

Carolina Crosstalk

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Broadening Your Horizons



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Letter From the Editor:

Broadening Your Horizons

Research requires thinking outside of the box. Every student joining or creating a research project takes a leap of faith into the unknown. For many undergraduates, it's their first experience in research, whether they're in a lab or completing a literature review in an online database. Some find a topic that they enjoy unexpectedly, inspiring them to start other projects. Research may seem intimidating, but taking the first step opens up a whole new world of possibilities. You learn throughout the process, making your mark and maybe even developing a new research method.

Undergraduate researchers at USC are making an impact around the world. One student is using motion detection cameras to track animal populations in Ukraine after the Chernobyl nuclear explosion. Another had an REU in New Jersey to study concrete model configurations for oysters. It was funded by the U.S. Department of Defense to create a living shoreline to protect military bases. Whether research is international, national, or local, it requires us to expand our horizons. These researchers committed to studying precursors to Alzheimer's disease, simplifying access to healthcare, advocating for public beach access, voting decisions amongst women of color, and using eDNA to study lionfish.

We encourage you to look beyond the classrooms and try something new. This issue of Carolina Crosstalk shows how research can be done in any field, if you think creatively.



Madelyn Weston

Studying Population Distributions of Mammals After the Chernobyl Disaster

Written by Emily Prillaman, Associate Writer and Editor
Edited by Raegan Cole, Associate Writer and Editor
Designed by Mary Stafford & Polly Tappan
Featuring Ariadna Julia Munoz-Jeon,
Biological Sciences major, English minor, Class of 2027

The Chernobyl Disaster, widely considered the most catastrophic nuclear explosion in history, occurred after a routine safety check went wrong at a power plant in Ukraine. On April 26, 1986, the plant exploded, resulting in devastating fires and the release of radioactive gas, particles, and aerosols into the atmosphere. Subsequently, regions of Ukraine, Belarus, and Russia were contaminated, and the enduring aftermath of this tragedy left a profound impact on people and animals in the area. Radioactivity effects on humans have been well-researched, but there remains a significant gap in research on animals. The population distribution of mammals after the disaster remains a mystery.

Across the world, Ariadna Julia Munoz-Jeon works on this in a lab. For eight hours each week, she reviews video footage taken from a multitude of cameras set up in different protected areas of Chernobyl. Using captured images, she aims to understand the scope of damage done and where animals can live safely. "It's inspirational because research is what I want my whole career to be around, especially on animals," she said. Her work is part of a larger conversation on changes in animal population distribution after natural disasters. Munoz-Jeon's mentor, Dr. Timothy Mousseau, has been studying animals in Chernobyl since 2000, but the first cameras were placed in 2015.

One animal stands out as the origin of this study. Curiously, dogs thrived in Ukraine's radioactive areas after the explosion, outnumbering humans at one point in history. When researchers went to Chernobyl to mitigate the wild dog population, they got the opportunity to study other animal populations, leading to the beginning of the dog project in 2017. After other nuclear accidents, the direct effects of radiation poisoning on individual animals have been observed and well-researched. However, indirect effects on entire populations have not.

This is one of few projects specifically targeting animal population distributions in Chernobyl using camera trap images. Using motion detection, cameras take a series of pictures as an animal walks by until the animal is gone. Tracking progress on a spreadsheet, Munoz-Jeon documents the series of pictures by different factors, including the time of the video, the species, the quantity of animals, their sex, their age, and the temperature and weather of the area.

She records several species, including moose, wolf, fox, raccoon, badger, boar, hare, weasel and deer, the most common animal captured on video. Specifically, there are three types of deer in Chernobyl: red deer, roe deer, and moose, which are also called elk. She counts the number of points on their antlers to determine their age and time in the area. Then, Munoz-Jeon inserts this into a database spreadsheet. As a freshman, she mainly spends her time working on this running database that is used by statisticians and other lab assistants to calculate changes year to year. She is in the preliminary stages of a project to discover if there is intraspecific



Headshot of Ariadna Julia Munoz-Jeon

competition between the three deer species in Chernobyl. Munoz-Jeon knew she wanted to research animals and the environment for a long time. She started early, taking AP Research her senior year of high school to study how pollution affected otters in her local river, Waccamaw. She navigated this research project without any direct advisors, which proved challenging but rewarding. Before officially committing to the University of South Carolina, she knew that she wanted to get involved in research of any kind. She met with Peyton Smalls, student representative of undergraduate research, several times before her freshman year.

Early into her first semester, she made an appointment with the Office of Undergraduate Research and used the faculty research database to locate her interests. Through this, she connected with Professor Mousseau. Explaining the process of becoming a student researcher: "I didn't expect that a lab would be this accessible, that it would be this influential, and that it would be catered exactly to what I want because there's so much research out there," Munoz-Jeon said. Prior to being employed in the lab where she currently works, she was a volunteer. Now, she works full time and occasionally takes on other projects in the lab.

She has also applied for and been awarded the Magellan Journey Grant, which provides funding for underclassmen with limited research experience. When asked how she felt about working on a project happening halfway across the world, Munoz-Jeon said, "I just didn't imagine that I'd be doing something with such a big impact my freshman year." She is eager to research the well-known Chernobyl disaster early in her college career.

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(Photos provided by Ariadna Munoz-Jeon)



A photo of deer captured with motion detected cameras.

Don't Overcomplicate It:

Simplifying Access to Health

As the daughter of scientists and the sibling of dentists and engineers, imagine my dismay when I realized that I was going to be weeded out of my bachelor's in science public health major as a freshman. Suddenly, I felt my life flash before my eyes, worrying that I would never amount to anything. Not really, but I did have a scathed ego and a W on my transcript to cope with. The day I switched to a bachelor's in arts in Public Health, I sobbed in my advisor's office for an hour. I felt like a failure, as if my work ethic had declined since leaving high school. My advisor patiently tried to explain the reality of the situation: I had no interest in my B.S. courseload, nor did I want to become a physician or health professional that required a science background. Truly, it didn't matter if I was good at anatomy and physiology, because my career aspirations had nothing to do with it. I wanted to go into healthcare reform, whether that be through law school or a policy route. A B.A. was perfect for that. "College is hard," my advisor said, "but you don't have to overcomplicate it."

