hombre* is a montage of myths and histories from the late 1800s stagecoach era, to the 1960s and the publication of the novel and production of the movie at Old Tucson Studios, to its ongoing reception by audiences. *Hombre* is a revisionist Western that questions the style and tradition of the genre. When released, *Hombre* was thought to present a positive view of Native Americans. However, as time passes, its racialized geography exposes deeply problematic tendencies of representations of the "other" by Hollywood and naturalizes inequalities and power relations. *Hombre*, through Jack Russell (Paul Newman), is a lone topographer who guides the narrative through a series of events and saves a group of stagecoach passengers from death in the harsh Sonoran desert, only to be killed by a fluke in the topography of a climatic event.

Richard Lycan, lycand@pdx.edu, *Portland State University*; and **Alan DeLa Torre**, aland@pdx.edu, *Portland State University*. **State of Aging Portland, Oregon**. In Portland, Oregon, the age sixty-five and older population is expected to be the most rapidly growing component of the city's population. This is in spite of the large stream of young, well-educated individuals moving to Portland to work in technology and services. The City of Portland is using various efforts to spur housing growth, but the impacts of these policies on Portland's aging population are not well understood. To address this deficit, the city asked the Institute on Aging at Portland State University to provide a background paper on the circumstances of Portland's older population; we are calling this paper "The State of Aging in Portland." The growth of Portland's older population is mainly due to the numbers of persons aging past age sixty-five, not due to net in-migration of older persons. There is no official forecast for the numbers age sixty-five plus, but Metro's Metroscope simulation forecasts a doubling of Portland's age sixty-five plus households from 2010 to 2035. Much of this growth will occur in single-family, owner-occupied neighborhoods with long-term residents aging in place. A smaller proportion of Portland's older population resides in apartments and is impacted by the tight housing market and rising rents. Most of these households lack home equity, and their housing options are limited as they age. There is considerable construction of senior-lifestyle and assisted-living housing and care facilities in the city, and more in Portland's suburbs, but older households often choose to age in place until well into their eighties.

Casey R. Lynch, caseylynch@unr.edu, *University of Nevada, Reno*. **Digital Infrastructure and the Urban Commons: Grassroots Knowledge Sharing and Techno-Political Citizenship in Barcelona**. Recent literature in digital geographies traces ongoing evolutions in the ways knowledge about the spaces and environments of contemporary cities is produced and consumed. Increasingly complex digital infrastructures allow for the production and storage of large amounts of spatial data, which can be algorithmically processed in near real-time and integrated and visualized through urban operating systems and control rooms. While such systems have received much criticism for their lack of transparency and their exclusion of urban citizens, most attempts to create more participatory forms of digital urban governance have failed to break with this basic logic and structure of digitalized spatial knowledge production. This paper explores the possibilities for alternative logics of spatial knowledge production based on decentralized forms of community organizing, and grassroots engagement and experimentation with digital infrastructures in the city. Based on a year of ethnographic fieldwork, I examine the practices of Guifinet—a community wireless network in Barcelona—as well as an array of related collectives in the city experimenting with community-managed digital infrastructures—from Internet of Things sensing networks to autonomous servers. I examine the practices of these grassroots actors through the lens of the

commons, bringing together literature on the production of a global knowledge commons through the Internet, with struggles over the urban commons as the shared spaces and infrastructures of everyday life in the city.

Janardan Mainali, jmainali@pdx.edu, *Portland State University*. **Environmental and Spatial Factors Affecting Surface Water Quality in the Seti-Khola River Watershed, Central Nepal**. The interrelationship between water quality and social-environmental factors is not well explored in Nepalese Himalaya. A recent increase in urbanization and more intense agriculture activities might have negative consequences to water quality. In this work, I explore the relationship between water quality and different social, demographic, and topographic factors in an urbanizing watershed of Nepal. I collected dissolved oxygen (DO) and electric conductivity data of the watershed using a handheld probe, and used the data to establish a relationship with land cover, topography, and population density. The predictor variables were extracted at the watershed scale and 100-meter buffer scale. The linear regression model was compared with eigenvector-based spatial filtering models. The spatial filters were constructed using five different graph types. I find that both conductivity and DO vary spatially within the watershed with clusters of varying degree. Among the factors considered in the analysis, I found that the population density, elevation, and sand cover in the watershed and riparian regions are most important in determining dissolved oxygen concentration and electric conductivity. It shows that the human signature in water quality as population density and sand cover is prevalent in this watershed. I conclude that the source, mobilization, and transport of these two parameters are different from each other, as the Relative graph type was the strongest model for DO while k-nearest graph was the strongest model for conductivity.

Michael Chase Mathis, chasermathis15@gmail.com, *University of North Alabama*. **The Geography of United States Rugby**. Rugby, a form of football that originated in mid-nineteenth century England, has become increasingly popular in the United States. Today there are more than 125,000 rugby players, about 900 college rugby teams, more than 1,400 rugby clubs, and 11 professional teams. The United States is considered a contender for hosting the Rugby World Cup in 2027, and the country has participated in many international events. Though rugby enjoyed a moment of popularity in the late nineteenth century, it has experienced a resurgence since the 1970s. Despite rugby's growing visibility in the United States, few geographers and other scholars have explored the spatial distribution of the sport, focusing instead on rugby injuries. In this project, I examine overall spatial patterns of rugby in the United States, looking in particular at team locations and player origins. Tentative results indicate regional concentrations in both these areas.

Kevin McHugh, kmchugh@asu.edu, *Arizona State University*. **"The Great Silence"—A Cosmic Encounter in New Mexico**. Working out from a series of encounters in New Mexico, I have been elaborating inhuman geographies tuned with elemental forces of the earth and cosmos. Today I speak about an encounter taking place at The Very Large Array (VLA), National Radio Astronomy Laboratory, situated in the remote Plains of San Agustin in west-central New Mexico. The radio telescope bridges the astral and the earthly: twenty-seven giant antennas arranged with precision across high-desert grasslands, surrounded by forested mountains, the earth lying in momentary volcanic repose beneath a vaulting New Mexico sky filled with floating cumulus clouds trailing wisps of virga, as if lifted from a Georgia O'Keeffe painting. This is an atmospheric landscape of dizzying nonhuman spatio-temporalities. The giant radio telescope is a cosmic ear, an experiment in radical passivity performed by SETI scientists, antennas pointed skyward, listening, waiting patiently for a sign of intelligent life in the universe. Silence. Fermi's paradox haunts. Even as humans construct technological marvels such as the VLA in seeking a sign of intelligent life elsewhere, the species *Homo sapiens* remains deaf to endangered life forms chattering across Planet Earth. This is the take-home message in Ted Chiang's parable, "The Great Silence," specter of the sixth mass extinction which promises to be humankind's lasting legacy for this damaged planet. In the long "meanwhile" of the Anthropocene, humans await signal of extraterrestrial intelligence, weave redemptive narratives of geoengineering global climate and forging a sustainable earth, and harbor chimerical dreams of colonizing habitable worlds elsewhere.

