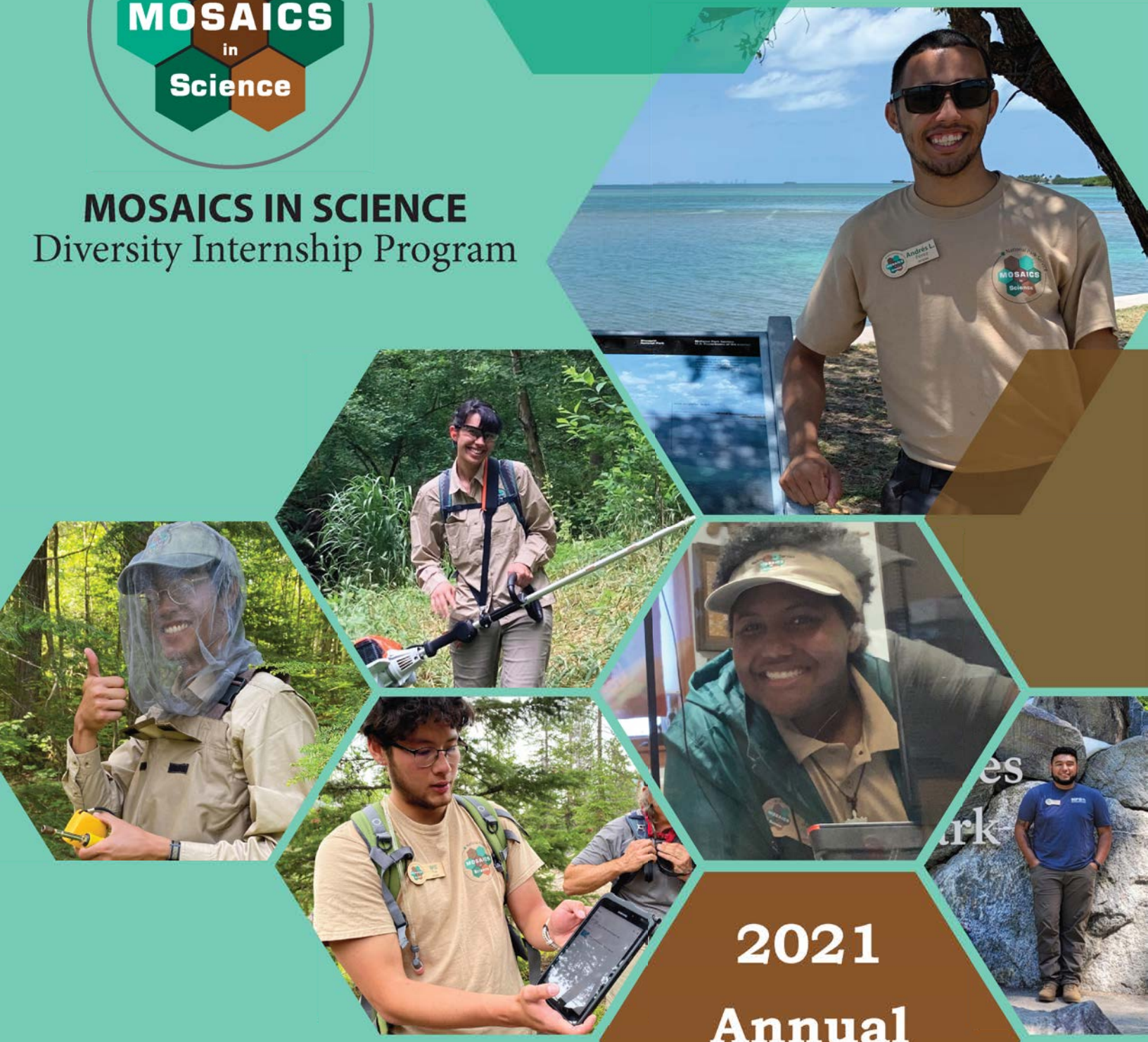
National Park Service

MOSAICS in Science

MOSAICS IN SCIENCE
Diversity Internship Program



2021 Annual Report

World Migratory Bird Day
Environment for the Americas

National Park Foundation

Scientists in Parks
National Park Service

National Park Service

2021

Mosaics in Science Diversity Internship Program

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MOSAICS in SCIENCE

The Mosaics in Science Diversity Internship Program provides diverse youth who are under-represented in natural resource science career fields with on-the-ground, science-based, work experience in the National Park System. Established in 2013, this multi-disciplinary program provides opportunities for undergraduate/graduate students and recent graduates to work on inventory and monitoring, research, GIS and other technologies, and interpretation and education projects. The Mosaics in Science Diversity Internship Program helps parks complete high priority science projects at a low cost to the federal government, connects the public to our parks through educational and interpretive programs led by the interns, and builds the next generation of park stewards. The program is administered by the National Park Service Natural Resource Stewardship and Science and Youth Programs Divison in partnership with Environment for the Americas.

For more information about Mosaics in Science, visit our websites at:
go.nps.gov/MIS or mosaicsinscience.org

ELIGIBILITY

- 18 to 30 years old, or military veterans up to age 35
- US citizen or legal resident
- Have a strong interest — or relevant experience — in areas pertaining to science, technology, engineering, natural resources, or other related fields
- African American, Alaskan Native, Asian, Latino/Hispanic, Native American, Native Hawaiian/Pacific Islander, mixed race and recent graduates are strongly encouraged to apply

BENEFITS

- Obtain on-the-ground education and paid work experience
- Gain a sense of resource stewardship on public lands
- Complete meaningful science projects in our national parks
- Receive professional development training via webinars
- Gain exposure to networking opportunities
- Participate in end-of-summer career workshop
- Eligible for Public Land Corps (PLC) Non-Competitive Hiring Authority or Conservation Fellow - Direct Hire Authority (DHA-RA) - Resource Assistant

Our main goals are to provide meaningful and relevant science-based internships for racially and ethnically diverse undergraduates, graduates, recent graduates and supporting the NPS mission.

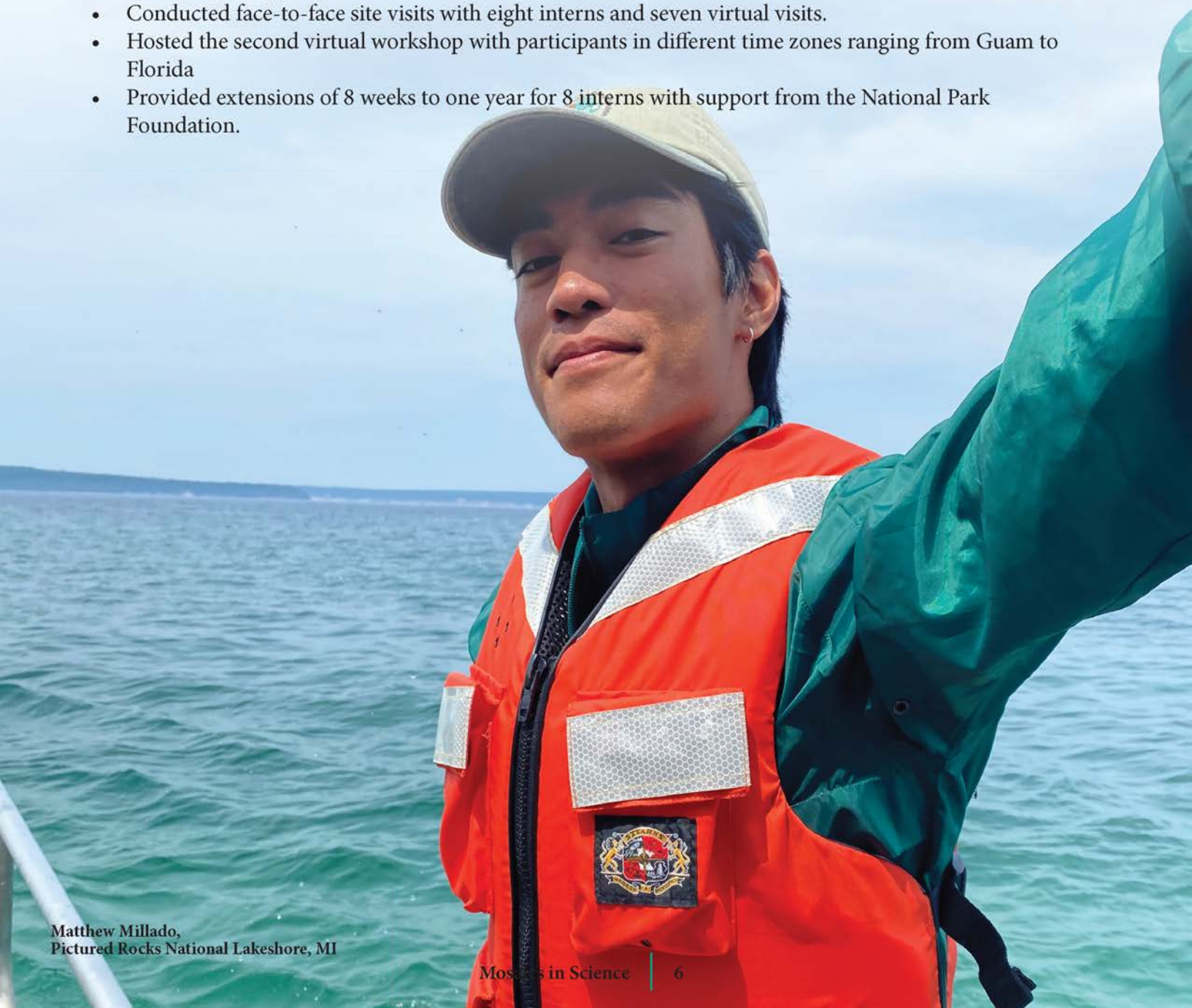
Executive Summary

In 2021, the Mosaics in Science (MIS) Diversity Internship Program successfully completed its 8th year and placed 25 interns in 25 parks in 10 of the 11 Unified Regions of the Department of the Interior (DOI) and three inventory and monitoring networks. These talented college students and recent graduates supported the NPS mission by completing important natural resource science projects, gaining on-the-ground work experience, and obtaining an understanding of the importance of conservation and resource stewardship on public lands.