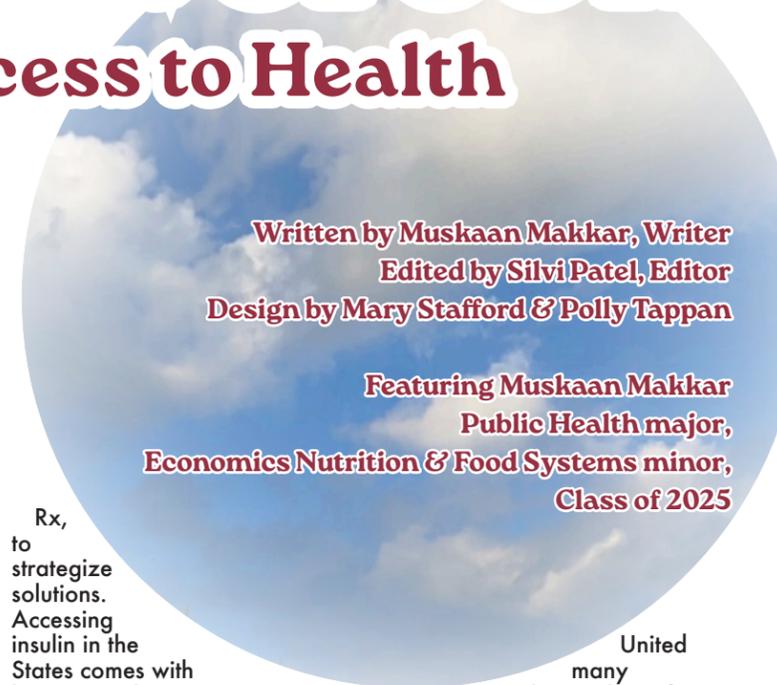
I didn't know it then, because frankly, being involved in research was never even on my radar, but don't overcomplicate it would become an integral tenet of my aspirations in the field.

It all started my sophomore year when a dear friend and peer, Audrey Richards, informed me of an opening in a health promotion, education and behavior research group. I would be examining the impact of food and beverage marketing communications on adolescent body image in Ghana under Morgan Boncyk and Dr. Christine Blake. I was always interested in nutrition and body image, and this project added a broader component of the impacts of globalization. I accepted the position, effectively entering the world of social science research. I had heard through the Office of Undergraduate Research, Magellan Ambassadors, and my professors that social science research was a whole other world with untapped potential, but I didn't realize how much passion I would develop for the field. Not only did I gain tactical skills, like proficiency in Excel and experience working with the statistical software, StataSE, but I also learned all about the importance of health resource accessibility.

In my research group, we found that processed foods high in fat and sugar were communicated more often. Certain marketing strategies, like goal frames, made unhealthy foods more desirable, aligning with the increasing trend of nutrition-related chronic diseases in Ghana. In short, the frequency and simplicity of the information distribution mattered. In this case, this knowledge was being used to promote an unhealthy product.

When I presented my research at the American Society of Nutrition Conference this past summer, I mulled over these conclusions and reflected on one main thought: what if we promoted healthy foods – or even other vital health resources – with this same strategy of increasing frequency and comprehensibility?

In the coming months, my peer Anusha Ghosh and I researched and co-presented a large-group presentation on the American insulin crisis for over 800 people at the Stamps Scholars National Convention. We featured expertise from real patients with insulin-dependent diabetes, academic experts in the fields of medicine and health economics, and the nonprofit insulin manufacturer, Civica



Written by Muskaan Makkar, Writer
 Edited by Silvi Patel, Editor
 Design by Mary Stafford & Polly Tappan

Featuring Muskaan Makkar
 Public Health major,
 Economics Nutrition & Food Systems minor,
 Class of 2025

Rx, to strategize solutions. Accessing insulin in the United States comes with many barriers and requires an understanding of patent law, monopolies, the pharmaceutical industry, and health insurance access. None are easy barriers to address, but at the very least, I could simplify the problem.

I aimed to do just that as I transitioned into a new role as an undergraduate health policy researcher in Dr. Christina Andrews' team. Dr. Andrews offered me a spot on her research team shortly after she advised Anusha and me on the American insulin crisis for the Stamps Scholars National Convention. She told me that my presentation took a complex topic unfamiliar to the audience, and simplified it through data, lived experiences, and diverse speakers. The simplicity of the presentation is what would make it accessible to communities that need the services, individuals who more than likely do not understand (nor care about) complicated jargon about the issue. She saw my potential to increase service accessibility for the community by studying the complexities of financing structures for substance use disorder treatment.

Months of tapping into my potential has affirmed that this ties into my career goal: remove barriers to healthcare utilization, especially within federal health assistance programs. Medicaid is the largest funder of substance use disorder treatment in the United States, financing around \$12 billion in treatment services every year. It is imperative to make access to these resources as easy as possible, which is why evaluation is important. In Dr. Andrews' group, I started contributing to R01 grant-funded projects from the National Institute of Alcohol Abuse and Alcoholism, and the National Institute on Drug Abuse. Specifically, these projects assess which state Medicaid programs do not cover the full continuum of substance use disorder treatment services.

Our research group looks at a variety of different factors that could impact access to care. We look at whether treatment services are provided through a fee-for-service (FFS) state Medicaid program or an outsourced managed care organization (MCO). We review the utilization management tactics that the MCOs use, such as prior authorization and quantity limits, which create challenges to accessing care. We also check for "carve out" services, which are certain aspects of treatment that the MCO outsources to a different organization, like a behavioral health organization

As I searched for FFS, MCO, and carve-out documents, I was overwhelmed by how confusing the system was, with information on coverage buried deep within the complicated pages of provider manuals and member handbooks – if updated documents existed at all. Even as a student designated to find these documents, spending hours on insurance websites and internet archives, I was often unable to retrieve a document. I thought about what this experience would be like from the consumer perspective – will an individual experiencing substance use disorder have the efficacy or mental capacity to find what services are available for them and who is funding them, only to realize that the full treatment continuum may not even be covered? These are the people who need effective solutions; right now, they deal with hindrances.

I continued to explore this issue of resource underutilization while working with Olivia Hinds, an MPH student in Dr. Andrew's team, on



the topic of single-state agency transparency. Single-state agencies are state departments of health that are given block grant funds from the Substance Abuse and Mental Health Services Administration to offer affordable treatment through contracted treatment providers.