Sophia Melfi, sam866@nau.edu, *Northern Arizona University*; **Maria Teresa Hernandez,** mth256@nau.edu, *Northern Arizona University*; and **Michelle Kearney**, mlk338@nau.edu, *Northern Arizona University*. **Analyzing Hydroclimatic Controls of Turbidity in Upper Lake Mary, Arizona**. The purpose of this study is to determine hydroclimatic controls on the turbidity of Upper Lake Mary, the primary water supply for the City of Flagstaff, Arizona. The reservoir is located 16 km south of Flagstaff and has a capacity of 16,300 acre-feet of water. It is 9.5 km long and varies in width from 94 to 802 meters. Inflow into the lake is primarily from snowmelt. The reservoir has occasional high turbidity and is treated at Lake Mary Water Treatment Plant in order to meet drinking water guidelines. Turbidity is a measurement of water clarity. Too much turbidity in water makes it unsuitable for drinking and recreation. While turbidity in itself is not harmful, it can create an environment for microbial growth and can indicate the presence of disease-causing bacteria. High turbidity in a drinking water source can increase costs of water treatment. We obtained a record of non-continuous turbidity for 1978–2018 in Upper Lake Mary from the Lake Mary Water Treatment Plant. Turbidity ranged from 1.20 to 140 NTU. These turbidity levels were compared against available hydroclimatic records including monthly water level and meteorological data (temperature, pre-

cipitation, snow, wind) from nearby climate stations. Preliminary results show that turbidity is highly correlated with lake water level and may also be correlated with precipitation, wind speed, wind direction, and air temperature. Implications of our findings suggest that changes to hydroclimatic conditions in northern Arizona could impact water supply operations for the City of Flagstaff.

John A. Menary, jmenary@csudh.edu, *California State University, Dominguez Hills*. **Integrating Geographical Storytelling into a First-Year University Human Geography Course**. Though gradually and unevenly, instructional technologies inundate the American education landscape. Increasingly, research documents their success for student learning as being contingent upon improved teacher training. In Human Geography, two useful additions have been games and story-mapping, both sharing visualization, narrative, and storytelling techniques. This paper explores possible ways to integrate geographical storytelling. Frequently, student learning advocates favor proposing that an instructional aid, if it is to be adopted and adapted, should fit into the existing content. Acting as a context, the existing content can provide teachers with both opportunities and challenges for the integration of new ideas. But this can be a complicated and complex undertaking for many teachers. For one thing, integration is often impacted by instructional capability: Do all teachers possess the necessary training? Do all teachers have equal access? For another, educational technologies, oriented specifically to the teaching of human geography, are in short supply, hampering access and availability for teacher's use. Furthermore, research into the problems centered on devising and implementing geographical stories is also relatively sparse. Given these conditions, the paper concludes by offering an operational strategy that builds on data visualization and narrative as two interrelated ingredients of geographical storytelling's ability to help students acquire "a geographer's eye"—an implicit objective of both geography teacher education and student learning.

Dugan Meyer, dugan.meyer@gmail.com, *University of Arizona*; and **Laura McCann**, lemccann@email.arizona.edu, *University of Arizona*. **The "Manufactured Housing Gap" in Tucson and Pima County: Emerging Themes from a Landscape of Vulnerability**. Despite a recent renewal of interest in manufactured housing (MH) as a promising option for low-income populations, MH remains an understudied, often denigrated form of housing whose residents are subject to unique kinds of social, financial, and environmental vulnerability. The need for research (particularly, we will argue, qualitative research) and action to address MH vulnerability is especially acute in the Southwest United States. In this presentation, we discuss some preliminary data and emerging themes from an ongoing, two-year research project focusing on the various dimensions of vulnerability faced by MH residents in Tucson, Arizona (and Pima County), where roughly ten percent of all housing

units are mobile/manufactured homes. The project seeks to better understand these dimensions of vulnerability and the myriad ways in which residents survive and thrive in this landscape. While MH is not an inherently insecure form of housing, we find that there is often a wide gap between the merits and promise of MH in theory, and how MH is lived in and experienced by residents. We call this disjuncture between promise and reality the "MH gap." Ultimately, we aim not just to explore the "MH gap" in Tucson, but to develop and pilot new housing models that build on the merits of MH.

Klaus J. Meyer-Arendt, kjma@uwf.edu, *University of West Florida*. **Crawfish in the Pacific Northwest**. Crawfish are found all over the world, yet they are prized as a food source in only select regions. The Pacific Northwest is one such region, and a crawfish industry has existed since the late nineteenth century. The hearth of the signal crawfish (*Pacifastacus leniusculus* sp.) is Oregon's Willamette Valley and lower Columbia River, which is also the historic core of the commercial crawfish industry. Today, the main areas of commercial harvest have spread beyond the original core area, especially to Lake Billy Chinook in central Oregon and also to Washington's Snake River. In Oregon, the 2004–18 average annual harvest of 82,360 lbs is slightly above the 1893–1956 average of 77,000 lbs. Although tiny compared to Louisiana's harvest, Oregon's crawfish industry is estimated as number six in the U.S. Washington's 2004–18 average annual commercial harvest was only about 5,000 lbs. While less important economically, recreational crawfishing is popular in Oregon and Washington. Select streams and lakes in both the lowlands and the mountains are favored by recreationists. Invasive species, such as the red swamp crawfish and the rusty crawfish, are of greater concern to wildlife managers than to families having fun. Crawfish have become more abundant in retail seafood markets, mostly in the urban areas of Portland and Seattle, where most are owned by ethnic Asians, especially Vietnamese. Both Asian-owned and trendy upscale restaurants serve crawfish dishes, in part because of the Asian-Cajun cuisine introduced by mostly Vietnamese migrants from Texas and California in the early 2000s.

Ryan G. Miller, rgmiller@ucdavis.edu, *University of California, Davis*. **Risk, Real Estate, and Climate Gentrification: A Difference-in-Differences Analysis of Flood Effects in Three U.S. Counties**. This paper investigates the relationship between flood events and residential real-estate prices in three U.S. counties using property transactions data provided by Zillow. We build on previous literature establishing both the magnitude and duration of post-flood price discounting for various worldwide flood events. Using a difference-in-differences regression technique, we detected a statistically significant flood-discount effect in two of three study areas, finding that real-estate prices have continued to decline in floodplains after flood events. This runs counter to some existing research suggesting that

prices in floodplains tend to rebound several years following a flood event. Conditions in these two counties may be pointing towards a new "climate gentrification" paradigm wherein increased flood risk awareness and greater capitalization of flood risk into property values is leading to increasingly bifurcated real estate markets in hazard-prone areas.

Michelle Mohr, mmohr2@toromail.csudh.edu, *California State University, Dominguez Hills*; **David Saldana**, dsaldana17@toromail.csudh.edu, *California State University, Dominguez Hills*; and **Gabriel Angulo**, gangulo2@toromail.csudh.edu, *California State University, Dominguez Hills*. **Ring Width Index Compared to Basal Area Increment in Response to Climatic Variables in Northern California's Sierra Nevadas**. The forest ecosystem is responding to climate change worldwide by advancing to higher altitudes, increasing recruitment, and changing radial growth pattern. To understand how the subalpine forest ecosystem of Northern California's Sierra Nevadas are responding, we collected tree-ring cores from Jeffrey Pine *(Pinus jeffreyi)* subalpine forest in the Lake Tahoe Basin. We used the standard dendrochronological procedure to surface, cross date, measure, and detrend tree-ring cores samples. Monthly and seasonal climate data of Tahoe city were applied to assess climatic variables (precipitation/temperature) impact on ring growth. A 374 year-long (1645–2018) chronology was developed from forty-eight cores (twenty-four trees) that were collected. The chronology was truncated to 244 years (1775–2018) based on subsample strength and sample depth. The years 1757, 1782, 1886, 1859, 1876, 1920, 1929, 1977, 1988, 2001, 2002, and 2008 exhibited low growth (narrow rings), and years 1747, 1749, 1792, 1828, 1866, 1868, 1913, 1969, and 1984 exhibited robust growth (wider rings). No recent increasing trend of ring width was observed in ten years' moving average of ring width index (RWI). However, the transformation of ring width to basal area increment (BAI) showed an increasing growth trend in recent decades. BAI indicated that 1928–30, 1987–89, and 2013–14 were low growth periods associated with extreme drought events not previously detected in RWI. Thus, BAI has an advantage over RWI in studying tree-ring growth and climate response because it is better spatially correlated with monthly climatic variables important to the science of dendrochronology.