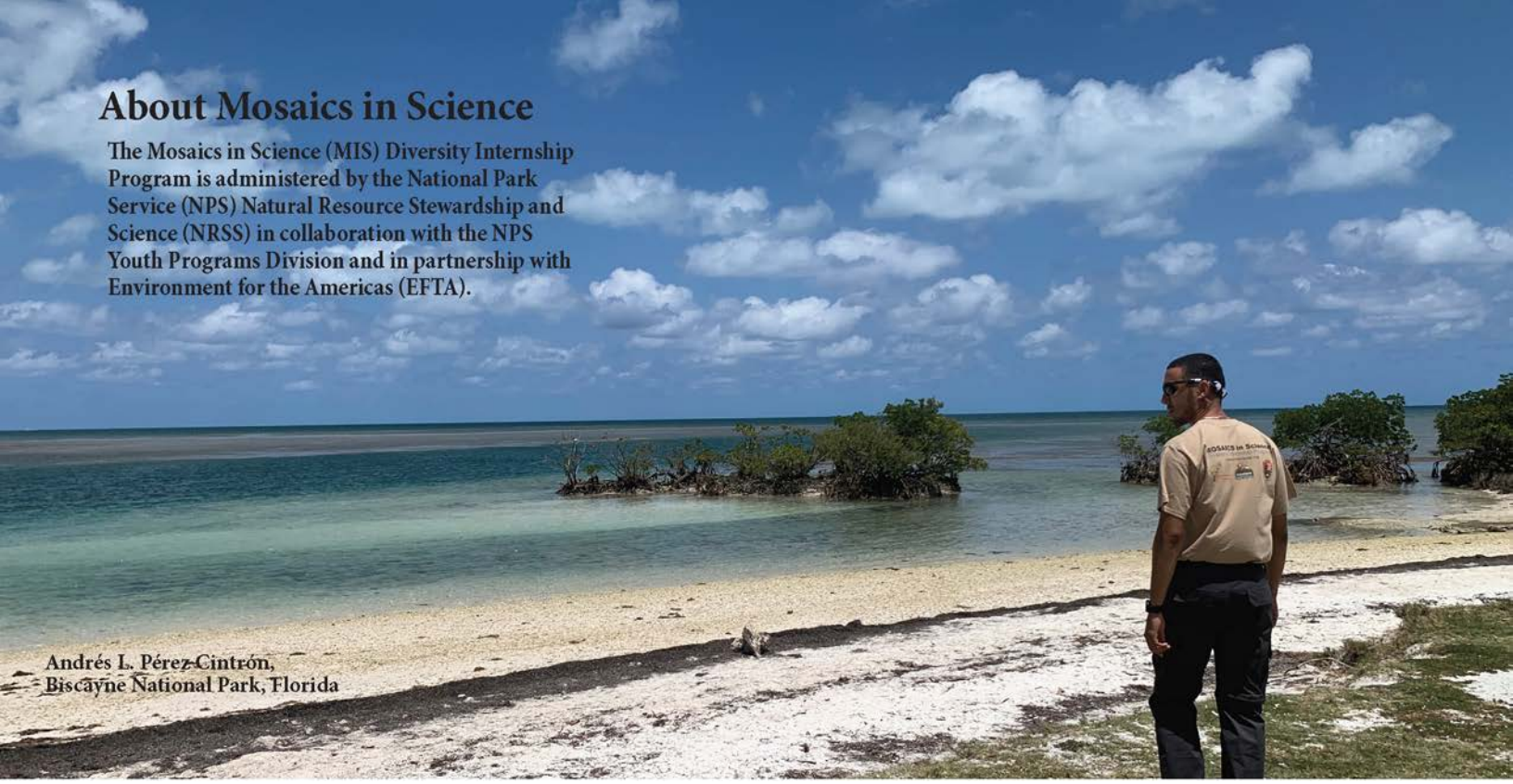
Projects ranged from inventory and monitoring to research and developing and presenting educational and interpretive programs. The 2021 MIS interns contributed approximately 12,000 service hours during the 12-week program. An additional 3,360 hours were contributed during extensions. This represents approximately 7.4 years of full time work doing critical science projects for the NPS.

In 2021, the Mosaics in Science Diversity Internship Program accomplished the following:

- Provided job opportunities to 25 interns
- Conducted face-to-face site visits with eight interns and seven virtual visits.
- Hosted the second virtual workshop with participants in different time zones ranging from Guam to Florida
- Provided extensions of 8 weeks to one year for 8 interns with support from the National Park Foundation.



Matthew Millado,
Pictured Rocks National Lakeshore, MI



About Mosaics in Science

The Mosaics in Science (MIS) Diversity Internship Program is administered by the National Park Service (NPS) Natural Resource Stewardship and Science (NRSS) in collaboration with the NPS Youth Programs Division and in partnership with Environment for the Americas (EFTA).

Andrés L. Pérez-Cintrón, Biscayne National Park, Florida

ABOUT THE PARTNER ORGANIZATIONS

NPS Natural Resource Stewardship and Science Directorate (NRSS)

The NPS Natural Resource Stewardship and Science Directorate provides scientific, technical, and administrative support to national parks for the management of natural resources. NRSS has a strong commitment to providing science-based on-the-ground youth career development opportunities through the management of the Scientists in Parks Program, which includes the Mosaics in Science Diversity Internship Program.

NPS Youth Programs Division (YPD)

The Youth Programs Division engages youth between the ages of 5 and 35 years old in various National Park Service programs to develop a life-long commitment to support our national parks and protect our natural environment and cultural heritage. Currently there are over 25 youth programs operating throughout the National Park System. Youth programs encompass a wide range of missions and responsibilities including the fostering of a strong relationship between youth and the natural and cultural resources managed by the NPS and instilling a work ethic into our nation's youth.

Environment for the Americas (EFTA)

Environment for the Americas is a nonprofit organization that is committed to providing environmental education opportunities and materials throughout the Western Hemisphere, with the primary goal of improving public understanding of shared resources and their conservation. EFTA believes providing opportunities for youth to become involved in science and natural resource careers is key to ensuring the protection and future existence of quality public lands and wildlife habitat. EFTA is committed to increasing participation in environmental education and outdoor recreation across all demographics and has conducted research and efforts to reduce barriers to participation since 2009.

www.environmentamericas.org

The MOSAICS Team

George McDonald
Division Chief
Youth Programs Division

Ernestine White
National Youth Employment
Coordinator Youth Programs Division

Kiersten Jarvis
Program Manager
National Park Service

Chelsea Bitting
Partnership Lead
National Park Service

Sheylda Díaz-Méndez
Program Coordinator
Environment for the Americas

Griselda Landa-Posas
Program Assistant
Environment for the Americas

Shanelle Thevarajah
Program Assistant
Environment for the Americas

Program Objectives

Mosaics in Science (MIS) connects students and recent graduates to valuable opportunities to learn the science skills they need. From gathering and recording data to conducting analyses, each new tool helps interns become more confident and proficient. MIS accomplishes the following:

- Provides meaningful and relevant science-based internships for racially and ethnically diverse undergraduate/graduate students and recent graduates allowing the NPS to increase relevancy, diversity and inclusion
- Supports high priority resource management and visitor education and interpretation projects in national parks
- Promotes the National Park Service mission

History of MOSAICS

The Mosaics in Science Diversity Internship Program was created in 2013 as a collaboration between the NPS' Natural Resource Stewardship and Science Directorate (Lisa Norby) and the Youth Programs Division (George McDonald). During its inaugural year, the Youth Programs Division had funding to place 12 interns in parks. The NPS partnered with The Geological Society of America during its first 3 years. In 2016-2020 the program partners were Environment for the Americas and Greening Youth Foundation. In 2021 EFTA became the sole program partner for the Mosaics in Science Program.

The program was developed to:

1. Offer high quality field-based natural resource science internships to college students and recent graduates that are under-represented in STEM fields with the goal of increasing diversity and inclusion in the NPS workforce. The positions are designed to be three months and are hosted by national parks across the U.S.

2. Make NPS internships more accessible to people of color by providing paid transportation to/from parks, an increased stipend, park-provided housing or housing allowance.

3. Provide an opportunity for interns to meet face to face at a final career workshop, present their work, discuss their experiences, learn about federal career opportunities and how to apply for them. The NPS had initially planned to also offer a pre-internship orientation session but funding was not available for this session.

4. Use available special hiring authorities (Public Lands Corps and Direct Hire Authorities) to hire program graduates.

Program Objectives:

- Encourage diverse youth to study and pursue careers in STEM fields,
- Introduce program participants to science careers in the National Park Service, and
- Increase relevance, diversity, and inclusion in the NPS workplace

Based on program feedback, MIS Program has grown and changed over time:

- added blogs, webinars,
- refined workshop focus,
- increased focus on strong mentoring of interns,
- added site visits,
- strengthened federal hiring authorities for recent graduates across the federal government and worked hard to place interns in subsequent NPS positions.

Mosaics in Science Diversity Internship Sites: 2013 - 2021

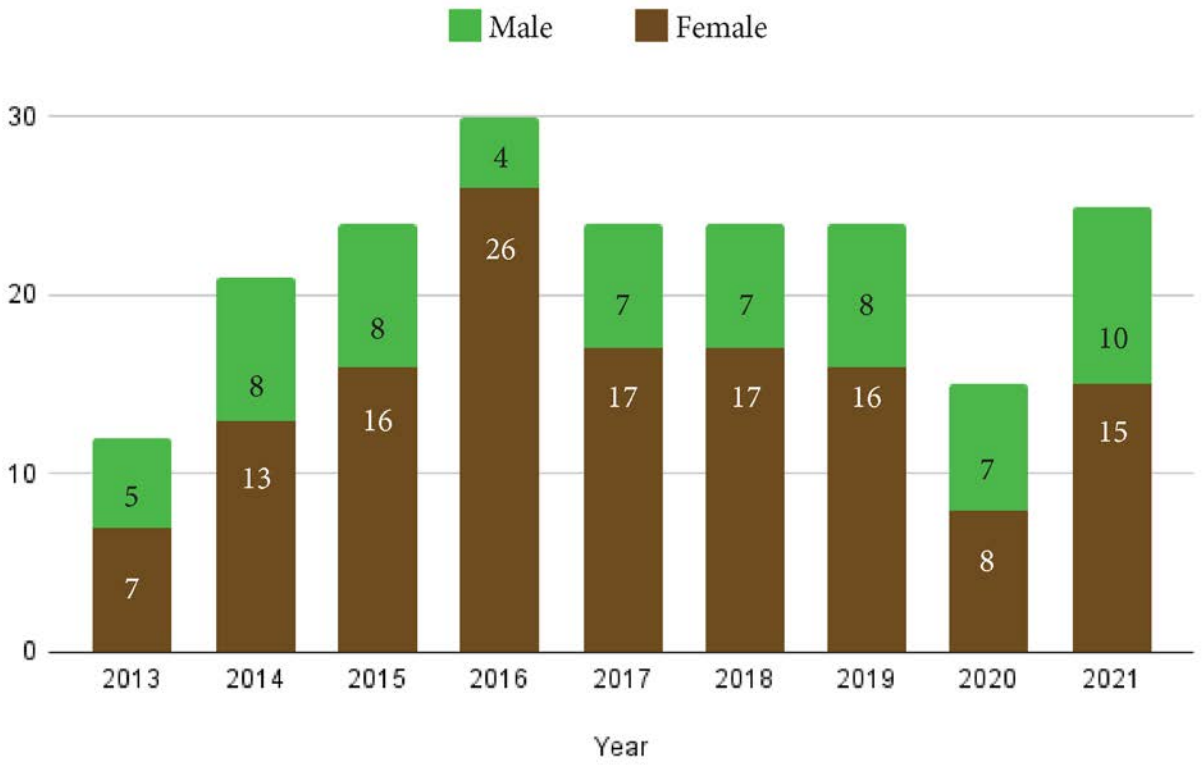
Mosaics in Science has had a tremendous impact on interns, the work of the National Park Service, and on the many parks that have participated.