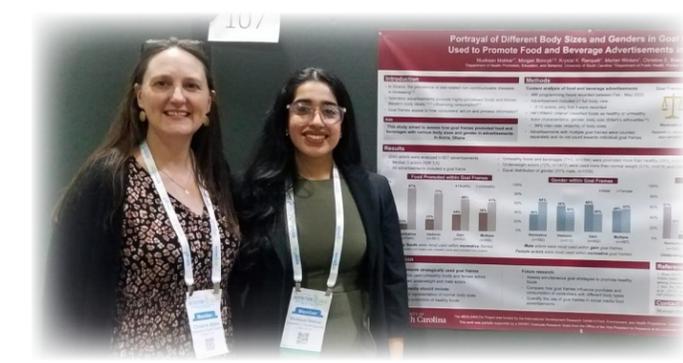
Olivia and I conducted a deep-dive on the single-state agency websites of all 50 states and D.C. We found that although these programs were government-funded, only 16 of all states even provided a list of contracted providers on their website. Among those, only ten states explicitly stated that they offered free services. Some states didn't even mention the program at all. It is unfair to put the responsibility of sifting through complicated websites for



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resources that may or may not exist for people experiencing life-threatening situations, like substance use disorder, lack of insulin access, or food insecurity. Rather, it is the responsibility of policy researchers to address underutilization issues by evaluating whether health resources are being communicated effectively.

Public health problems are already complex, so we can't overcomplicate the solution further. In other words, we can't make accessing already existing resources harder than they need to be, whether that be an oversaturation of unhealthy food advertisements, lack of transparent regulations on pharmaceutical manufacturers of insulin, or intense health insurance utilization mechanisms. The solution may be as simple as fixing a website or as nuanced as regulatory and legislative policy changes, but evaluating these errors is necessary to prevent an insurmountable detriment to populations who need resources. I hope to dedicate my career to removing barriers to health resource utilization as an aspiring health policy researcher, whether that be as a university professor or as a director of a center for research. My freshman-year academic crisis has developed into an incredibly fruitful journey in which I harness both my aptitude and passions to make an impact in the field of health policy.



(Photos provided by Muskaan Makkar)

Examining the Effects of Climate Change of Oysters

Written by Savanna Eggerling, Associate Writer

Edited by Madelyn Weston, Editor-in-Chief

Designed by Polly Tappan, Vice President

Featuring Nina Coli, Environmental Science Major, Marine Science Minor, class of 2025

Increased hurricanes, sea level rise, and erosion are some of the problems that coastal areas face due to climate change. They damage infrastructure and can ruin the livelihoods of those who live on the coast. When Nina Coli learned about the danger the current climate crisis poses in her high school AP Environmental Science class, she wanted to spread awareness and promote sustainability.

Coli always knew she wanted to conduct environmental science research at USC, and worked with the Office of Undergraduate Research to connect her to a professor researching the endangered North Atlantic right whale. However, with a busy second semester her freshman year, Coli couldn't find the right time. She still wanted to get involved, so the summer before her junior year she applied to a research experience for undergraduates program at Rutgers University. A month later, Coli was accepted.

Coli traveled to New Jersey to work on the project with her mentor, Dr. David Bushek. Her goal was to determine what configuration of concrete models were the best suited for oysters. It was part of a larger project funded by a research agency within the U.S. Department of Defense to create a living shoreline to protect military bases. However, the research can also have applications outside of military bases, as they assist in protecting coastal infrastructure and

ecosystems. A living shoreline combines the use of artificial constructions and biological organisms to help combat sea level rise, storm surges, and hurricanes, all of which increase with climate change. For Coli, the artificial construction was concrete and the biological organisms were oysters. This is largely because oysters are resilient to changes in the environment and can filter water, making them essential for the overall health of our waters.

Coli developed a strategy to find the ideal configurations of concrete modules for oysters to better understand the ideal conditions for creating a thriving oyster reef, a type of living shoreline. The methodology consisted of placing different module configurations into a large annular flume that spun and created a current within, replicating the ocean. Next, Coli put baby oysters in and fed them. She ran the flume for about five days, then stopped the flow of water and counted the number of oysters that settled on each configuration. After that, Coli analyzed the data using density maps to visualize where the oysters settled on the concrete modules. She intended to do three trials in her research, but because of time constraints, she unfortunately wasn't able to finish all three.

"Being able to get out in the field and have hands-on work, and be able to see the project being carried out," Coli said.

"For one, it's a lot more fun, and number two, being immersed in the project really makes you understand it more." The skills Coli gained from this experience, such as learning how to problem solve and being flexible when working in research, will help immensely with future research. She made connections with her mentor and others around her, something that she says will help with graduate school and her eventual career. "Find a good PI you're going to have a good relationship with, whether that is in an undergraduate lab or your thesis or like your PhD. Find somebody who is really excited to work with you and is willing to put in the time to do so," Coli said. "Make sure you surround yourself with people who are going to support you and lift you up and help you when you need it."

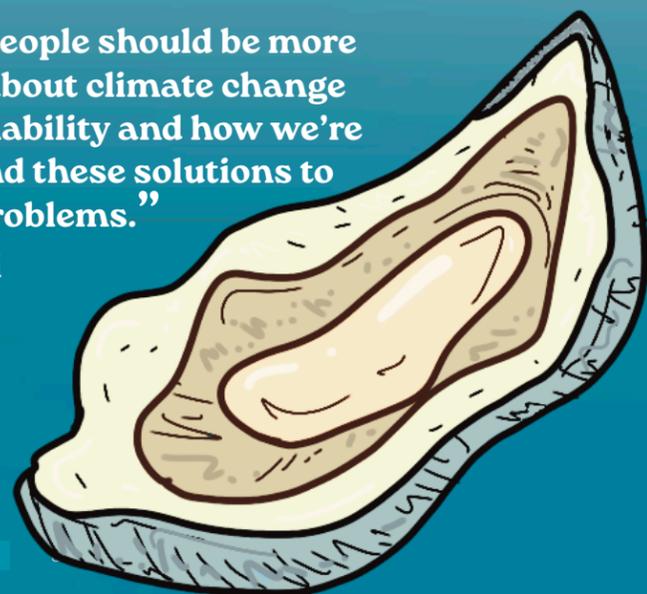
Too many people underestimate the effects climate change and sustainability will have on our future. But it affects people too—it is becoming more and more clear the necessity of innovations like living shorelines to protect human infrastructure and the livelihoods of those who live on the coast. As sea levels rise and hurricanes become stronger, research like Coli's will become imperative to maintaining our coasts. "I think people should be more cognizant about climate change and sustainability and how we're trying to find these solutions to really big problems," Coli said.

"I think people should be more cognizant about climate change and sustainability and how we're trying to find these solutions to really big problems."

-Nina Coli



Nina Coli and Dr. David Bushek pictured with Annular Flume, a rotating channel that holds water to mimic specific flow conditions.



Cape Shore flats of Delaware Bay in New Jersey. Below are half-scale models of the modular units used to observe natural oyster recruitment and to measure the stability on actual sand flat with waves and currents impacting them.