Holly Moulton, hmoulton@uoregon.edu, *University of Oregon*. **Gender, Environmental Change, and Resilience in the Peruvian Cordillera Blanca**. Women in the Peruvian Cordillera Blanca, the most glaciated tropical mountain range on earth, are surrounded by disappearing ice. By 2100, de-glaciation of all but the highest peaks in the area is expected (Silverio and Jaquet 2017), and disaster maps show dramatic red flood zones and seasonal water scarcity. Despite these apocalyptic narratives, many women are successfully caring for social and familial networks. More specifically, women whom I have interviewed defy the category of "triply vulnerable

highland villagers," those who are poor, indigenous, and female (IUCN 2009). They are instead increasing their household security by building and managing tourist hostels, transplanting montane crops to urban gardens, and having children later in life. These women appear to be resilient, not vulnerable. This preliminary study explores female and indigenous narratives of resilience and environmental change in the Peruvian Cordillera Blanca, a climate change "hotspot." I do this by using ethnographic methods, including walking ethnography (following Jones et al. 2008) and participant observation, to explore how women think about home, environment, and resilience, and how these linkages are being shaped by global environmental change. Additionally, I use content and discourse analysis to compare local perspectives of resilience and vulnerability with government and NGO narratives of the same terms. I argue that a more robust understanding of non-Western conceptions of home and women's social networks is critical to understanding global dialectics of vulnerability and resilience in the face of climate change.

Edwin H. Nahavandi, edwin.nahavandi.360@my.csun.edu, *California State University, Northridge*. **Causes and Effects of Drought Related to Climate Change in California**. California has been known to be an ideal place for the agricultural industry to grow many types of crops. The state has been well known for its hot, sunny weather which gives sunburns to many individuals with sensitive skin. There are many causes relating to the California drought, the main one being catastrophic temperatures, which are resulting in many limitations in the state's water supply. Water can be very expensive in California, especially for farmers. The short-term effects of drought can be devastating, as farmers will use groundwater pumps to extract water from underneath the soil and meet the water demands for their crops—which in the end can lead to long-term environmental damage. Among the long-term effects are aquifer depletion and land sinking, or subsidence. There will also be a permanent loss of groundwater storage which can cause an increase in wildfires due to the region being drier than normal. California is known for having hot, dry summers and cold wet winters, with limited precipitation in the winter months, occurring mostly in the northern part of the state. Climate change can have lasting consequences on our water supply for the future, which can lead to privatization due to a failure to sustain and conserve our water supply. For every 10°F increase in temperature, there is a 2.6 percent increase in cardiovascular deaths, which can be dramatic in the long run.

Atsushi Nara, anara@sdsu.edu, *San Diego State University*; **Thomas Herman**, therman@sdsu.edu, *San Diego State University*; **Coline Dony**, cdony@aag.org, *Association of American Geographers*; and **Michael Solem**, msolem@aag.org, *American Association of Geographers*. **Researcher-Practitioner Partnership for Developing Inclusive Learning Pathways toward Geocomputation Thinking: A Case Study**

in Southern California. With the increasing demand for spatial computational (or geocomputational) skills in GIS research and industry, the development of effective learning pathways toward geocomputationally intensive jobs is prominent. Two key challenges are: (1) the need for educational cross collaborations between geography and computer science to cultivate spatial and computational thinking; and (2) inclusiveness and diversity to broaden participation in the context of computational geography. To address these challenges, this research project employs a pilot researcher-practitioner partnership (RPP) composed of geographers, computer science educators, and geospatial technology specialists experienced in serving underrepresented minority students and communities. This RPP will provide the foundational knowledge upon which future strategy for scaling-up RPPs can be designed, developed, and implemented in other states and regions. Scaling-up approaches in other states will use a common set of core activities informed by a Collective Impact framework that will be developed in this initial pilot effort. This pilot RPP is led by the American Association of Geographers in collaboration with organizations including the San Diego State University, the University of California-Riverside, the California Geographic Alliance, and the Sweetwater Union High School District (SUHSD). This study discusses the current progress in understanding challenges and gaps to develop pathways toward a more inclusive curriculum for geocomputation thinking in K–12 and universities in Southern California and SUHSD. This work is supported in part by the National Science Foundation under the grant number 1837577.

Michael W. Pesses, mpesses@avc.edu, *Antelope Valley College*. **"Damndest Ride Ever Invented": Revisiting the Discourse v. Ideology Debate in a Jeep Wrangler**. This paper will revisit the methodological debate between Foucauldian discourse versus Marxist ideology by setting them alongside four-wheeling practices in the northern Sierra Nevada mountains. After a brief outline of both traditions, I contend that the two methods need not be exclusive and can open possibilities for a spatial politics. Stuart Hall's theory of ideological articulation and Michel Foucault's definition of critique, with just a hint of Žižek, reveal a bridge between the two that can take us past the frustrating concept of resistance. Rather than fixate on an overt binary of power/resistance, this paper will question how authority is experienced and how, as always, place and space play a key role in that experience. We will specifically look at how law enforcement operates in the very wilderness where four-wheelers are seeking freedom from the law.

Brian Petersen, brian.petersen@nau.edu, *Northern Arizona University*. **Convenient Untruths: Drawdown and the Misdiagnosis of Climate Change**. Recent reports and analyses paint a grim future. Climate change is accelerating faster than projected. The Intergovernmental Panel on Climate Change last year indicated that humanity

has until 2030 to drastically reduce carbon emissions to avoid irreversible climate change. To date, responses to climate change have relied largely on narrow, technical means to reduce emissions. In particular, Project Drawdown, purportedly "the most comprehensive plan ever proposed to reverse global warming," is premised on faulty assumptions that do not identify the root causes of climate change. Relying on convenient untruths, these efforts perpetuate the status quo and offer "solutions" that do not require fundamental changes to society, do not adequately address climate change, and impede the necessary actions required for significant carbon reductions. This paper outlines and highlight these impediments and offers a preliminary framework for overcoming them.

Lora A. Phillips, phillips.1151@osu.edu, *Arizona State University*. **Places on the Margin: Variation in Economic Insecurity and Recovery across County Populations**. Recent national events and debates have substantiated a reality that many Americans long sensed to be true: the financial stability and upward mobility characteristic of the post-war era have given way to pervasive, systemic insecurity. While large and growing cross-disciplinary literatures elucidate nationwide increases in employment, housing, and income insecurity, questions remain regarding the generalizability of national findings to lower levels of geography. In other words: Americans are struggling—but are they struggling equally everywhere? I address this question by exploring variation in economic insecurity and recovery therefrom across county populations, between the mid-1990s and mid-2010s. Using a novel measure of population-level economic insecurity, in combination with data from the Small Area Income and Poverty Estimates program of the United States Bureau of the Census, I find substantial variation in the frequency, duration, and magnitude of economic insecurity across county populations. I also find substantial variation in the recovery process, including whether county populations ultimately rebound to pre-insecurity levels of economic well-being. I leverage these findings to classify counties as stable and growing, unstable and growing, stable and declining, or unstable and declining—wherein nearly half of counties are categorized as unstable and declining. The distribution of these county types across the United States is also geographically uneven, with counties in New England, the Midwest, and the mid-South faring particularly well and counties in the Rust Belt, Deep South, and Pacific Northwest faring particularly poorly. Additionally, rural counties not adjacent to metropolitan areas fared significantly better than metropolitan counties.