199
Interns

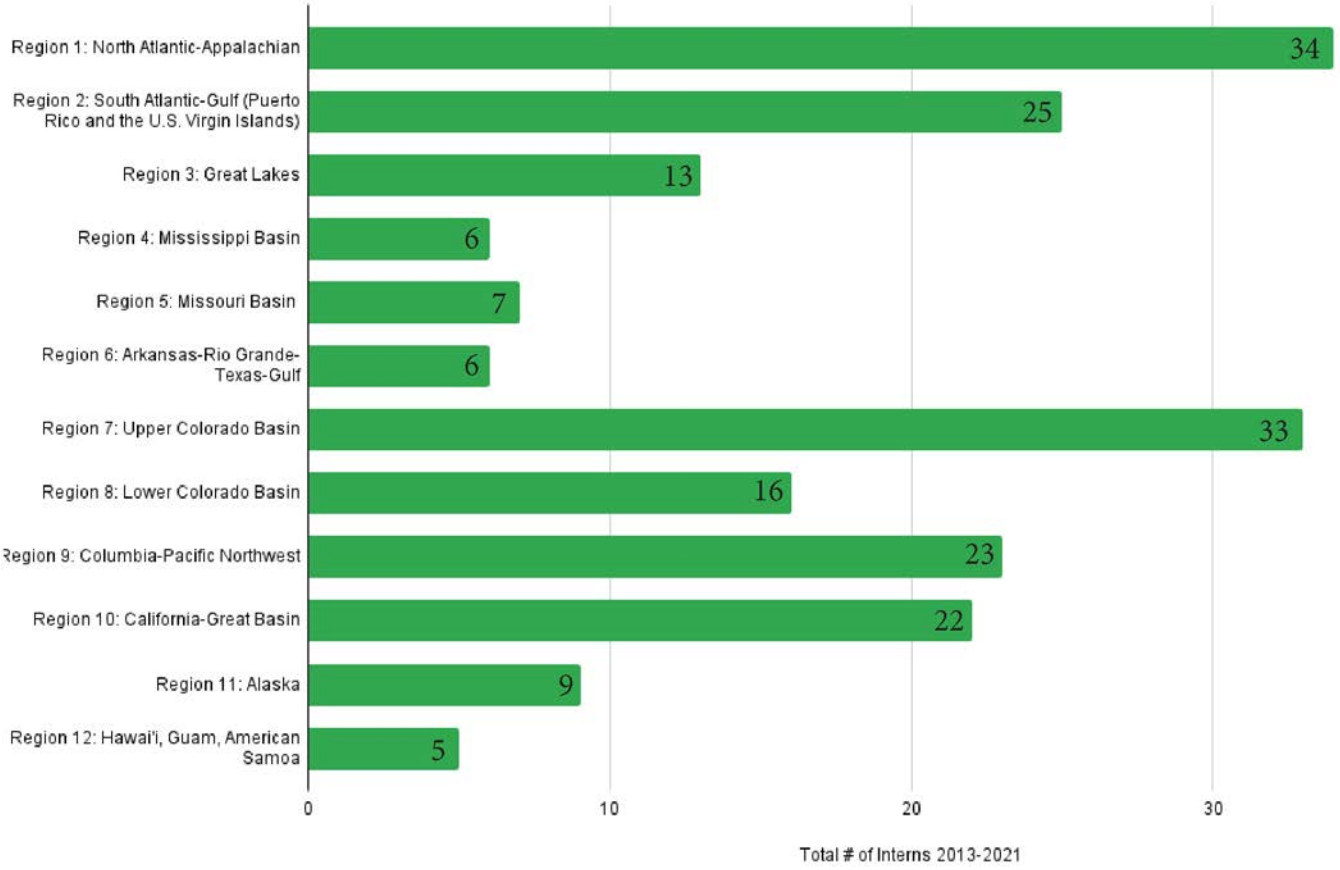
>95,000
Hours of Service

97
NPS Units

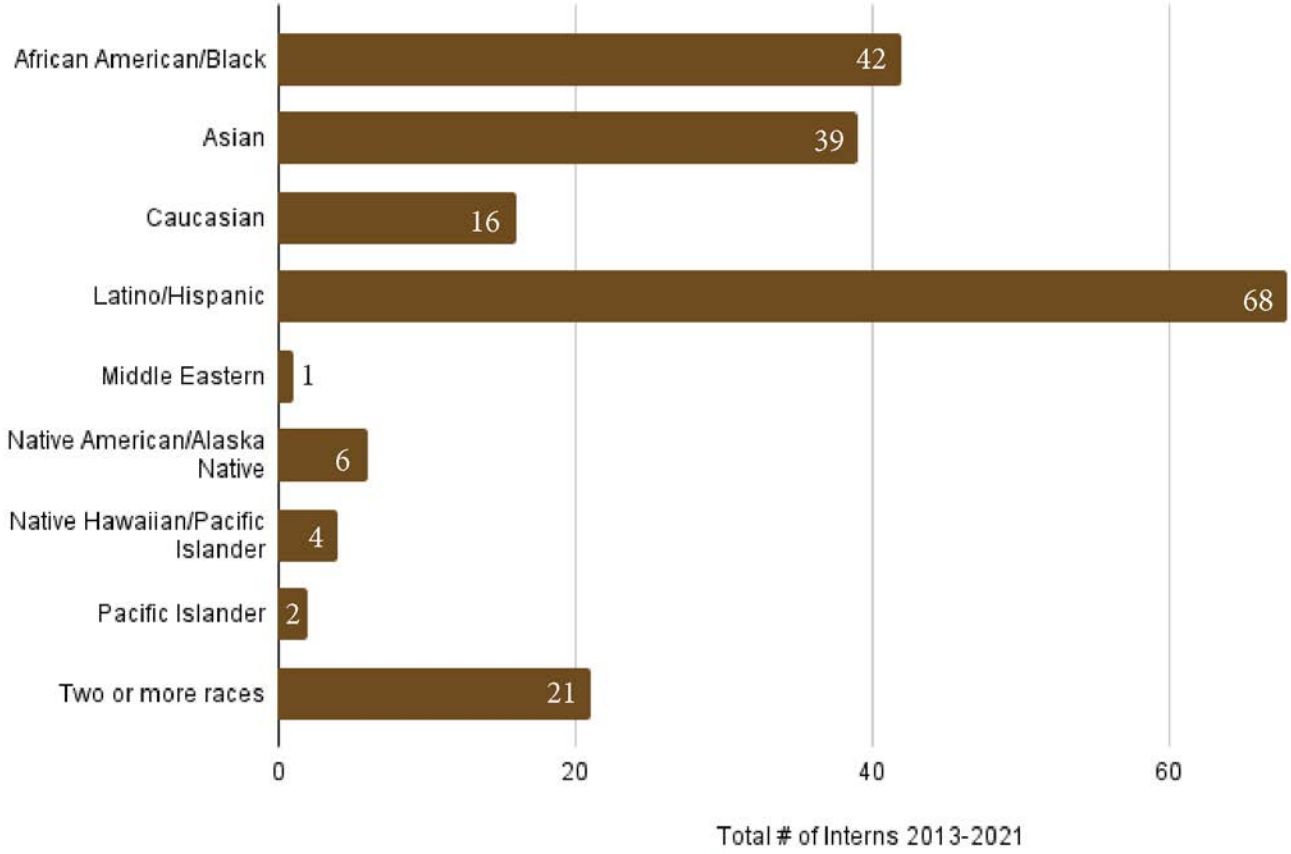
Gender of MIS Interns
2013 - 2021



Total Number of MIS Interns by NPS Region: 2013 - 2021



Race/Ethnicity of MIS Interns 2013 - 2021



Funding Overview

The National Park Service Youth Programs Division provided $300,000 to support 25 MIS interns. In addition, the National Park Foundation provided $100,000 to support intern lodging, travel, and extensions.

National Park Foundation

As the official nonprofit partner of the National Park Service, the National Park Foundation generates private support and builds strategic partnerships to protect and enhance America's national parks for present and future generations.

Chartered by Congress in 1967, the National Park Foundation is rooted in a legacy that began more than a century ago, when private citizens from all walks of life took action to establish and protect our national parks. Today, the National Park Foundation carries on that tradition as the only national charitable nonprofit whose mission is to directly support the National Park Service.

"This internship is very special to me because it will also give me the opportunity to work on side projects like setting up wildlife cameras, and studying the night blooming cereus (another cool cactus). Furthermore, I will be a park and MIS intern for one year! It is very inspiring to meet new scientists, especially because everyone is passionate about the work they do. I'm really looking forward to exploring and studying more about the biodiversity of the Sonoran Desert.
-Viridiana Orona, Saguaro National Park, AZ

"I am beyond grateful for this opportunity as it has been a dream of mine to work for the National Park Service and I get to work with PLANTS!
- Edwin Torres, North Cascades National Park, WA

Federal Workforce Success Stories

Mosaics in Science tracks the success of its interns. Since 2013, MIS interns have been hired into 17 permanent and 12 seasonal positions within the National Park Service. Thirteen of the interns were hired into the NPS, and five of these used their Direct Hire Authority - Resource Assistant flexibility. Some of our interns have been hired into the following General Schedule Series: GS-0404, GS-1702, GS-0025, and GS-0090.

Sebastian Espinoza
FEMA, NC

Richard Duenas
Census Bureau, MD

Permanent Hires

Ricardo Escobar
Rocky Mountain National Park, CO

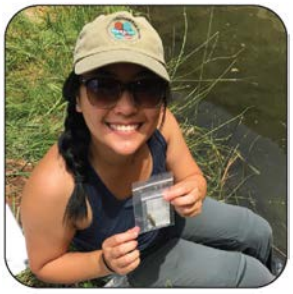
Brenna Rodriguez
Haleakalā National Park, HI

Liliana Calderon
U.S. Fish and Wildlife Service, OR

Gabriela Dunn
Golden Gate National Recreation Area, CA

Kayla Fermin
Lewis and Clark National Historical Park, WA

Sophia Bass -Werner
National Parks of Boston, MA



Katherine Ko
National Park Service, CO

Fabiane Barato Speyrer
Gulf Coast Inventory & Monitoring Network, Gulf Coast states

Dominique Sanchez
Mammoth Cave National Park, KY

Rhys Joaquin
Big Cypress National Park, FL

Jeanie Lai
U.S. Fish and Wildlife Service, ND

Howasta Tahiry
Environmental Protection Agency,WA

Stephen Roethle
U.S. Army Corps of Engineers, NM

Jay Stevenson Kim
Environmental Protection Agency, IL

Chelsea Collins
Bureau of Land Management, CA

Seasonal Hires

Christian Knutson
Badlands National Park, SD

Alianora Walker
Lawrence Livermore National Laboratory, CA

Marissa Reis
Sequoia National Park, CA

Caleb Bolin
Montezuma Castle and Tuzigoot National Monuments, AZ

Salvador Silahua
Olympic National Park, WA

Diego Morales
Environmental Protection Agency, CA

Laura Palma
Biscayne National Park, FL

Hannah Gershone
Grand Canyon National Park, AZ

Jaylin Solberg
Theodore Roosevelt National Park, ND

Elizabeth Rico
Big South Fork National River & Recreation Area, KY

Maaz Fareedi
Yellowstone National Park, MT

Cory Zaller-Edmonds
Mount Rainier National Park, WA

"

This position was my foot in the door to getting my 3-year term, 1st permanent position at a National Park...