Analysis of Mitochondrial Black Coral Genomes and Lionfish eDNA

Written by Raegan Cole, Associate Writer and Editor
Edited by Madelyn Weston, Editor-in-Chief
Designed by Mary Stafford & Polly Tappan
Featuring Brendan Cruz, Marine Biology, Class of 2026



Headshot of Brendan Cruz

The ocean contains wonders beyond comprehension, but many researchers are working to make sense of this strange world. Brendan Cruz is a non-traditional undergraduate attending the University of South Carolina's Beaufort campus. He previously worked as a recruiter for government contracts, but he decided to return to college and get a degree in marine biology. After being accepted by USCB, he toured campus. Dr. Mercer R. Brugler, who is now Cruz's mentor, spoke with the tour group in the marine science building, sharing how students have the opportunity to get involved in research before classes start.

Cruz emailed several research professors and joined Dr. Brugler's team to study black coral mitogenomics. Black corals, named after their black protein-based skeleton, are found in all oceans and hold the record for the deepest (8,900 meters) and longest-lived (4,265 years) coral. Cruz spent the summer of 2023 comparing the DNA of black coral species found on the Alaskan and Italian coasts to determine how their mitochondrial DNA has changed over time.

Cruz expected his role to consist of cleaning glassware and assisting the research team, but Dr. Brugler encouraged him to be much more involved. Cruz spent the summer working to understand how two deep-sea species (from the North Atlantic Ocean and the Mediterranean Sea) are related to other black corals. The research team used a computer code to separate the mitochondrial and nuclear DNA. Next, they took the mitochondrial DNA and assembled the genetic information into a genome to compare the two black corals. When they weren't waiting on the DNA sequence to process, the team combed through gene files to ensure they were in the correct order.

One of Cruz's favorite memories was when Dr. Brugler asked him to locate, download and insert a mitogenome into the computer code to process the sequence himself. "I'd made the right choice to kinda stepping out of my comfort zone and asking to join the research lab," he said. Because of his contributions to the project, Cruz was named the first author of the research paper which is in the process of being reviewed at ZooKeys (Cruz et al., in review).

After comparing the two different species, they found that their DNA signatures were strangely similar. Typically, mitochondrial DNA evolves quickly, so species in completely different climates should be more genetically distinguishable. The two black corals, while having similar DNA signatures, look radically different. This discovery has led to more questions that Cruz and Team Black Coral plan to investigate. Their research and the code they created have made mitogenome retrieval and assembly more accessible in this field and others.

Cruz's time on the project has also inspired him to conduct his own studies. He is monitoring estuaries in the Port Royal Sound in Beaufort for environmental DNA released by lionfish. Oyster reefs could serve as an essential habitat for lionfish, but whether they live in Port Royal Sound is unconfirmed. This type of DNA consists of genetic material that has been released into the environment, such as skin cells, scales, etc. By simply sampling water, lionfish will never be physically handled. This method is much more humane as it is not only less stressful for the lionfish, but safer for the researchers because those fish are invasive in the Gulf of Mexico and Atlantic Ocean and are venomous. Cruz has applied for USC's Magellan Grant to help support him in this endeavor. In raising awareness of this possible infestation, the public can be protected from this dangerous fish. However, it may also be introduced as a potential low-cost food source, but needs to be prepared correctly.

Cruz looks forward to future research opportunities. "Looking back on the research now, I came a long way in a very short amount of time," he said. "I'm very happy with the decisions I made and where it's brought me." During the writing of this article for Carolina Crosstalk, Cruz submitted a second manuscript for review to Nature, and it has been under consideration by their editorial staff for 16 days (as of January 8, 2024).

Brugler MR, Cruz BA, Chutjian H, Gonzalez AD, Cappelmann A, Lopez D, Quintana L, Pettay DT, Horowitz J, Staton JL, Campbell JM, under consideration. The Ghost of UV Past still haunts anthozoan molecular evolution. Nature (Impact Factor: 64.8). Includes 6 USCB undergraduates and 2 USCB faculty as co-authors.

Cruz BA, Cappelmann A, Chutjian H, Roman JC, Reid MA, Wright J, Gonzalez AD, Keyman T, Griffith K, Appiah-Madson HJ, Distel DL, Wareham Hayes VE, Drewery J, Pettay DT, Staton JL, Brugler MR, in review. Complete mitochondrial genomes of the black corals *Alternatipathes mirabilis* Opreško & Molodtsova, 2021 and *Parantipathes larix* (Esper, 1788) (Cnidaria, Anthozoa, Hexacorallia, Antipatharia, Schizopathidae). ZooKeys (Impact Factor: 1.3). Includes 8 USCB undergraduates & 2 USCB faculty as co-authors.



Brendan Cruz with his research team cast netting for shrimp to show local children.



(Photos provided by Brendan Cruz)



WAVES OF HISTORY: STUDYING THE HISTORY OF BEACHES FROM 1700 TO 1850

Written by Amber Holowiecki, Associate Writer
 Edited by Jake Brezner, Associate Editor
 Designed by Polly Tappan, Vice President
 Featuring Lilly Kosoglow, Marine Science, Class of 2023

When most people think of research, the first thing that comes to mind are scientists in lab coats meticulously measuring beakers and squeezing pipettes. Lily Kosoglow, a sophomore marine science major, thought that way.

When Kosoglow arrived at the University of South Carolina, she didn't know what she wanted to research, so she combed through the online USC researcher database. She discovered Dr. Johnstone, a researcher studying one of the Great Lakes: Lake Erie, and Kosoglow was attracted to this project due to its proximity to her hometown, Pittsburgh, Pennsylvania, but was disappointed to discover that Dr. Johnstone was no longer conducting this research and Kosoglow restarted her search for a project.

Kosoglow learned about the Magellan Journey project at a networking event and applied for the grant. Upon her acceptance, she met her mentor, Dr. Josh Eagle, a researcher focusing on environmental law. Kosoglow didn't have background



Headshot of Lilly Kosoglow

knowledge about environmental law, but she was drawn to the project.

Kosoglow's original perception of research was altered when she began her journey last January. She discovered that her research would be more independent and historical. Kosoglow used historical paintings to interpret the history of beaches in Holland, England and the United States from 1700-1850. When most people think of beaches, they immediately think of recreational summer fun made up of volleyball, swimming, and sunbathing. However, Kosoglow recognized other beach uses.