Lorne Platt, laplatt@cpp.edu, *Cal Poly, Pomona/CSULA*. **The Sublime Landscapes of Monterey Bay: Nature and the Pursuit of the "Middle Landscape" along the California Coast**. Dr. Alister MacKenzie designed golf courses throughout Europe and the United States in the early twentieth century. As one of the sports early "golf architects," MacKenzie brought a particularly vivid interpretation of nature to his

course designs. Using his writings, along with maps, diagrams, and plans, this analysis focuses on his work at two courses along the Monterey Bay: Cypress Point and Pasatiempo. Considered to this day one of the world's most beautiful golf courses, Cypress Point represents MacKenzie's views of a nature that is both constructed and preserved, with manicured lawns atop rugged cliffs and crashing ocean waves. Pasatiempo's greens undulate around deep ravines and groves of redwoods. Both courses may be evaluated within the context of Leo Marx's "Middle Landscape" as spaces of nature, art, and leisure. While some elements of the physical environment were "preserved," much of the design of these spaces was intent on portraying a landscape in which players could experience raw beauty while maintaining a sense of comfort and safety. As such, this analysis considers the extent to which course plans and photographs serve as notable examples of Marx's "middle landscape."

Michael Pretes, mjpretes@una.edu, *University of North Alabama*. **Edmund W. Gilbert: The First Western Historical Geographer?** Though historical geography is an ancient approach to the student of place, the field of Western historical geography, focusing on the western United States, is relatively young. Who was the first scholar to write extensively about the history of the western United States from an explicitly geographic perspective? A case can be made for the British geographer and Oxford professor Edmund W. Gilbert (1900–1973), whose book *The Exploration of Western America, 1800–1850* (Cambridge University Press 1933) is perhaps the pioneering work. This presentation considers Gilbert's life and contributions to historical geography, exploring his early interest in the western United States and his later shift to work in Great Britain.

Barbara Quimby, bquimby@sdsu.edu, *San Diego State University-University of California, Santa Barbara*. **Women's Participation in Samoan Coastal Fisheries Management: Negotiating Gender Roles in Hybrid Community-Based Governance**. Women's participation in Pacific coastal fisheries represents fifty-six percent of annual small-scale catch totals (Harper et al. 2013). Women also play significant roles in processing and marketing products drawn from lagoons, mangroves, and reefs across the region (Schoeffel 1985). Underappreciated until recently, the contributions and impacts of women's fishing are now widely recognized, and there is more pressure to create gender-inclusive governance for greater equity and resilience (Rohe et al. 2018). In Samoa, the Community-Based Fisheries Management Programme (CBFMP), a comanagement approach initiated in the 1990s, prioritizes broad community involvement and local ownership. To support local control, the program integrates traditional Samoan institutions of tenure and village governance. Recognizing that traditional institutions may pose limitations on women's participation, the program organizes workshops to create more inclusive discussion processes that still align with Samoan culture. Yet as the program has expanded,

staff capacity has decreased, creating potential for gaps in women's participation and representation in decision-making, which can lower compliance with rules and adaptive capacity. Drawing on interviews and household surveys conducted in 2018 with communities on the island of Upolu, this paper presents the experiences of fisherwomen and community perceptions and practices of coastal management. While women are encountering barriers, they are also exercising other means for collectively and individually influencing the management process and outcomes.

Jessi Quizar, jessi.quizar@nau.edu, *Northern Arizona University*. **A People's Guide to Northern Arizona: Engaging Students to See Power, Race, and Resistance into a Tourist Landscape**. This paper describes a collective mapping and research project called "A People's Guide to Northern Arizona" that I developed for a joint graduate and upper-level undergraduate Ethnic Studies class at Northern Arizona University. The projects draws particularly from Laura Pulido, Laura R. Barraclough, and Wendy Cheng's *A People's Guide to Los Angeles*, which reframes the classic guide book model to guide visitors and residents to sites of oppression, struggle, and resistance in the city. Northern Arizona, like Los Angeles, is often narrated through tourism promotion, which tends to highlight natural beauty for recreational purposes like skiing and hiking. The purpose of the People's Guide to Northern Arizona project is to create an alternative guide that highlights histories and present struggles that tend to be marginalized in mainstream tourist discourses, but are in fact central to the lived experiences of the region. Students pick a site to focus on throughout the semester, and develop a research plan specific to that site. By the end of the semester, they have written a guide to their site, designed to help people locate it, and to "see" what is often unseen—or intentionally erased—in tourist landscapes. Examples of student guide sites include a Native American boarding school, a Japanese Internment camp, Snowbowl, and the rerouting of the Rio de Flag.

Ivy Rea, irea1@toromail.csudh.edu, *California State University, Dominguez Hills*; and **Parveen Chhetri**, pchhetri@csudh.edu, *California State University, Dominguez Hills*. **Pattern of Vegetation Recovery after 2017 Thomas Fire in Ventura County, California**. California wildfires play a major role in the coastal chaparral ecosystem. The coastal chaparral is a biome that is adapted to infrequent fires, also making it one of the biomes most vulnerable to wildfires. Fire intensity, amount of rain after fire, topographical (elevation, slope angle, slope aspect, curvature) and edaphic (soil type, soil depth) factors control the recovery of the vegetation. To investigate the environmental factors that affect vegetation recovery after major fire, we selected the 2017 Thomas Fire of Ventura County. Ventura County falls within the coastal chaparral region, and in 2017 the Thomas Fire burned 281,893 acres of land. This project investigated recovery after the fire by looking at the roles played by topography, hydrology, soil profile, fire intensity, and land use within the burned

area. To investigate such factors, we used Landsat satellite images, ASTER Digital Elevation Model (DEM), GIS layers, and GPS data. The methodology followed two main steps: bimonthly Normalized Difference Vegetation Index generation, topographic variables generation from DEM and, identify high and low vegetation recovery zones. We identified different regeneration patterns of the burnt area and used a generalized linear model to evaluate relative importance of the variables to identify the factor responsible for quicker vegetation recovery.

Elizabeth Ridder, eridder@csusm.edu, *California State University, San Marcos*. **Baseline Isoscape Construction for Cyprus and Jordan**. Stable isotopes of C, H, and O exhibit spatial and temporal variation related to the various biogeochemical processes that deposit, uptake, and fractionate these isotopes. Spatial patterns vary from local to global, with some processes like precipitation, dependent upon regional-to-global scale interactions of the atmosphere and lithosphere, resulting in a general spatial pattern of decreasing 2H and 18O with increases in elevation, latitude, and distance from oceans (continentality). This in turn influences the spatial patterning of surface waters, plant uptake, and incorporation into collagen. Many current models of isotope landscapes (isoscapes) are regional to global in scale, and although many of these products are available, the spatial scale does not allow for the examination of local to regional variation of isotopes. This paper discusses the construction of 13C, 2H, and 18O baseline isoscapes for Cyprus and Jordan, using meteoric and surface waters and vegetation. The data for this preliminary examination were collected in 2017 and 2018, across an elevational gradient in both countries. Additional samples were collected from near the Bronze Age sites of Politiko-Troullia, Tell Abu en-Ni'aj, Tel el-Hayyat, and Khirbat Iskander. Modern isoscapes provide spatial coverage, while tooth collagen and carbonized seeds and wood from specific archaeological sites permit the extrapolation of middle-to-late Bronze Age isoscapes. Construction of isoscapes at this spatial and temporal scale will allow us to test hypotheses regarding environmentally related abandonment and resettlement.