Gabriela Dunn, GS-7 Administrative Assistant
Golden Gate National Park

Impacts of COVID-19

Impacts to the Coordinating Organization

- We began planning for an in-person workshop in Washington, D.C., but were confronted with many obstacles, as restaurants and event facilities in the area were not open. Considerable time was spent making alternative arrangements for meals. In June, we recognized that doing the event in person was challenging and that the National Park Service could not approve such a large gathering. The decision was made to host the Career and Leadership Workshop virtually again. Planning started anew. Staff essentially organized two workshops.
- All training was hosted virtually, including the final Career and Leadership Workshop, where interns usually have the opportunity to meet face-to-face.
- Although EFTA staff did fewer site visits because of concerns about travel, we were able to complete more than in 2020. Still, we were careful about local restrictions and COVID rates in the areas where we traveled.

Impacts to the National Park Service

- In 2021, the COVID-19 situation seemed to be improving as we began intern recruitment. In contrast to 2020, we were able to place all interns at their sites for 12 weeks.
- Housing continued to be a challenge, with some restrictions still in place. At the same time, less housing was available overall, and many interns lived in short-term rentals or Airbnbs.
- Many background checks and issuing of PIV cards were delayed.

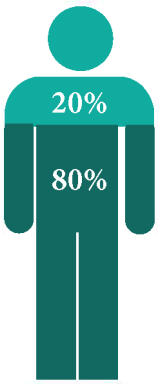
Impacts to the Interns

- Interns were disappointed that the in-person workshop was changed to a virtual workshop.
- Because some sites have been closed, mentors may have been preparing to relaunch their projects for the first time since the onset of COVID. This may have caused some delays in their preparedness for interns.

Left to right: Cynthia Rubio, Donna Shaver, Sheylda Díaz-Méndez and Jailyn Hoskins.

Intern Demographics

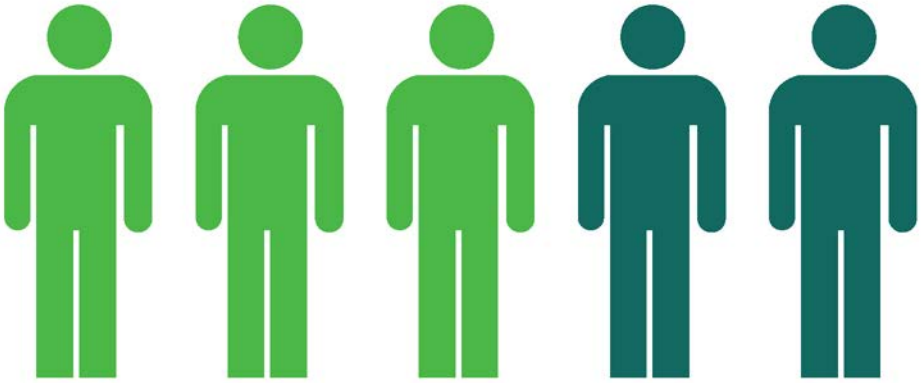
AGE



19-25 years (20)

26-30 years (5)

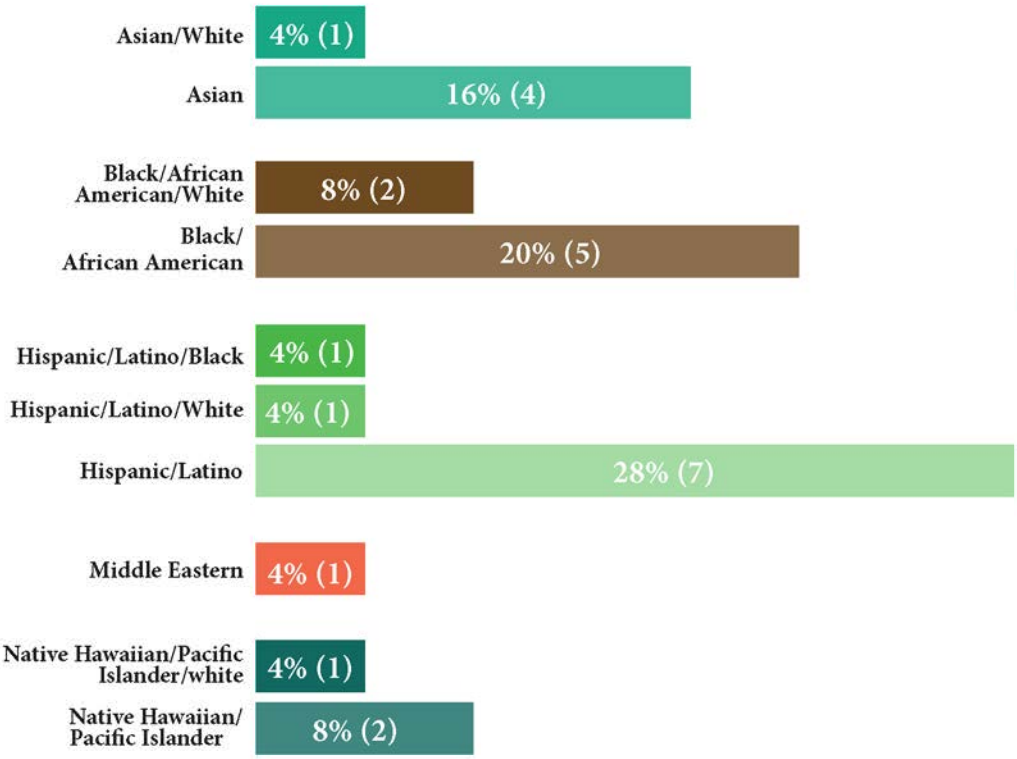
GENDER



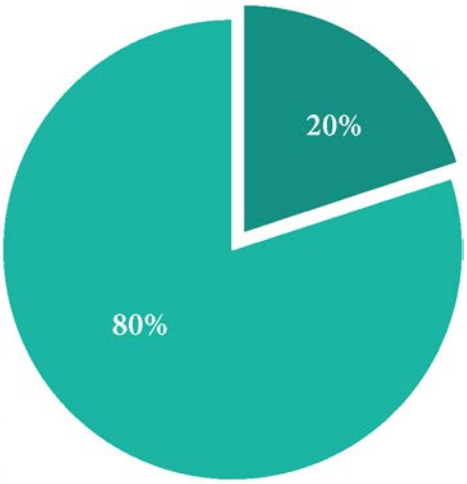
Female 60% (15)

Male 40% (10)

RACE / ETHNICITY



CURRENT EDUCATION



Bachelors: (20)

Masters: (5)

Examples of Projects Completed

Research

- Fieldwork monitoring butterflies, insects inventory and wildlife research. Saguaro National Park, AZ
- Advancing recovery efforts of Grand Canyon National Park's only Endangered plant species through data analyses, resource stewardship, and education and outreach. Grand Canyon National Park, AZ
- Examining species distributions, forest pathology, vegetation ecology, threatened species, remote sensing. North Coast and Cascades Inventory & Monitoring Network, WA
- Conducting wildlife camera trap surveys, biology, GIS, interpretation, science. Wind Cave National Park, Mount Rushmore, Jewel Cave, and Northern Great Plains Inventory & Monitoring Network, SD
- Testing salinity of groundwater and soil. Jamestown Island, VA

Inventory and Monitoring

- Collecting hydrology data. Monocacy National Battlefield, Maryland
- Conducting statistical analyses and refining sampling design to document the effects of habitat restoration on vegetation. Boston Harbor Islands, MA
- Monitoring stream, discharge, data management, water quality, hydrology and scientific writing. Pictured Rocks National Lakeshore, MI
- Reintroducing mussels, conducting water quality research, and delivering eduction programs. Homestead National Historical Park, NE
- Monitoring coral reefs and water quality. War in the Pacific National Historical Park, GU
- Inventorying night skies lighting, collecting natural sounds data, and GIS mapping. Natchez Trace Parkway, MS
- Monitoring steelhead and coho and restoring habitat. Point Reyes National Seashore, CA
- Monitoring vegetation, controlling invasive species, and restoring habitat. Ocmulgee Mounds National Historical Park, GA
- Conducting scat surveys on trails, identifying species, and learning about park management. Mount Rainier National Park, WA

GIS and other technologies

- Monitoring sea turtles using GIS and ArcGIS Online. Cape Lookout National Seashore, NC
- Assessing abundance of snowshoe hare in a wilderness park following wolf reintroduction. Isle Royale National Park, MI
- Teaching fishing skills and monitoring aquatic resources. Congaree National Park, SC

Education / Interpretation

- Assessing visitor use and social trail impacts and providing community science education. Rocky Mountain National Park, CO
- Conducting interviews with people fishing to learn about their activities. Biscayne National Park, FL
- Developing science storytelling for ecological monitoring in parks. Mojave and Great Basin Deserts, Mojave Desert Inventory & Monitoring Network, NV
- Provided native plant education and restoration, resource management, and youth and community engagement. North Cascades National Park, WA
- Exploring the over 130 products (reports, videos, graphics, photographs, digital watercolors, databases, and presentations) to convert elements of existing materials into accessible information for the UERLA website. Urban Ecology Research Learning Alliance (UERLA), Washington D.C.