Kosoglow worked seven hours per week combing through databases and websites in search of historical paintings depicting beaches. Over the course of her search, she discovered hundreds of paintings, more than she knew what to do with. Originally, Kosoglow had placed all of her paintings into one Google document. However, as she progressed, she realized that her method was an unorganized and inefficient process to analyzing each painting. Kosoglow was at an impasse. How could she systematically organize and analyze hundreds of paintings that did not share many similar aspects? She couldn't just pick through every nuance of every single painting, it would take days. It was a conundrum, the biggest one Kosoglow had faced yet, but she didn't let that stop her.

Kosoglow created her own organized method by classifying the paintings through ranks paintings based on common elements such as horses, children and carts. By

“By averaging these values, she could gain numerical insight into how beach use differed in each country. She had discovered a way to quantitatively organize qualitative data!”

averaging these values, she could gain numerical insight into how beach use differed in each country. She had discovered a way to quantitatively organize qualitative data! It was incredible - using this feat, Kosoglow could easily decipher each individual painting quicker than before and determine the beaches' use. Her discovery opened the doorway for her research..

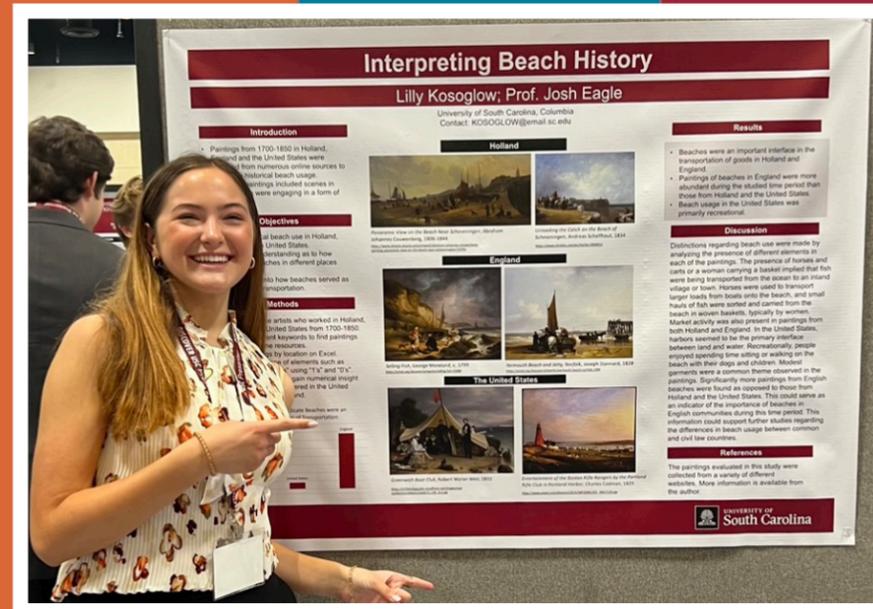
During Kosoglow's digging, she determined that Holland and England's beaches were more commonly used for transportation (about 55% and 68% respectively), while the United States beaches were used for recreation. This discovery was shocking because she first associated beaches with recreation, not transportation. This information indicated the importance of her research. Additionally,

there were significantly more paintings of English beaches found in comparison to those from Holland and the United States. Kosoglow deduced that beaches in English communities were very important during the given time period.

Kosoglow's research was very beneficial to her own growth, and it could also be useful in others' future endeavors. In addition to discovering a systematic way to quantify qualitative data, her results could support further studies regarding the differences in beach usage between other countries. This study highlighted how beaches are an important environmental aspect of several different countries and cultures, leading her to pursue future studies within the field of beaches and environmental law.

Before this study, Kosoglow was never interested in environmental law - or law in general. However, after engrossing herself in the beach environment, she became more intrigued by the topic, looking into more research topics related to environmental law. In 2024, she will be undertaking research related to reforming beach access laws. Kosoglow grew both as a researcher and a person from this study, discovering a technique that could be used in countless future studies and sparking her interest in law school. Through her research, Kosoglow has begun paving a road for the rest of her academic career and beyond.

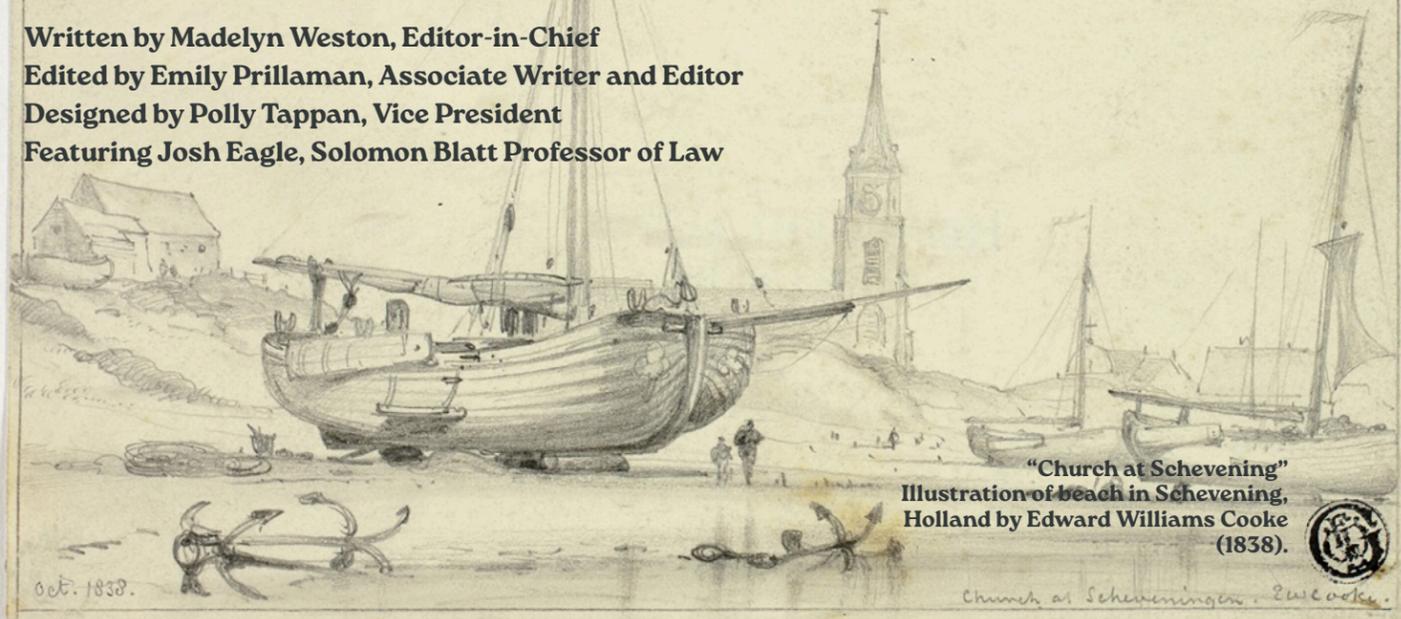
Kosoglow pictured with her research.