David Saldana, dsaldana17@toromail.csudh.edu, *California State University, Dominguez Hills*; **Michelle Mohr**, mmohr2@toromail.csudh.edu, *California State University, Dominguez Hills*; and **Gabriel Angulo**, gangulo2@toromail.csudh.edu, *California State University, Domi*. **Dendrochronological Evidence of Growth Reduction in Response to Drought of Jeffrey Pine**. In an increasingly warming world, droughts are becoming more and more frequent weather events in the American Southwest. Dendrochronology can not only provide information about past climate but can potentially identify periods of drought. In this study forty-four tree-ring cores were gathered from twenty-four Jeffrey pine (*Pinus jeffreyi* Grev. & Balf.) trees in the Cascade Lake watershed, California, to survey and discern past extreme

drought events. Tree-ring cores were processed with standard dendrochronological methods to enhance the detection of climate-sensitive data of the tree-rings, and ring-width were analyzed with the Velmex tree-ring measurement system. Visual crossing dating and statistical packages (COFECHA, ARSTAN, and dplR) were used to remove most of the cross dating and age-related error. We developed a 318-year-long (1700–2018) tree-ring chronology of Jeffrey pine for this area. Stunted growth events coincide with twentieth-century drought events and precipitation records from California. Due to this strong correlation, we have deduced that years 1729, 1730, 1752, 1753, 1757, 1763, 1771, 1777, 1781–83, and 1796 were drought events in the eighteenth century, and years 1822, 1844, 1846, 1859, and 1886 were drought events in the nineteenth century. The higher frequency of low growth events in the eighteenth century than that in the nineteenth and twentieth centuries shows resemblance to other reconstructed drought events for this area. For expansion of this research, we have concluded that the inclusion of more species from the study area will help constrain the nature of past drought events to better predict future drought events.

Katherine G. Sammler, ksammler@csum.edu, *California State University, Maritime*.
Intimate Outer Space: Gravity, Waste, and the Spatial Orientation of Bodies. Discard studies scholars confront the materiality of waste and recognize that, particularly within the Anthropocene, there is no "away" place for its disposal. The idea of our planet as a bounded sphere, containing the only livable habitat within an otherwise hostile universe, is made urgent through emissions in the atmosphere and plastics in the water. However, human activities—including generating waste—extend beyond earth, up into orbit, and there is an emergence of scholars exploring the upper atmosphere and low earth orbit as a part of a global environment. While a new corporate space race is shifting space-waste politics with reusable rockets and orbital debris recycling, utilizing a feminist geopolitics and political ecological approach requires a look beyond the national and corporate actors toward intimate, bodily scales. Engaging the physiological feat of maintaining life in orbit draws attention to the invisible relationships between bodies, waste, and gravity. The engineered habitats required to support life in space are a microcosm of the urgent planetary concerns surrounding air and water resources, but also waste storage and elimination. Without strong gravitational fields, liquids coalesce at the location they are created, instead of flowing down and away. Such excesses disrupt the orderly engineered environments and minutely monitored bodies. This paper looks to use astronaut tears, space gynecology, zero-g surgery, and NASA's "space poop challenge" to investigate the broader politics of waste, gravity, the spatial orientation of human and planetary bodies, and the risk posed by our inability to get away from our intimate waste.

Cory R. Sanchez, corsan@uga.edu, *University of Georgia*. **Into the PIT: Unseen, Uncounted, and Severed through the Homeless Census**. This paper examines U.S. Department of Housing and Urban Development's (HUD's) Point-in-Time (PIT) counts of homeless individuals in the U.S. PIT was initiated in 2007, and HUD argues that such counts are crucial to determine the scope of homelessness, funding for abatement programs, and overall progress in ending homelessness. Scholars, however, have criticized PIT counts for undercounting homeless people, inconsistent methodology, and problems with execution. This paper argues that HUD's PIT counts should be understood as political objects. As such, they are important for establishing how resources are allocated to a vulnerable population and how a particularly complex social problem is conceptualized and acted on. This paper also argues that PIT counts unduly deepen homeless individuals' sociospatial severance from mainstream society. I chart the origins of HUD's PIT counts as well as the criticisms by scholars and advocates for homeless people. I discuss national PIT counts and contrast them with counts conducted in Phoenix, Arizona. I investigate the ways that undercounting of people impacts how we conceptualize homelessness in the city. I argue that use of PIT counts is problematic and constitutes some of the ways we do and do not engage in care work for homeless people in our communities.

Bryan G. Saul, bgs56@nau.edu, *Northern Arizona University*. **Academically Speaking, Sustainability Is More than a Color**. This study lays foundational research into the sustainable practices implemented by colleges and universities. Moreover, the intention is to stress the growing need for respectful climate actions within our communities while highlighting the importance of these practices within our academic institutions. Technological advancements have propelled both our awareness and knowledge of our environments to astounding new levels, yet there is still contentious debate as to whether or not climate change is actually occurring or if we should even do anything about it. Nevertheless, our actions are extinguishing species, raising carbon levels, exhausting natural resources, and removing natural landscapes with commercialization practices. This research examines past, current, and prospective climate and sustainability action plans enacted on campuses and stresses the need to significantly raise awareness in regard to respectful climate actions. Higher learning is the beginning of meaningful, noteworthy, lifelong endeavors where the congregation of knowledge enriches and changes perspectives for all involved. Undeniable research strongly emphasizes the dire need to redirect respectful climate action from opinion to fact, and there is no better place to enact these changes than on campuses. By integrating community programs, incentive-based efforts, effective conversion efforts, and research such as this, we can undoubtedly enact positive change that reaches from campus into the community. In doing so, we can begin properly demonstrating that change is possible, realistic, and non-infringing to business practices.

Jeffrey P. Schaffer, jeffreypschaffer@yahoo.com, *Mountaineering geomorphologist and retired adjunct professor*. **Will Physics Finally Produce a Grand Unified Theory (GUT)**, or, **The Geography of the Universe: It Is Probably Not What You Think.** This is the third abstract in my "Will" trilogy. The first two addressed the inability of the world's leading experts to solve easy "impossible" problems, due to their inflexible dogma. This third is vastly more complex and appears to be a truly impossible problem. Surprisingly, astrophysicists and cosmologists cannot agree how the universe originated. Short answer: Astrophysicist Paul Davies says GUT is gutted and String theory is ad hoc (so true). Most geographers "know" that OUR universe began with the Big Bang about 13.7 billion years ago and has been expanding ever since, with life evolving along the way, which is A, The Absurd Universe, the default position; basically: it's absurd, and we are clueless. Next, B, The Unique Universe: don't ask. C, The Multiverse, infinite universes are spawning, even now on Earth; nerds love it. D. Intelligent Design: God created it about 6,000 years ago. E, The Life Principle: like D, sans God. F, Self-Explaining Universe: it evolves consciousness, then goes back in time and creates itself. G, Fake Universe: don't talk about it, but there may be an infinite number of them. And H, None of the Above: that would include mine: a Virtual Reality Relativistic Quantum Metaverse. Only D and H allow meaning; the others are meaningless universes, so why look for meaning in your lives? But if H is Virtual Reality, this begs the question: What is Reality? Reality is the Conscious Singularity, infinitely better than the "God" concept.