Multi-faceted

- Monitoring Peregrine Falcon and other songbirds and small mammals and providing education and outreach. Yukon-Charley Rivers National Preserve, AK
- Developing science communication, social media, web design, conservation and education. Padre Island National Seashore, TX
- Conducting cave and geology research. Lava Beds National Monument, CA

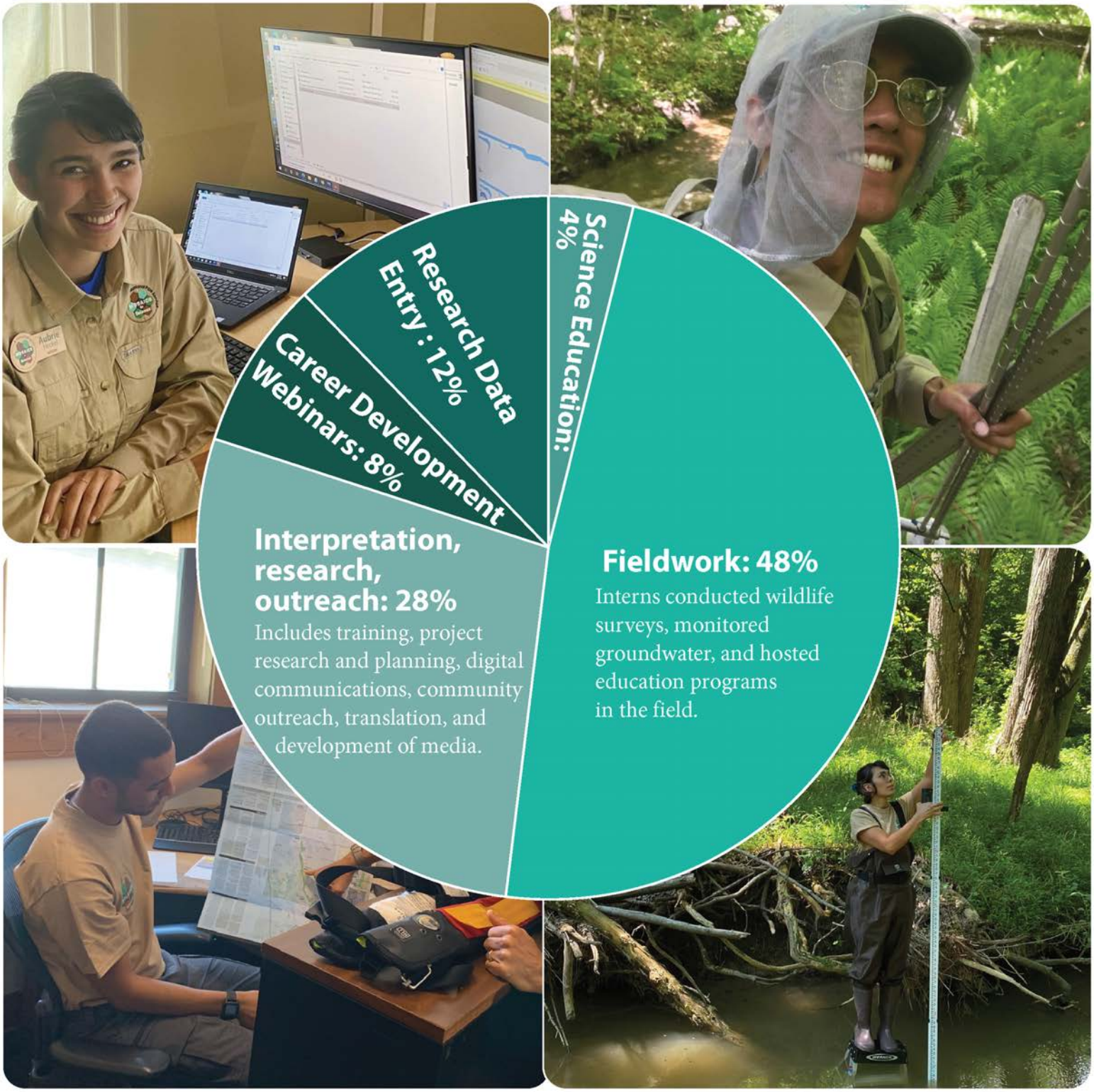
Internship Host Sites

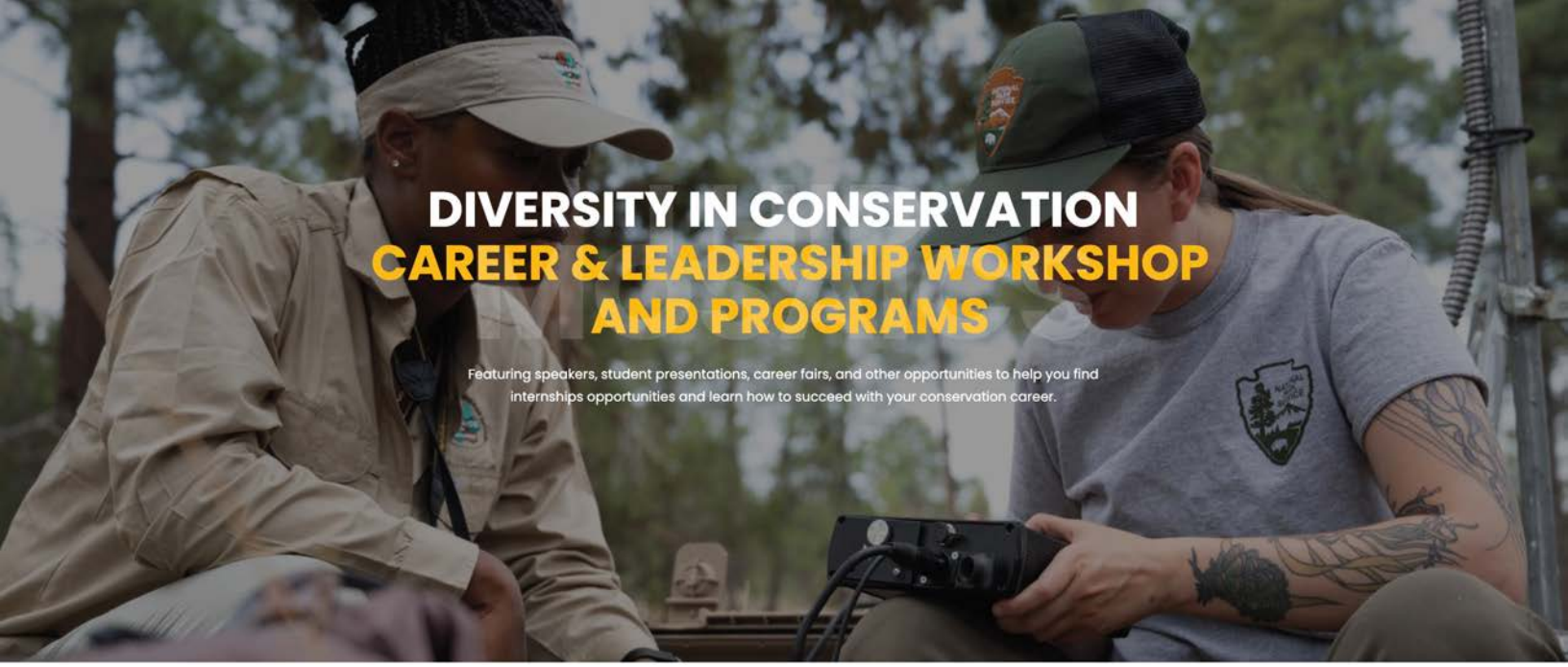
- Biscayne National Park, FL
- Boston Harbor Islands National Recreation Area, MA
- Cape Lookout National Seashore, NC
- Colonial National Historical Park, VA
- Congaree National Park, SC
- Grand Canyon National Park, AZ
- Homestead National Historical Park, NE
- Isle Royale National Park, MI
- Lava Beds National Monument, CA
- Mojave Desert Inventory & Monitoring Network, NV
- Monocacy National Battlefield, MD
- Mount Rainier National Park, WA
- Natchez Trace Parkway, MS
- North Cascades National Park Service Complex, WA
- North Coast and Cascades Inventory & Monitoring Network, WA
- Ocmulgee Mounds National Historical Park, GA
- Padre Island National Seashore, TX
- Pictured Rocks National Lakeshore, MI
- Point Reyes National Seashore, CA
- Rocky Mountain National Park, CO
- Saguaro National Park, AZ
- War in the Pacific National Historical Park, GU
- Wind Cave National Park, Mount Rushmore National Memorial, Jewel Cave National Monument, and Northern Great Plains Inventory & Monitoring Network, SD
- Yukon-Charley Rivers National Preserve, AK
- Urban Ecology Research Learning Alliance,Washington, DC

Intern Positions

Region	Park
Region 1: Northern Atlantic-Appalachian	Boston Harbor Islands National Recreation Area
	Colonial National Historical Park
	Monocacy National Battlefield
Region 2: South Atlantic-Gulf	Ocmulgee Mounds National Historical Park
	Cape Lookout National Seashore
	Natchez Trace Parkway
	Biscayne National Park
	Congaree National Park
Region 3: Great Lakes	Isle Royale National Park
	Pictured Rocks National Lakeshore
Region 5: Missouri Basin	Wind Cave National Park, Mount Rushmore National Memorial, Jewel Cave National Monument, and Northern Great Plains Inventory & Monitoring Network
	Homestead National Historical Park
Region 6: Arkansas-Rio Grande-Texas-Gulf	Padre Island National Seashore
Region 7: Upper Colorado Basin	Rocky Mountain National Park
Region 8: Lower Colorado Basin	Saguaro National Park
	Grand Canyon National Park
	Mojave Desert Inventory & Monitoring Network
Region 9: Columbia-Pacific Northwest	North Coast and Cascades Inventory & Monitoring Network
	North Cascades National Park Service Complex
	Mount Rainier National Park
Region 10: California-Great Basin	Point Reyes National Seashore
	Lava Beds National Monument
	Mojave Desert Inventory & Monitoring Network
Region 11: Alaska	Yukon-Charley Rivers National Preserve
Region 12: Pacific Islands	War in the Pacific National Historical Park

How Interns Spent Their Time





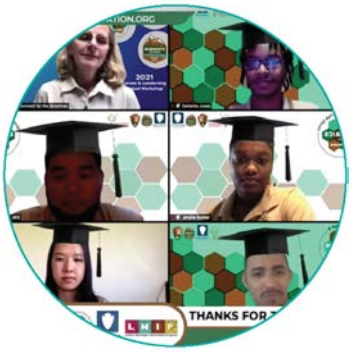
Career and Leadership Workshop

www.diversityinconservation.org

MIS interns attended the Career and Leadership Workshop from August 2-5, 2021. The goals of the workshop were to give interns the opportunity to present their work, engage with distinguished scientists, and learn about federal career paths in public land management and how to get hired into those positions.