Faculty Mentor Spotlight:

Examining the Use of Beaches to Protect Public Access

Written by Madelyn Weston, Editor-in-Chief
 Edited by Emily Prillaman, Associate Writer and Editor
 Designed by Polly Tappan, Vice President
 Featuring Josh Eagle, Solomon Blatt Professor of Law



"Yarmouth Beach"
 Painting of beach in Norfolk, England
 by Alfred Stannard (1847).



"Coastal Scene"
 Painting of beach in the United States by
 Thomas Birch (1779).

centuries, looking through primary sources such as colonial autobiographies and beach paintings. Prof. Eagle's undergraduate researchers, Lilly Kosoglow and Emma Diederich, looked at paintings from the 1600s through 1800s in Europe and the United States. The team primarily focused on English because of the connection to our modern beach laws, which are based on longstanding English law. Prof. Eagle discovered the beach paintings by accident while looking for descriptions of how people used beaches in olden times. He thought that while the paintings could be biased, the scenes would likely be a realistic depiction of beach activity because landscape painters would be unlikely to paint landscapes that were wholly unfamiliar. Painters from the 1600s painted familiar images, such as recreational use of the beach through enjoying the scenery. The beaches also were safer than walking through wooded areas that could conceal predators and would be a good place to meet others. So he explored the function of beaches as trading ports through paintings. "I also always had this suspicion that beaches were used as ports," Prof. Eagle said. "If you want to land a ship on the coast, the beach is really the best way to do it by far because it's not fun to land on rocks or in the marsh." Beaches are smooth, hold boats, and are easy places to load and unload people and goods.

Some of the best paintings were from Holland, but many were from England. England had common law, while Holland had civil law in the 1700s. The government owns the beach to the point of the dunes under civil law, but in English law the private landowner owned beachfront property to the high waterline. The research team compared paintings in England and Holland to see if the legal difference was reflected in where people were on the beach. Despite the legal differences, there were not fewer people towards the dunes in English paintings. This similarity suggests that beaches are the subject of natural law, meaning that rules exist because of the nature of things, he concluded. So regardless of rules, beaches were used in the same way. Few professors specialize in beach painting. Prof. Eagle doesn't know anyone studying the history of beach law, so his research will inform others in the future.

Beaches are also used for invasions, which is why some countries restrict private ownership to the high tide line. The government can quickly transport troops onto land close to the water. Beachfront landowners have reasonable rights, so it's a shared property. State laws vary on whether landowners own down to high tide or low tide. South Carolina landowners own to the high tide mark, but landowners from Maine and Massachusetts own to low tide, so the public has very limited access to the beach. Fishermen are the exception because they need access to the ocean for work. The U.S. Constitution has rules about regulation of interstate commerce, Prof. Eagle said. The Constitution refers to channels of interstate commerce, which are really roads and rivers. There are a lot of commerce laws meant to encourage individual freedom and entrepreneurship and to prevent unfair monopolies.

If Prof. Eagle hits a roadblock, he brainstorms a new process. When he was a new lawyer, he felt disappointed when he didn't get the anticipated results because it felt like a waste of time. Now his outlook is more optimistic because research is exciting, he said. "You learn a lot on the journey," Prof. Eagle said. "It's part of the job and it's part of what makes it fun." Hitting roadblocks is a part of the game.

Prof. Eagle doesn't have specific qualifications for undergraduate researchers, but he wants students like Kosoglow who genuinely enjoy the work and persevere. When students ask him about joining a project, he gives them assignments. The students can decide if they're passionate about the topic, and those with the drive to work will stick with the research. Kosoglow put together a huge database of paintings, got a Magellan Grant and presented her research at Discover USC. While law students typically are focused on passing the bar exam and becoming lawyers, he said, undergraduates are excited about learning and want to expand their horizons. "They're probably more just curious and excited about learning for the sake of learning," Prof. Eagle said. He hopes that his undergraduate research students learned something interesting, and he's always happy to have students join his research endeavors.

Headshot of Dr. Josh Eagle



"You learn a lot on the journey. It's part of the job and it's part of what makes it fun."

-Professor Eagle

Beaches have been popular vacation attractions for a long time. Current research explores beaches from a modern perspective, but preserving public access requires knowledge of their history. Josh Eagle, a professor of law at USC since 2004, found that many articles and court decisions only considered the last 50 years of beach access. With this in mind, he dove deep into European history, the predecessor of U.S. law, studying as far back as the 13th century. "There have always been conflicts over public use of the beach, in which private landowners try to keep the public off the beach," Prof. Eagle said. "These efforts have expanded dramatically in recent years." His primary goal is reasonable public access to beaches in the United States.

Prof. Eagle's career path began after law school with tax litigation for the Justice Department in his hometown, Washington, D.C. After four years, Prof. Eagle returned to graduate school to study forestry where he learned about the relationship between public lands and law. He worked for the National Audubon Society and then at Stanford Law School, where his work focused on recreational and commercial fishing regulation in the ocean. When he became a professor at USC, Prof. Eagle's research focused on ocean fisheries, but he knew that there weren't many potential job opportunities for his students in that field. He decided to reorient his focus to coastal land use, an area with many potential job opportunities. Prof. Eagle wrote one of the first law school textbooks on coastal law, which includes beaches, broader wetlands and the

development of coastal land. He designed a coastal law course that focused on coastal land development and property in environmental rules because he wanted to create a practical class. His Beach Law Seminar class studied state beach laws. Five groups of students did in-depth research on beaches in five states around the country. The history went as far back as possible in terms of who owned it and how it was used.

Right now, there's a lawsuit over beach access in Rhode Island, so Prof. Eagle has been looking for evidence of historical beach use in the state and throughout the colonies. For example, he read a diary of a woman from around 1750 who had traveled on King's Highway, the first major trade route established in the colonies. The route acted as an interstate trade, reaching from Boston, Massachusetts to Charleston, South Carolina. Some stretches of the road went to beaches, like Myrtle Beach, South Carolina. They chose this route because beaches are firm, but marshes would be more difficult for transit. "That's interesting because we have really lots of very special rules about preservation of highways," Prof. Eagle said. These rules might have created indelible public rights in some beaches. The King's Highway didn't go through the beaches in Rhode Island, so Prof. Eagle went back to the drawing board. In another case, William Penn, the founder of Pennsylvania, offered property to those who came to him as payment because he wanted to develop a city or trading post in North America for the King. Penn kept for himself those properties along the river that included beaches because they were most valuable as trading ports.