William A. Selby, wselby@smc.edu, *Santa Monica College*. **Geographers as Influencers Saving the World: California Examples**. As scientific research has evolved to become increasingly interdisciplinary, geographers and their geospatial technologies have been pushed into the spotlight to better understand our world and to identify and solve problems. Our ability to utilize and connect all realms of geography and related sciences has led to effective synergistic problem solving. Physical, human, and regional geographers, working together to incorporate research from many disciplines, are making much greater impacts than the sum of their individual efforts. We will share examples of influencers from California who are changing the world, one project at time. Your participation and contributions are welcome at https://www.rediscoveringthegoldenstate.com/

Shelby Lillian Smith, shelbys@email.arizona.edu, *University of Arizona*. **A Politics of Obscurity: Sanctuary, the State, and Resisting Legibility**. The heightened emphasis on work-site raids as tools of immigration enforcement under the second Bush Administration contributed to a renewed interest in sanctuary policies in the United States. Heightened levels of deportations under the Obama Administration, coupled with anti-immigrant policies and legal attempts to penalize sanctuary cities under the Trump Administration, have, at least partially, amplified this continued

relevance of sanctuary activism and debate across an array of political spaces. Yet, sanctuary policies and practices are not, and should not be, theorized as responses to repressive state apparatuses. Despite state, media, and at times, scholarly attempts to define and render legible sanctuary, its actual policies, practices, implementation, and logics vary across sites, as do its political effects. While geographers have made significant interventions into sanctuary scholarship around questions of inclusion and exclusion (Houston and Morse 2017), insurgent citizenship (Ridgely 2008), the violence of waiting and temporality (Bagelman 2016), and minor politics (Squire and Darling 2013), it is at the nexus of urban and national policies and politico-discursive practices in the United States where I contend that sanctuary needs further attention and theorization. Based on ethnographic and archival fieldwork, I contend that there is a discursive and material disconnect from the policies and practices of sanctuary and the state and media produced discourses that surround them. Specifically, I argue that sanctuary cities and spaces of sanctuary practices are important sites of difference, in which local historical, political, and economic urban contexts are its primary drivers.

Peter T. Soule, soulept@appstate.edu, *Appalachian State University*; and **Paul A. Knapp**, paknapp@uncg.edu, *University of North Carolina-Greensboro*. **Re-evaluating the Long-Term Effects of Rising Atmospheric CO_2 on Radial Growth Rates of Western Juniper *(Juniperus occidentalis* Hook.): A Longitudinal Study from Central Oregon, USA**. In this longitudinal study, we explore the impacts of changing atmospheric composition and increasing aridity on the radial growth rates of western juniper (WJ; *Juniperus occidentalis* Hook.). Our primary objective is to determine whether carbon dioxide (CO_2) enrichment continues to be a primary driving force for a tree species that was shown to be positively affected by increasing CO_2 levels circa the late 1990s. We collected data from mature WJ trees on four minimally disturbed study sites in central Oregon and compared standardized radial growth rates to climatic conditions from 1905 to 2017 using correlation, moving-interval correlation, and regression techniques. We found the primary climate driver of radial growth for WJ is antecedent moisture over a period of several months prior to and including the current growing season. Further, the moving interval correlations revealed that these relationships are highly stable through time. Despite a trend toward increasing aridity manifest through significant increases in maximum temperatures during the summer growing season, WJ radial growth post-1960 exceeds growth pre-1960, especially during drought years. Our results support prior conclusions that increasing atmospheric CO_2 increases water-use efficiency for this semiarid species, which allows the trees to continue to grow during climatic periods negatively associated with radial growth. Recent studies have shown that semiarid ecosystems are important for understanding global variations in carbon uptake from the atmosphere. As WJ woodlands cover an extensive region in western

North America and have been experiencing rapid expansion during the twentieth and twenty-first centuries, they may become an increasingly important carbon sink.

Paul F. Starrs, starrs@unr.edu, *University of Nevada, Reno*. **Evolving Thought in the Berkeley School of Geography: Faith in Diversity and Skepticism about Globalization**. For seventy-five years (1923–1997), the Berkeley School of Geography animated its proponents and was enthusiastically vilified by antagonists. No other so-called "school" of geography approaches its significance and inventiveness. Yet in Berkeley Geography a goodly bit of evolution is evident, from the stony cultural conservatism of Carl Sauer to the activist stance of James J. Parsons. Heard in the School's waning days were claims for an strong political ecology, voiced in the exhortations of latter-day advocates Bernard Nietschmann and David R. Stoddart, now deceased. Although "Berkeley School" geography of the olden days has perhaps breathed its last—briefly displaced by fifteen subsequent years of toying with "critical social theory," in the words of Pred—a new stripe of Berkeley Geography is an achievement of today's American academic geography. A distinctive evolution is charted, citing some leading exponents.

Rachel Stilley, rachelstilley@email.arizona.edu, *University of Arizona*. **Cultivating Queer: Urban Agriculture and Identity in Tucson**. Tucson, a UNESCO City of Gastronomy, is home to around fifty-seven school gardens, more than twenty community gardens, dozens of urban farms, and the award-winning Southern Arizona Community Food Bank, and it hosts farmer's markets nearly every day of the week. Participation across such a broad spatial and temporal spectrum is inherently diverse, and intersections between urban queer and urban green spaces may be grounds for a deeper understanding of how space sustains the (re)creation of identity. This research focuses on identity building in green spaces, specifically queer identity and intersections in community gardens and the local urban agricultural community. Urban agriculture and queer identity are topics of interest in the study/literature of metropolitan areas, but have not yet been married to derive a full sense of queer identity within green urban space. As food insecurity and food deserts (areas with little or low access to grocery stores and fresh vegetables and fruits) positively correlate with economic recession and poverty, food justice issues are much more likely to affect the experience of non-dominant groups, and people with restricted social and economic mobility. Both qualitative and quantitative data will be used in attempting to construct a contemplative picture of queer engagement in the burgeoning green spaces of Tucson. Surveys seek the participation of people with differing identities, including non-queer folks, and will serve to draw a basic map of participation in urban agriculture, while semi-structured interviews with key informants will comprise the bulk of the research.

Selima Sultana, s_sultan@uncg.edu, *University of North Carolina, Greensboro*. **Great Smoky Mountains National Park and Missing African-American Visitors**. This research is designed to better understand African-American interest in Great Smoky Mountains National Park (GSMNP) and reasons for both visiting and not visiting GSMNP. Despite the close geographic proximity of large African-American populations to GSMNP, African-Americans comprise less than one percent of visitors to this park. These visitor numbers are only marginally greater than African-American visitation levels recorded in 1938, a time when park facilities were segregated. Underrepresentation of minorities challenges the view that national parks reflect the central values of American culture and that public land is open to all. While existing park visitation surveys provide information about visitors, they do not provide reasons for either visiting or not visiting a park. Additionally, the data collected by the park service is based only on individuals who visit the parks, not the surrounding population. Therefore, minority voices and perspectives are missing in our knowledge about why people visit or don't visit the national parks. This proposed research builds on these visitor surveys by conducting open-ended surveys with the African-American population in nearby large cities. These surveys will help identify the factors that account for visitation of the park by local residents and will be compared to conditions within GSMNP to identify any issues affecting attendance. This research will use a quantitative and qualitative mixed method analysis.