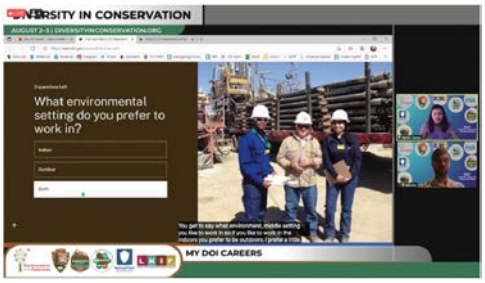
20 Guest Speakers

4 Alumni



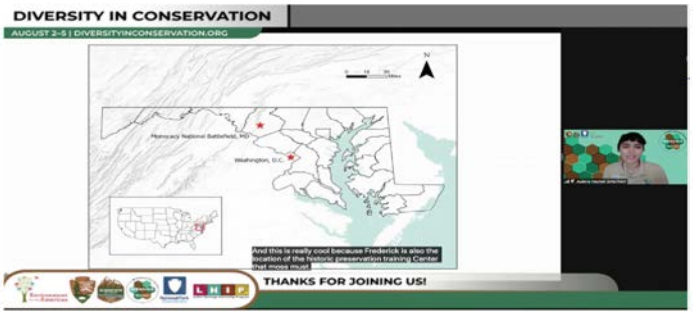
4 Days LIVE

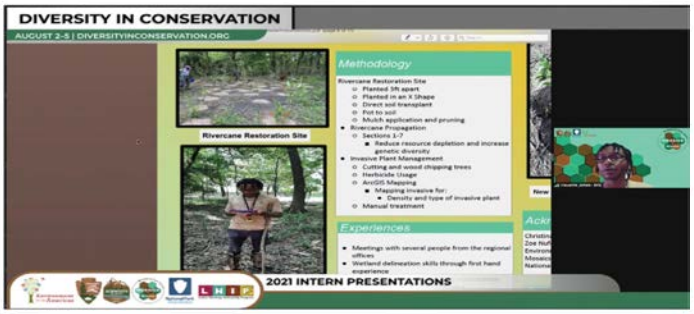
3 Wellness Contributors

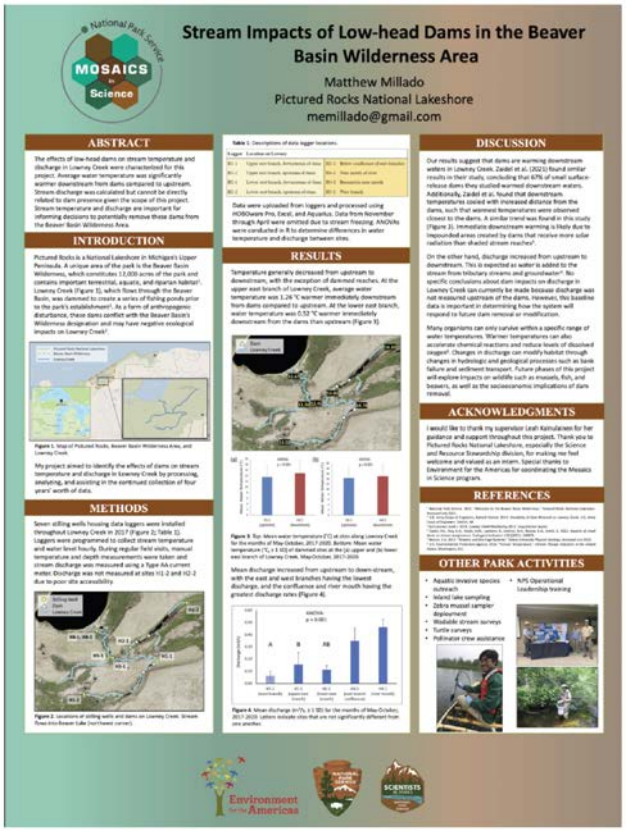


Intern Presentations

Both Conservation Fellow - Direct Hire Authority (DHA-RA) and Public Land Corps Hiring Authority (PLC) interns presented their park projects during the second virtual Mosaics in Science Career and Leadership Workshop. Because the presentations were hosted in Zoom and livestreamed to 3 Facebook pages and the Diversity in Conservation website, site mentors, family members, friends, and others were able to view the presentations.







Recognition of Outstanding Interns and Mentors

MENTORS

Lynette Potvin
Nominated by Intern Ana Arce
Isle Royale NP

Cynthia Rubio
Long-term supervisor award
Padre Island NS

David Hays
Nominated by Intern Ashleyann Bacay
Lava Beds NM

INTERNS

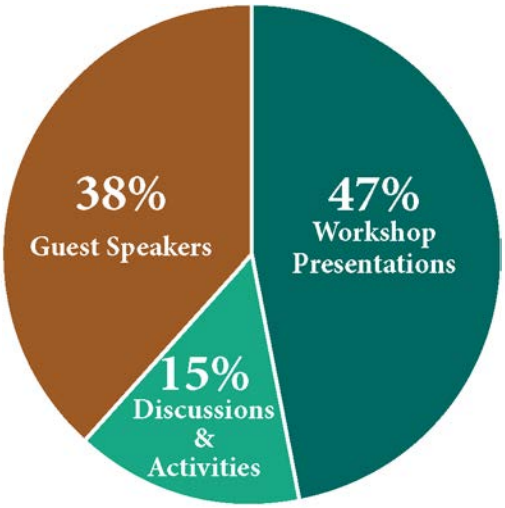
Will Tsai
Nominated by Supervisor Paige Lambert
Rocky Mountain NP

Sasha Escamilla
Best blogger
Grand Canyon NP

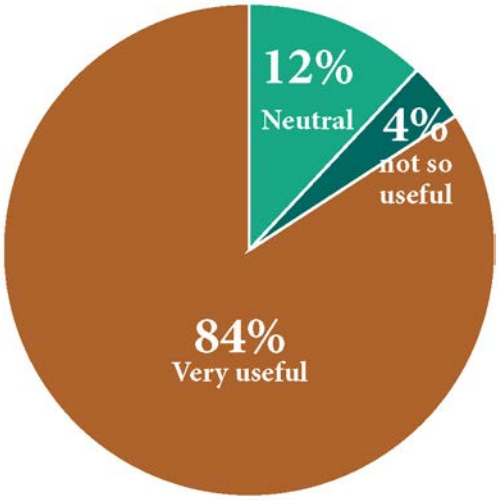
Andrés L. Pérez
Best all-around intern
Biscayne NP

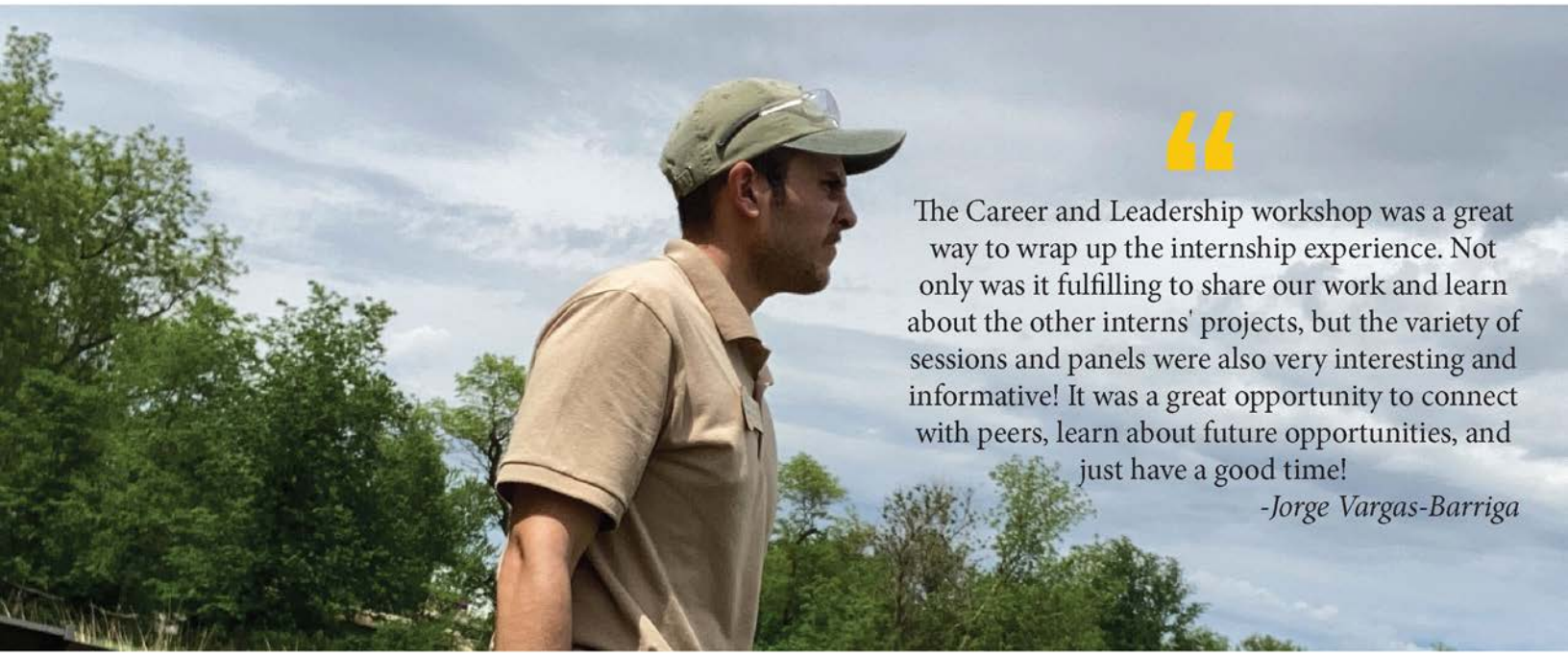
Workshop Surveys

What sessions did you like the most today?



Rate the usefulness of the Career and Leadership Workshop thus far





"The Career and Leadership workshop was a great way to wrap up the internship experience. Not only was it fulfilling to share our work and learn about the other interns' projects, but the variety of sessions and panels were also very interesting and informative! It was a great opportunity to connect with peers, learn about future opportunities, and just have a good time!

-Jorge Vargas-Barriga

Please rate the usefulness of the Career and Leadership Workshop

84%

Positive

Please rate the Art of Science presentation

85%

Positive

Media Highlights

Articles:

- **Edwin Torres**
  NPS article: "Edwin Torres: A Native Plant Propagation Assistant"
  https://www.nps.gov/articles/000/edwin-torres-mis.htm

- **Andrés L. Pérez Cintrón**
  NPS article: "From Puerto Rico to Florida: My Summer with the National Park Service"
  https://www.nps.gov/articles/000/andres-perez-mis.htm

Videos:

- **Jorge Vargas-Barriga**
  Local State News (Southeast Nebraska News Channel): "Game & Parks Work to Reintroduce Mussels in Big Blue Watershed"
  https://southeast.newschannelnebraska.com/story/44300740/game-and-parks-works-to-reintroduce-mussels-in-big-blue-watershed?fbclid=IwAR0FUXAFj11g8iXC-pc5hSNrwmuftnCQzEejAaVvrUGBSHxRTDdwfCZ4CIE

- **Kayla Fermin** Featured this year on NPS 2021: 2017 intern
  NPS video & article: "Dare to Imagine: Kayla Fermin"
  https://www.nps.gov/articles/000/dtikaylafermin.htm

Radio:

- **Jorge Vargas-Barriga**
  Ol' Red 99.5 Radio Interview (Ol' Red - SOUTHEAST - NEWS CHANNEL NEBRASKA)