ALZHEIMER'S RESEARCH

Empowered by Research: Illuminating Pathways to Personal and Professional Growth

Written by Janhvi Kartik, Associate Writer

Edited by Shaivee Fozdar, Associate Editor

Designed by Polly Tappan, Vice President

Featuring Shannon DePratter, Biomedical Engineering, Class of 2024



Shannon DePratter
Student researcher

Alzheimer's disease (AD) is a neurodegenerative disorder characterized by cognitive impairment in aging individuals. The number of Alzheimer's cases is expected to rise due to an aging global population, leading to increased healthcare challenges. Increasing evidence suggests that specific experiences, such as traumatic brain injury (TBI), may play an influential role in the early onset of Alzheimer's. Introducing Shannon DePratter, an undergraduate researcher on an accelerated masters track who is committed to studying Alzheimer's and its correlation to TBIs.

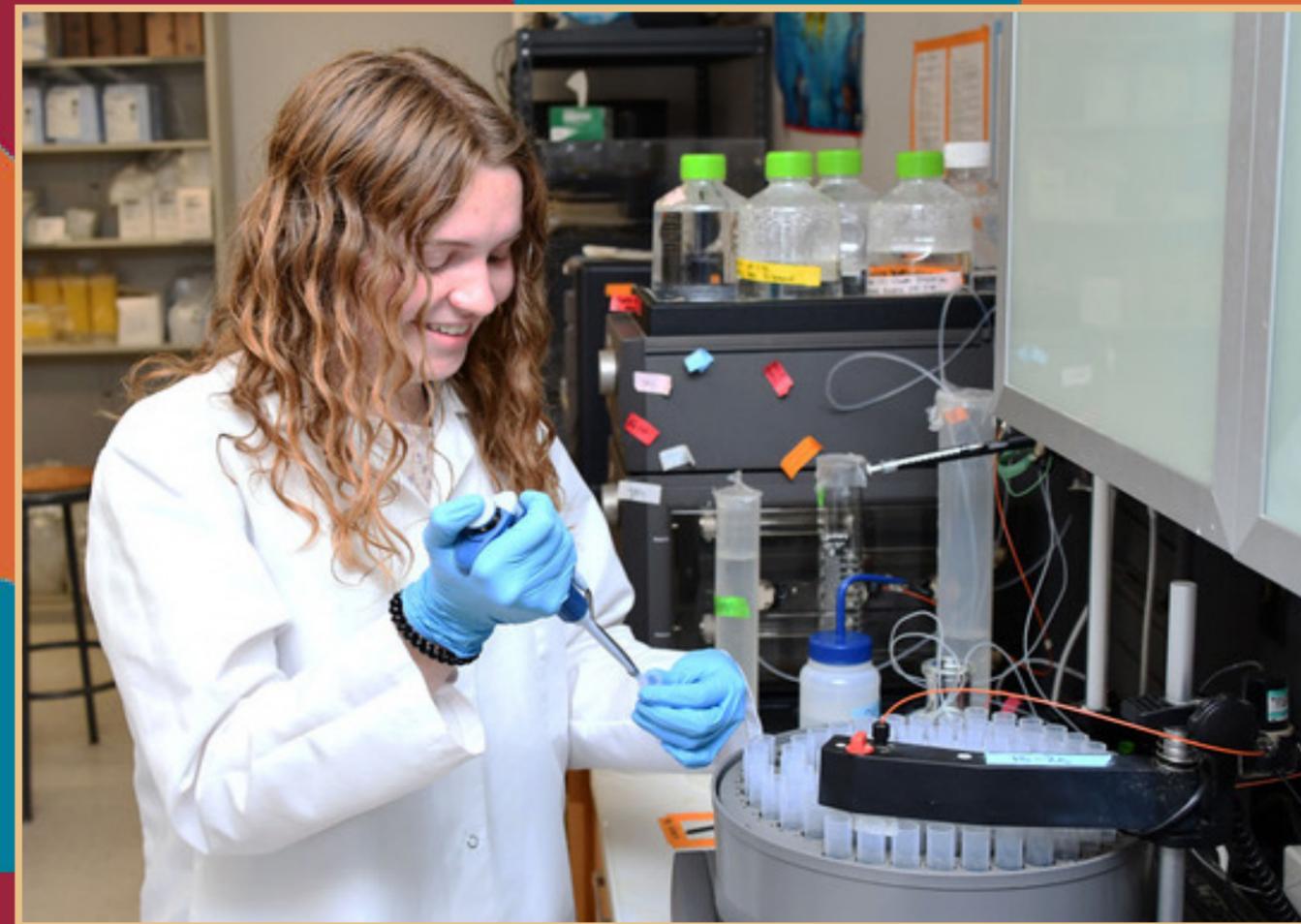
DePratter studies under Dr. Melissa Moss in the Departments of Chemical Engineering and Biomedical Engineering within the College of Engineering and Computing at USC. DePratter researches traumatic brain injury and beta-amyloid protein, a protein widely thought to cause AD, as precursors to the onset of Alzheimer's disease. While she has developed significant laboratory skills spanning protein purifications, assays, academic writing, and presentations, DePratter fondly recalls her best research moment to be amongst people, rather than cell plates.

"My favorite research memory would have to be with my Ph.D. mentor, Dr. Brittany Watson," DePratter said. "I remember last year, when I was really nervous about messing up a protocol, she took me under her guidance and reassured me, which really meant a lot."

From an outside perspective, participating in undergraduate research may appear to be a secluded endeavor. However, mentors play a highly influential role in a student's relationship with research. This sentiment is certainly reflected in DePratter's extensive research experiences. With the guidance of her

mentor, DePratter has accomplished many feats in a short amount of time, spanning from poster presentations at the national Biomedical Engineering Society (BMES) conference to receiving the highly competitive Barry Goldwater research scholarship. The Goldwater fellowship is the highest research award undergraduate students in the natural sciences, mathematics, and engineering fields can receive for research. Awarded to about 30% of all nominees, the Goldwater fellowship enables DePratter to continue research under a stipend for the remainder of her undergraduate studies.