Ray Sumner, rsumner@lbcc.edu, *University of Melbourne*. **Two Castles on the Adriatic—Geography and Culture**. This short talk skims hundreds of years, with a focus on two Castelli, Miramar and Duino. The nearby city of Trieste, often described as multi-ethnic, cultured, cosmopolitan, is the former entrepôt of the Austro-Hungarian (Habsburg) Empire. As part of Italia irridenta, the region was much contested from the early nineteenth century till the 1970s. Political geographers and historians have documented these changes to Mitteleuropa, while the city is well known to some literary scholars, linguists, and ethnographers. The Karst is studied by physical geographers and geologists, and the Bora by climatologists. New interest is being directed to this semi-forgotten northeastern corner of modern Italy, and for a number of reasons Trieste and its castles are becoming tourist destinations.

Matthew Toro, matthew.toro@asu.edu, *Arizona State University*. **Recovering Washburn's Grand Canyon Survey Data**. In the 1970s, legendary explorer and cartographer Bradford Washburn led a major, field-based and aerial survey of the most accessible, well known, and frequented portions of the greater Grand Canyon region, its so-called "heart." The Washburn survey resulted in the largest-scale (1:4,800) topographic and hydrographic data hitherto produced for the region. Scribecoat map manuscript sheets embodied those data. Washburn and a group

of globally elite cartographers used those data to produce the cartographically celebrated "The Heart of the Grand Canyon" map publication featured in the July 1978 issue of *National Geographic* magazine. That map, in addition to being one of the most iconic maps of the region ever produced, marks the culmination of the first two centuries of Grand Canyon exploratory and topographic cartography. But what of the raw survey data used to create the map, the manuscript sheets? This presentation recounts the fate of Washburn's Grand Canyon survey data, and how, after being nearly forgotten for more than three decades, these important artifacts of late twentieth-century cartography re-emerged, and at a most auspicious moment in the larger history of Grand Canyon mapping, no less.

Nate Treacy, ntreacy@email.arizona.edu, *University of Arizona*. **Counter-Geographies of Displacement and Resettlement in the Era of Neoliberal Multiculturalism**. Guatemala's Comunidades de Población en Resistencia-Sierra (Communities of Population in Resistance; CPR-Sierra) present a compelling case study encompassing negotiations of territoriality, indigenous politics, and transitional justice in a post-conflict landscape. Uprooted from Guatemala's western highlands in the late 1970s and early 1980s, these communities of Ixil and K'iche' Mayans formed the highly organized and cohesive social structures necessary to survive more than fifteen years of military violence and displacement. Today, however, CPR-Sierra communities have been geographically dispersed by the post-conflict resettlement process, environmental challenges, and the slow attrition of migration both within Guatemala and beyond. Through this dispersal, the struggle to preserve the social cohesion and organizational capacity that earlier allowed them to challenge wider structures of political and economic inequity has been locally constrained to disaggregated communities spread across the country, while also becoming entangled in neoliberal structures of governance. How have this movement's political objectives been rearticulated through its unremitting displacement? Building on ideas of neoliberal multiculturalism and drawing from archival research and interviews conducted with CPR community members and leadership, this research analyzes the territorial logic of the post-conflict neoliberal state and how indigenous resistance takes shape within its framework.

Tera Trujillo, tera.trujillo.682@my.csun.edu, *California State University, Northridge*. **Urban Development in an Agricultural Ventura County**. Ventura County has been experiencing rapid urbanization in a once-sleepy coastal and agricultural landscape. Examining the urban intensification index over thirty years (1995–2015) will paint a picture of just how much this county has changed and will continue to change.

Dustin Y. Tsai, dytsai@ucdavis.edu, *University of California, Davis*. **A Tale of Two Croatias: How Club Soccer Teams Produce Regional Divides in Croatia's Na-**

tional Identity. Croatia's monumental second-place finish at the 2018 FIFA World Cup represents the highest soccer achievement to date for the young nation. This victory, however, masks violent internal divisions between its domestic club soccer teams. This paper examines the most salient rivalry between Dinamo-Zagreb and Hajduk-Split, two teams that have evolved to represent the interests of Croatia's north and south, respectively. Using interviews with radical soccer fans, I argue that the two teams act as reservoirs for regional identity building, while violence between their fans is a microcosm for political and economic tensions between Zagreb and Split. More importantly, this rivalry exposes the dividedness of the Croatian state, as it continues to grapple with the complexity of its regional identities in the wake of its independence from Yugoslavia. This paper contributes to the existing body of literature on sports identity and regionalisms/nationalism as well as how sporting teams shape the geographies of belonging.

Amber M. Villa, amber.villa@sjsu.edu, *San Jose State University*; and **Kathrine Richardson**, kathrine.richardson@sjsu.edu, *San Jose State University*. **Autism in Geographic Education: Faculty Experiences Teaching College Geography Students with Autism Spectrum Disorder; Literature Review and Methods**. This qualitative research project will examine the current and past experiences of college and university faculty teaching students with ASD (Autism Spectrum Disorder) in geography and geographic information science courses through semi-structured, in-depth interviews and phenomenological and thematic analysis. The phenomenological analysis relies heavily on first-person experiences. During the analysis process, the researcher will find common themes via thorough evaluation of typed interview transcripts, highlighting common themes. To diversify types of faculty experiences, this study will select a minimum of twelve interview participants across two states, California and Texas, from both public and private, two- and four-year institutions, versus selecting participants from one specific academic institution or geographic location. All participants must currently teach or have taught students with ASD in the field of geography at the college level. By examining the experiences and recommendations of faculty teaching college students with ASD in the field of geography, we can begin to determine best pedagogical practices, to increase ASD awareness, improve teaching methods and instructors' interactions with students with ASD. This study may lead to further research on how to effectively and efficiently teach college students with ASD in both STEM and liberal arts fields, as the field of geography expands across both areas of study.

Robert Voeks, rvoeks@fullerton.edu, *California State University, Fullerton*. **Carurú: The Enigmatic Origin of Brazil's Signature Afro-Brazilian Dish**. The hearty green stew known as carurú represents a powerful cultural marker for adherents to Brazilian Candomblé, an African-derived religion that arrived during the slave trade.

Based principally on the African cultigens okra and palm oil, carurú is associated in particular with the Ibeji, twin spiritual entities in the Candomblé pantheon. Although various versions of carurú are enjoyed throughout the southern U.S. and the Caribbean, including Louisiana gumbo, Barbados cou cou, Jamaican callaloo, and Haitian kalalou, the origin of this iconic African-American dish is disputed. This presentation explores the significance of carurú to the Afro-Brazilian community, the convoluted ethnobotanical history of the dish, and the current war against carurú being waged by evangelical groups.

Chuyuan Wang, chuyuanw@asu.edu, *Arizona State University*. **Empirical Modeling and Spatial Analysis of Heat-Related Morbidity in Maricopa County, Arizona**. Maricopa County, Arizona, experiences extremely high temperatures in the summer that can have a negative impact on the health of its residents and visitors. Morbidity and mortality due to environmental heat is a significant public health issue in Maricopa County, especially because it is largely preventable. The objective of this study is to examine the demographic, socio-economic, housing, and environmental factors that contribute to heat-related morbidity in Maricopa County. Heat-related morbidity data between 2012 and 2016 were obtained at census-tract level from the Maricopa County Department of Public Health. Demographic, socio-economic, and housing variables were derived from 2012–16 American Community Survey five-year estimates. Landsat 8 Level-1 products were acquired for all the summer months from 2013 and 2016. NLCD 2016 percent tree canopy and percent developed imperviousness data were obtained from USGS. We used ordinary least squares (OLS) regression and multiscale geographically weighted regression (MGWR) techniques to examine the relationship between these variables and heat-related morbidity rate. Results suggest that higher morbidity rates are found in census tracts with a higher percentage of poverty, disability, no vehicle ownership, white non-Hispanic population, less than high-school graduates, and those with higher surface reflectance but lower NDVI values. The MGWR model shows a significant improvement in goodness-of-fit than the global model, which means spatial heterogeneity is another important factor that contributes to the relationship. Among these variables, population ages sixty-five and older, Hispanic population, disability, vehicle ownership, and house occupancy have much stronger local effects than other variables.