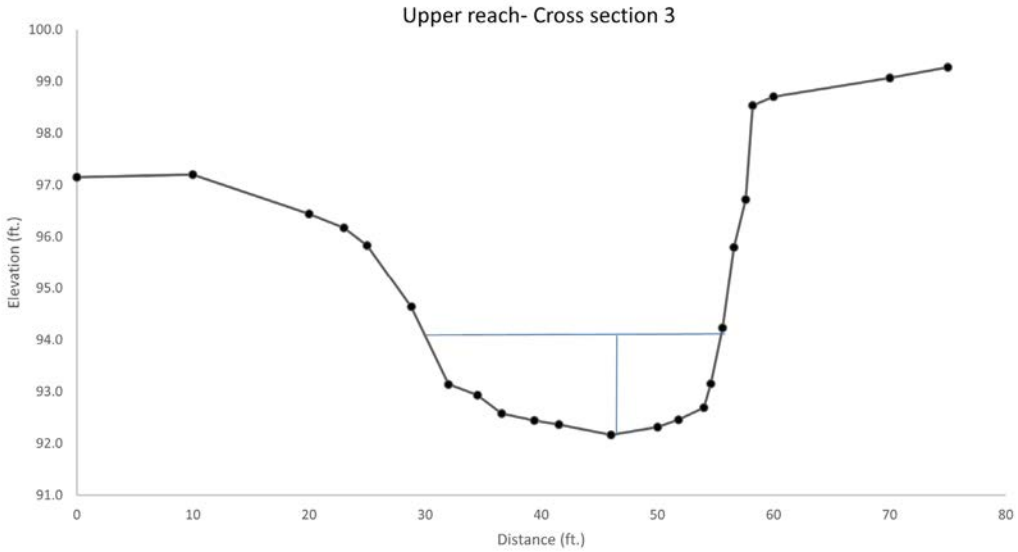
Project Highlights

Jenna Aubrie Heckel
Monocacy National Battlefield, MD

The Department of the Interior preserves landscapes and structures in the Monocacy National Battlefield as their historic condition to commemorate significant battles. This battlefield also contains many streams and rivers across its terrain. Aubrie worked to preserve this significant environment to prevent damage to the historic conditions of the battlefields.

Aubrie worked at Monocacy National Battlefield as a hydrology assistant, focusing on assessments of stream health relative to the surrounding landscape. The focus of the work, Harding's Run river, is about two miles long and borders agricultural fields and a four-lane highway. To guide management and mitigation strategies, Aubrie collected baseline data of the stream over a total of 11 survey spots. She focused on two sections of the stream by assessing sediment transportation through physical measurements of channel width, river curvature, elevation changes and sediment size to determine how the water shapes the river channel. In the future, the highways along the river are projected to widen so collecting these assessments can justify further preservation of these waterways.

One skill Aubrie learned during her internship was how to design and choose a stream survey site using methods that will be easy for future surveyors to replicate. Aubrie ontextualized her scientific project within the rich history of the battlefield, giving her a greater understanding of the importance of the landscape preservation.



Aubrie's work provided information about stream morphology. The figure above illustrates the elevation and depth of the stream channel.

"I thought everyone at EFTA really cared about my success as an intern. I have always wanted to work for the park service, but MIS makes me want to mentor others and relate to people who are like me.

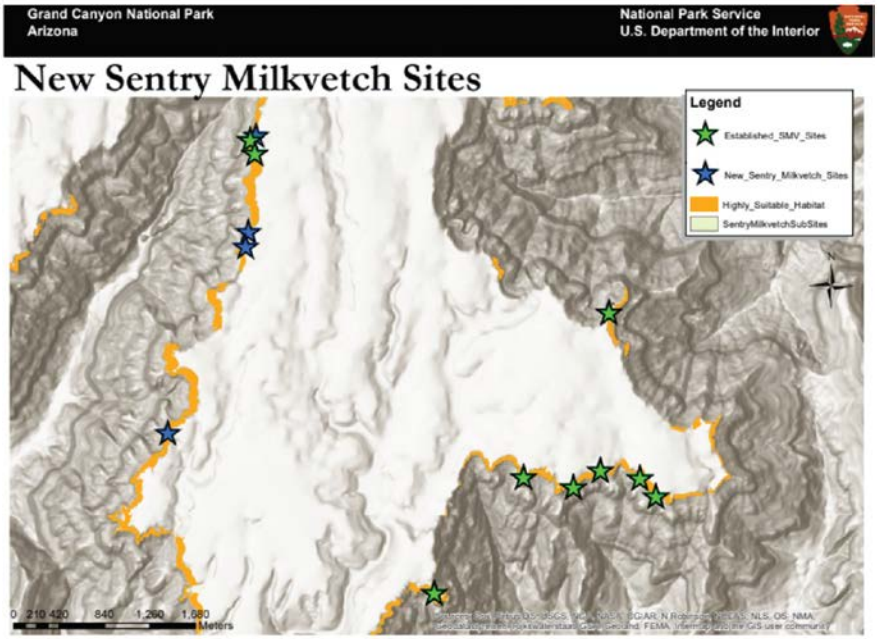
Project Highlights

Sasha Escamilla
Grand Canyon National Park, AZ

The large elevation gain of 6,000 feet in the Grand Canyon supports a wide diversity of plants - around 1,700 known plant species have been identified in the park. However, only one endangered plant, the sentry milk-vetch (*Astragalus cremnophylax or* SMV*)* is found in Grand Canyon NP. This perennial herb grows within 25 feet of the rim and is only present in the cracks and crevices of the top layer. It is threatened by habitat loss, drought, competition, climate change, low reproduction rates and primarily from the activity of larger animals such as the increased population of bison in the park.

As a Botanical Resource Assistant, Sasha monitored this endangered species and collected data to further understand and prevent its decline. She recorded data on microhabitats, plant size, phenology, and the proximity of previous years' plant locations. If new plants or seedlings were found, they were tagged for identification in future surveys and to follow their progress. Additionally, Sasha used habitat maps and GPS collar data from bison to determine if bison are impacting the SMV as well as other native plants. The seeds she gathered from wild populations of SMV and other native plants will be used for future restoration projects. Through her data collection, she found three new SMV populations and over 350 new SMV plants. However, more specifically, she found that where bison are present, fewer SMV plants were found. As bison populations increased, the SMV population decreased from 49 to 11 in the south location of the park.

While SMV is still not abundant, even with newly introduced populations, there are hopeful next steps for its recovery. This includes installing more fencing around populations, planting more SMV at reintroduction sites, and re-surveying and conducting more research. Sasha is appreciative of this opportunity to explore different fields of study and learning more about what occurs in the various parks.



This map shows sites where the New Sentry Milkvetch is present. Sasha gathered the data in the field and used mapping tools to prepare the results.

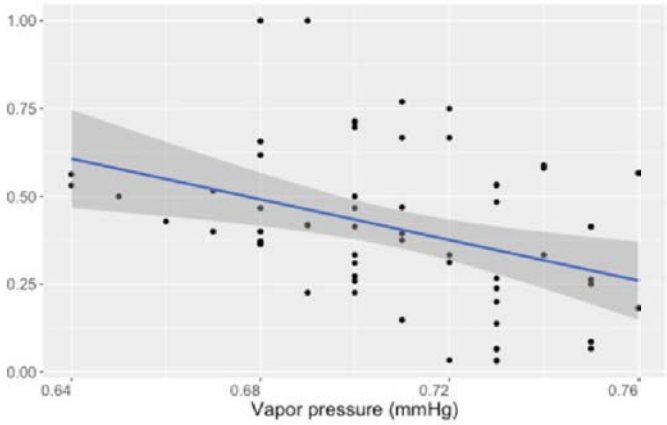
"My MIS internship allowed me to hike and travel to various areas around the Grand Canyon and work closely with an endangered plant species and observe exactly how this program in particular was working to save the species. I really enjoyed my time at the park and learned a lot that has influenced my career goals.

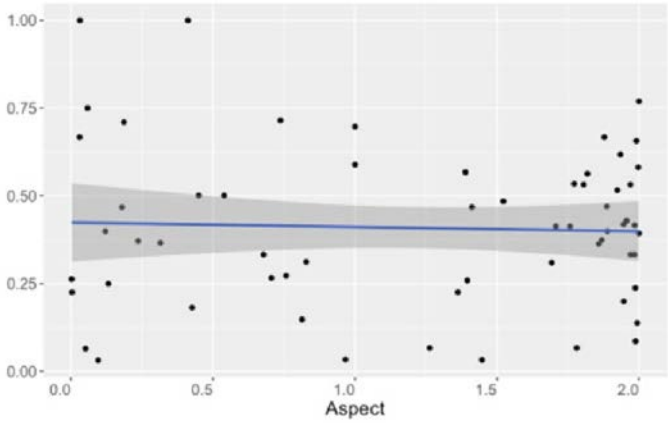
Project Highlights

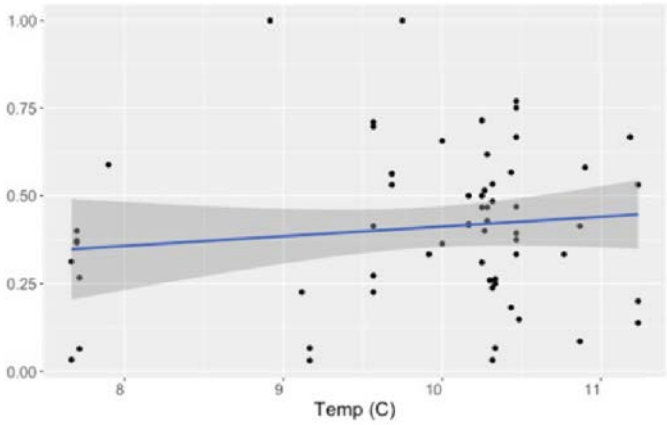
Sebastian Espinosa
North Coast and Cascades Monitoring Network, WA

The North Coast and Cascades Monitoring Network encompasses seven parks across the Pacific Northwest, including Mount Rainier National Park, Olympic National Park and North Cascades National Park. The network works to achieve long-term monitoring of characteristics, statuses and trends across the multiple parks to inform management decisions and establish reference data. This helps monitor the health of the natural resources and identify any changes that occur. One change that is occurring throughout the network is the decreasing population of whitebark pine (*Pinus albicaulis*). This species plays a critical role in ecosystems, but is proposed to be listed as threatened under the Endangered Species Act.

As a Biological Resource Assistant, Sebastian analyzed whitebark pine occurrence and distribution in national parks in Washington State. He used a combination of statistical programing, spatial analysis, and fieldwork to analyze the climate and ecological forces that are threatening whitebark pine throughout the Pacific Northwest. One of these factors is blister rust, which is the swelling and resulting cankers in trees that prevents water and nutrient movement. He also examined annual precipitation and its relationship with whitebark pine occurrence.







Sebastian studied the relationship between vapor pressure, temperature, and aspect on the incidence of whitebark pine blister rust. His results suggest that as temperature and vapor pressure increase, the incidence of blister rust also rises. An increase in aspect may also positively impact the presence of blister rust.

> MIS gave me an opportunity to play a role in a National Park. This experience was simply irreplaceable. It showed me that a career with the park service is obtainable.