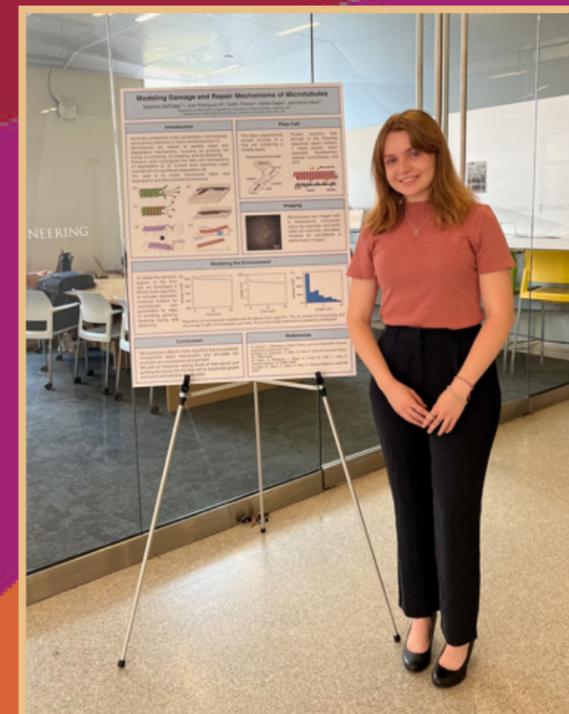
This past summer, DePratter received a unique opportunity to participate in a Research Experience for Undergraduates (REU) at Columbia University. Unlike other REU applicants, DePratter did not apply for the national fellowship. Instead, she was offered the position after meeting Dr. Henry Hess, her eventual mentor, at the national BMES meeting. During her project, she studied single-molecule kinetics by utilizing fluorescence microscopy as well as microtubule degradation and repair by performing motility assays. With the help of various Ph.D. candidates, she created a highly effective kinetic model using Python and analyzed single-molecule binding kinetics. This opportunity was exceptional and strongly reaffirmed her passion for research. After completing her joint B.S. and master's degree at USC, DePratter hopes to pursue the field of neuropharmaceuticals.



Shannon DePratter pictured working in the lab



Shannon DePratter and Dr. Moss



DePratter presenting her research findings
(Photos provided by Shannon DePratter)

Political Attitudes of College-aged Women of Color

Written by Madelyn Weston, Editor-in-Chief

Edited by Silvi Patel, Associate Editor

Design by Mary Stafford & Polly Tappan

Featuring Jazmine Lara Guerrero,

Political Science Major, Education Minor, Class of 2024

Political elections bring a variety of opinions and feelings. Although political science usually uses quantitative data, Jazmine Lara Guerrero gave underrepresented populations a voice in her research by surveying focus groups. It's uncommon to use qualitative data in research, but she prefers it because it allows her to build personal connections and understand how someone feels. Lara Guerrero's research, "An Examination of Attitudes Toward Descriptive Representation among Women of Color" studies how women of color such as Latinx, African American and Asian women consider the gender and race of political candidates in choosing their vote. She is searching for a trend in whether descriptive representation or substantive representation are more popular amongst college-aged women of color. Descriptive representation is choosing a candidate because they share similar racial and gender identities with the voter while substantive representation is voting based on political beliefs. Lara Guerrero ran two focus groups of six college-aged women with two Asians, two African Americans and two Latinas each to answer her research question. Finding women in those communities was difficult because USC is a predominantly white institution, Lara Guerrero explained. The underrepresentation of women of color in U.S. politics led her to study their voting decisions. "It was always better to talk to people from those backgrounds than just have them as numbers," Lara Guerrero said.

Since Kamala Harris is the first Black woman and South Asian woman to become the vice president, the historical context made Lara Guerrero's research more relevant. "I really want to put an emphasis on women of color, especially since our vote is growing even more and more every single year," Lara Guerrero said. "And I feel that every election cycle they've really put an emphasis on women of color." She predicted this may be a trend in college-aged women since their identities have been represented now in various political offices. Lara Guerrero used questions for her focus groups from the collaborative multiracial post-election survey, which examines attitudes about politics among many racial groups. Funding from the Magellan program helped her incentivize participation with an Amazon gift card.

Based on literature studies, descriptive representation is more important to have political participation among underrepresented groups, especially women of color, she said. However, Lara Guerrero's focus groups suggest the opposite. If they share similar identities, but don't have aligned political beliefs, they're less likely to vote for that candidate, she explained. The members of her focus

groups are mostly democrats, so they'll vote on liberal ideals. "It's more ideology based because we've been seeing this weird shift in political science where everything is so polarized," she said. "It matters having a candidate who will represent their interests and champion their interests."

Professors say the results are unprecedented, she said. Lara Guerrero has been coding the results with NVivo, a software that finds trends in data. She hasn't jumped to conclusions yet because she needs to cross translate data with results from the collaborative multiracial post-election survey in election years 2016 and 2020. Lara Guerrero plans on comparing the survey to her own research to see if the voter behaviors and turnout align. Her research mentor, Dr. Todd Shaw has access to the survey results. He is helping Lara Guerrero through the difficult coding process, she said. She has seen from others' experiences working on their senior theses that it's hard to have a relationship with faculty who genuinely care sometimes. But Lara Guerrero feels supported by Dr. Shaw, who is understanding and helpful in her research journey. "I love Dr. Todd Shaw," she said. "With Dr. Todd Shaw, you can definitely see that

difference where he actually does take the time to talk to me, know about my life." Dr. Shaw taught her research course when she was a McNair Scholar. Their research is similar, so he decided to support her project as her faculty mentor. When Lara Guerrero first proposed this question, another professor said she couldn't research it. Now



Headshot of Jazmine Lara Guerrero

Lara Guerrero has worked on it through the Magellan program and is completing the research for her senior thesis through the Department of Political Science.

Lara Guerrero's favorite part of research is talking about it with Dr. Shaw and meeting new people. She met the creator of the collaborative multiracial post-election survey, Dr. Lorrie Frasure, a professor of political science and African American studies at the University of California, Los Angeles when she attended a UCLA conference through the McNair Scholars Program. The data Dr. Frasure collected has been helpful to many scholars, Lara Guerrero said. She was awarded the Magellan Voyager Grant and the Carolina Engage Grant to attend the conference, which also made it possible to tour UCLA and the University of Southern California. Her story is also featured on the University of South Carolina's webpage. Lara Guerrero plans to attend graduate school and ultimately become a professor because she's always wanted to teach politics in an historical setting. Being exposed to undergraduate research and learning to code qualitative research has put her ahead of the curve, she said. Next semester she'll present her research at Discover USC and earn Graduation with Leadership Distinction in the research pathway.



Jazmine Lara Guerrero at UCLA.



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