Joe Weber, jweber2@ua.edu, *University of Alabama*. **Exploring America's Lost National Monuments**. America's national park system currently consists of 419 units, including parks, monuments, battlefields, preserves, lake shores and seashores, memorials, parkways, and historic sites, but this total does not include twenty-eight units that are no longer counted as part of the system. Among these were eight western national monuments that were typical small park units, includ-

ing two caves, a fossil site, high mountain parks in the Rockies, desert buttes near Phoenix, and a Native Alaskan village. They were removed from the park system due to a perceived lack of development possibilities. They have disappeared from maps and memory. This work maps these lost monuments and provides an assessment of what they contained and their place within the park system. The idea of counterfactuals, or examining what might have been had these monuments been developed in a fashion similar to that of their peers, will be employed to understand what these units could have become had they remained in the system. The results provide a more positive view of these lost monuments, as well as making evident a number of limits to the development and expansion of the national park system.

Xiaozhe Yin, xiaozhey@usc.edu, *University of Southern California*; **Meredith Franklin**, meredith.franklin@usc.edu, *University of Southern California*; and **Yao-Yi Chiang**, yaoyic@usc.edu, *University of Southern California*. **Traffic Noise Prediction Using Mobile Data Collection Methods and Machine Learning Techniques**. With the growing expansion of urban transportation needs, traffic noise has become a dominant environmental issue, and, therefore, a particular interesting research problem. Conventional traffic noise models such as TNM2.5 are designed for modeling highway traffic noise and have a coarse spatial resolution of 100 m, which makes it hard to predict local-level noise, especially for epidemiologists who are interested in community-level noise exposure. Therefore, the need is urgent to come up with some practical noise modeling method to produce finer spatial-temporal resolution and a more spatially complete traffic noise model. In a pilot study in Long Beach, California, we adopted a mobile data collection method that is capable of identifying small-scale spatial patterns and noise gradients between high traffic and residential areas. The collected data were further compared with TNM2.5. To understand the contributions of different road features to traffic noise, we adopted four machine learning models: linear regression, Extreme Gradient Boosting (XGBoost), Random Forest, and Multilayer Perceptrons (MLPs) to predict A-weighted equivalent continuous sound level LAeq. Results indicated that Random Forests outperformed the other three models by having the smallest RMSE and largest R2. Among all input variables, the distance to the residential roads was found to significantly contribute to the traffic noise levels. Comparing measured values with the TNM2.5 estimates, we observe that TNM2.5 overestimated noise by more than 15dB in north Long Beach. In conclusion, our study proves the efficiency of the mobile data collection method and the potential of machine learning techniques to model traffic noise.

Yonit Yogev, MES, yonityogev@gmail.com, *Independent researcher, Olympia, Washington*. **Creating a Culture of Mentoring in Public Lands Agencies and Environmental Organizations**. In comprehensive Participatory Action Research completed for my Master's in Environmental Studies degree, forty participants

recommended seven key areas on which public lands agencies and environmental organizations need to focus in order to become welcoming places for under-represented populations. These critical areas include youth leadership development, targeted environmental education, deep collaboration in partnerships, collaborative community outreach, cultural humility trainings centering equity and implicit bias, and intentional mentoring programs. The participants emphasized that all of these are necessary, in combination, in order to create outdoor spaces that are actually relevant and welcoming for these communities. As outdoors and public lands agencies and environmental organizations increasingly grapple with inequitable access (Taylor 2015), research as well as experienced leaders in this field point to why it is critically important to create and incorporate semi-structured mentoring into our workplace systems (Handelsman 2005; Yogev 2017). At the same time, those who try to do this encounter barriers that impede their progress or even prevent them from attempting. In the early-stage research I present, I explore the basics of these types of programs, begin to examine the multiple barriers that can potentially interfere with their creation and implementation, and discuss ways to overcome any obstacles that might emerge. I use a collaborative, participatory approach, thereby encouraging the sharing of collective wisdom, which is essential to meeting these challenges. Collaboration also helps to create a culture of mentoring and is integral to the transformation necessary for these organizations to become genuinely equitable.

Yolonda Youngs, younyolo@isu.edu, *Idaho State University*. **Viewing Power, Place, and Territory at the Grand Canyon: A Social and Economic History of Scenic Viewpoints, 1880 to 1926**. This paper explores the visual and cultural history of Grand Canyon National Park from 1880 to 1926 through the story of its iconic south rim scenic viewpoints as places of social and economic power and territory. This is a pivotal time for the canyon, when its settlement history, economic development, tourism potential, and federal management shifted in several important ways. In short, Anglo settlers, federal land managers, the Santa Fe Railroad, and the Fred Harvey Company transformed the scenic beauty of the canyon into a commodity whereby certain locations along the canyon's south rim became a series of named viewpoints that codified economic hubs of hotels, shops, trailheads, and visitor services. In the process of developing these areas for the quickly growing tourism trade, they transformed these coves and lookout points into a commodity that functioned as an economic hub between the inner canyon and rim developments. While many geographers, historians, and other scholars have written about this time in the canyon's cultural history, few have paired their analysis with a visual approach. I ground my discussion through a variety of visual representations of the canyon through time (postcards, photographs, stereoview images, historic maps) along with archival documents, government reports, and extensive fieldwork. Findings from this paper suggest that the period between the 1880 and 1926 transformed

the environment, social networks, cultural landscape, and economic potential of the Grand Canyon from local and individual entrepreneurs and groups to federal and corporate control.

Xuan Zhang, xuan.zhang@uga.edu, *University of Georgia*; **Lan Mu**, mulan@uga.edu, *University of Georgia*; and **Jerry Shannon**, jshannon@uga.edu, *University of Georgia*.
Evaluating the relationship between older population migration and destination characteristics in Georgia. In the global trend of an aging society, the United States is facing a significantly growing number of older people. From a community to national scale, the considerably increasing older population and proportion will elicit many challenges as well as opportunities. Compared with young people, older adults have different preferences in migration destinations, due to their mobility constrain and retirement status. Previous research rarely considers the related variables, despite evidence of growing demand for long-term care from older adults. To better serve the older population, it is crucial to answer the question about where and why they migrate and understand their needs. Focusing on the state of Georgia, this study examines the older population migration by migration types (interstate and intrastate), age groups (relatively younger old, and older old), and urbanized levels of the migration destination. We use geographically weighted regression (GWR) and decision-tree regression to analyze and compare the migration with destination environment variables, and visualize the migration pattern in GIS. We consider various perspectives of the destination living environment, including variables describing the physical environment, climatic environment, built amenities, cost of living, and demography of the destination county. Results indicate that interstate and intrastate migration are statistically significant with different sets of variables and at different magnitudes. This research reveals that long-term care facility-related variables, such as availability and capacity, along with hospital availability, are significant with the number of older migrants, especially for interstate migration.