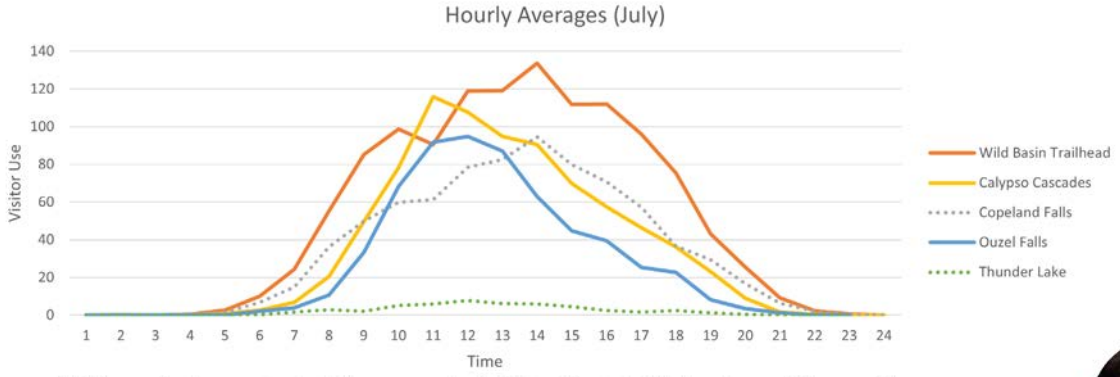
Project Highlights

Will Tsai
Rocky Mountain National Park, CO

Rocky Mountain National Park is one of the most visited national parks. With the growing impact of visitors, the park is is seeking to improve its resilience to the increasing number of hikers and campers. The Continental Divide Research Learning Center (CDRLC) helps these efforts by conducting and creating opportunities for research. The CDRLC gathers data to educate and engage the public in resource preservation. The work done by the CDRLC is crucial in resource preservation to ensure that the parks stay pristine in years to come.

As a new member of the CDRLC, Will studied visitor use in Rocky Mountain National Park to examine how visitor use impacts the trails and surrounding habitats. In the field, Will led a group of volunteers to collect and quantify visitor use data. The three types of impacts Will documented were trash, social trails and congregation areas. Trash includes litter and human waste, and social trails are any trails created by the public and not established by the park. Congregation areas are the places where people have gathered, often causing destruction of vegetation. All of these impacts are harmful to the environment.

Throughout his monitoring in the park, Will mapped many trails and documented the locations of the litter he found, giving each data point a severity value on a scale of one to five, where five is most severe. The results will be used to determine the impacts of human activity at various locations across the park. By the end of his internship, Will had found and mapped 5,934 meters of social trails and 231 points of litter.



Will's work demonstrated the amount of visitor foot-traffic by time of day on 5 trails in Rocky Mountain National Park.

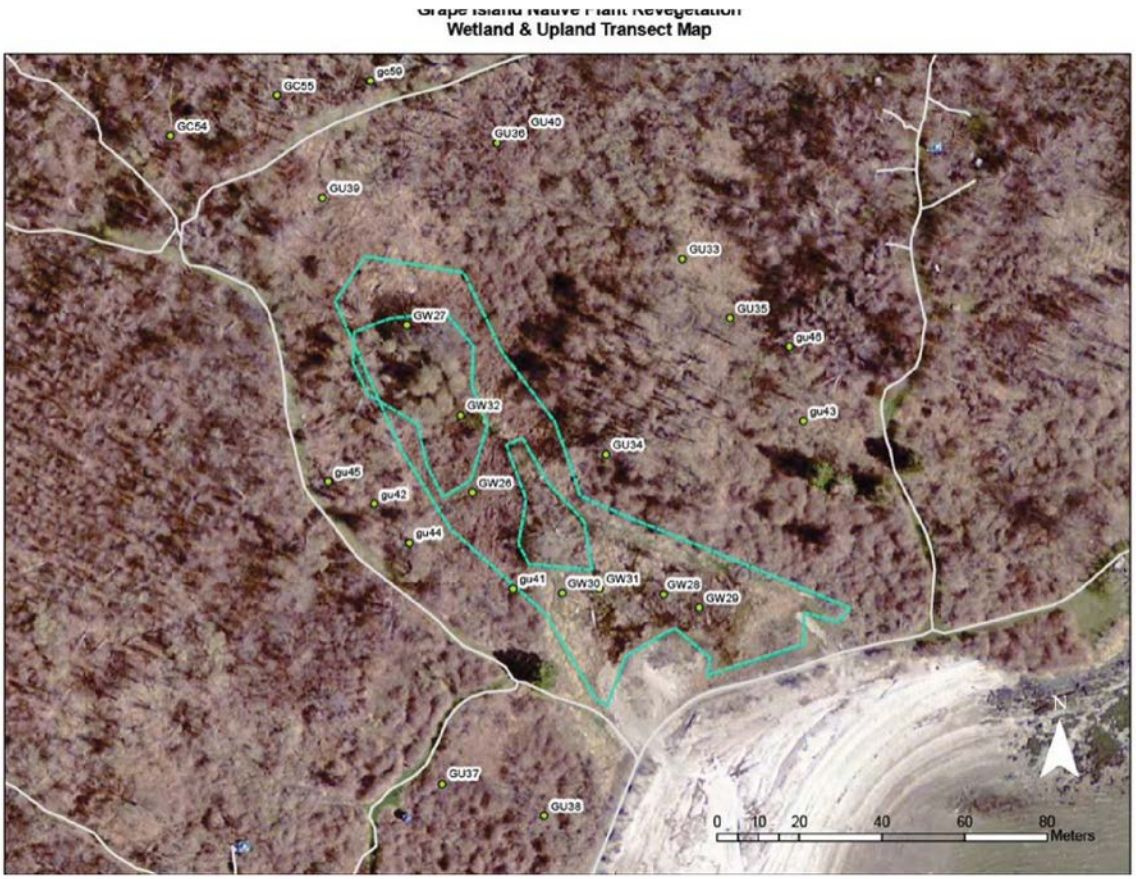
> "Everyone was super friendly and responsive. I could tell you all cared about us! Extremely happy with the program! My research skills have drastically improved. My leadership skills have also improved along with some GIS skills. The people made this experience great. At first I felt like I was the only POC, but after Steven came- and after we all met up with Ricardo too- my experience at the park improved by so much.

Project Highlights

Sahil Duvadie
Boston Harbor Islands National Recreation Area, MA

The Boston Harbor Islands National Recreation Area encompasses 30 islands and 4 peninsulas. Many of the islands were created as a result of glacial deposition, when large sheets of ice moved north and pushed boulders and other debris to create small hills called drumlins. These are now visible as islands. Two of these islands have large populations of invasive plants and marine species that negatively affect native species. Some of these invasives outcompete native species, while others use large quantities of resources.

Sahil worked as a Biological Resources Assistant and focused on invasive species and vegetation monitoring, native species planting, and data analysis. He planted over 2,000 plants on the two islands. He also collected data on which plants are prevalent in certain areas of the work sites to aid in choosing ways to target certain invasive species or to find ways of helping native species flourish. He organized the data collected from 2015-2020, reviewed and analyzed the data, devised a simple sampling design to be implemented in future monitoring, and made recommendations for future management. Native species bring cultural and natural significance and uniqueness to areas that promote individuality and diversity, and Sahil's work will help a diversity of plants return to the islands.



A map of Sahils' transects on Grape Island show the locations of his surveys. Data points in white are control sites, and areas inside the green outlines are wetland. Upland sites are located outside of the green polygons.

> I have had many experiences with national parks before my MIS internship, but the MIS internship certainly helped to validate and further enforce my beliefs.

Intern Achievements

Cristal Espinosa
Cape Lookout National Seashore, NC

The coastlines of Cape Lookout National Seashore (CALO) are important nesting grounds for sea turtles, mainly the Loggerhead Sea Turtle (*Caretta caretta*). The coastal environment is also a dynamic and ever-changing natural barrier island ecosystem due to the amount and power of coastline storms, which can pose a threat to the nesting habitats of sea turtles.

Cristal worked at CALO as a Marine Biological Conservation Assistant to explore this dynamic. In her fieldwork, she collected sea turtle data and fenced nests for their protection, sometimes even relocating nests threatened by the tides and storm events. Cristal further investigated these effects by focusing her research project on the storm events' impact on sea turtle disorientation and the disorientation of hatchlings within the nest. Disorientation may be caused by artificial lights, which result in turtles wandering inland, where they may die from predation or dehydration. It may also be caused by dune slopes, which may redirect turtles away from the ocean. Cristal analyzed data from 143 nest surveys completed in 2020. She found that 31 experienced disorientation events, and 71% of disorientations were associated with dune loss. The results show that greater dune loss of the CALO coastlines will likely cause greater sea turtle disorientation events, impacting the sea turtle populations.

Andrés L. Pérez Cintrón
Biscayne National Park, FL

Andrés worked at Biscayne National Park as a Fish and Wildlife Inventory and Monitoring Program assistant to help park scientists assess the efficacy of new fishing regulations implemented in the park. His project included conducting creel surveys and interviews with anglers, as well as monitoring dead fish. He conducted 26 surveys, 600 interviews, and measured 424 dead fish representing 32 species. From the surveys and interviews collected, Andrés found that 90% of anglers were knowledgeable of the 2021 fishing regulations and 40% were not satisfied with the fishing in 2021. He also found two fish species whose mean length has increased significantly since the implementation of the new regulations.

Andrés also had the opportunity to participate in other activities at the park, including turtle nest monitoring and inventory, beach clean-ups, safety reviews and exotic plant removal.

Devante Jones
Ocmulgee Mounds National Historical Park, GA

The Ocmulgee Mounds National Historical Park highlights the lives of prehistoric Native Americans. The area that includes the park was occupied by many different Native American tribes for as many as 17,000 years. The most recent to inhabit the park were the Creek people or the Muscogee Creek Native American Tribe. The Muscogee Tribe relied heavily on natural resources in what is now the national park, especially rivercane. They used rivercane for shelter, weapons, baskets, furniture, ceremonial events and nourishment. However, this resource is being threatened by invasive plants.

Devante was a Botanical Research Assistant and focused on invasive plant management and the Rivercane Restoration Project. He helped to clear thick and dense vines, removed invasive species, and then planted rivercane. Devante himself planted 292 rivercane, counted 219 new shoots, and helped to accomplish 75% growth in a short time. Throughout these restoration efforts, Devante researched methods to further stop the spread and growth of new invasive species to benefit rivercane. Potential solutions include co-planting ground cover plants to reduce the opportunity for invasive regrowth and considering what environmental conditions best promote rivercane success.

Edwin Torres
North Cascades National Park, WA

North Cascades National Park is part of the larger North Cascades National Park Complex which also includes the Ross Lake and Lake Chelan National Recreation Area. This complex covers 681,158 acres of land and waterways with eight life zones from lowland forests to alpine peaks and glaciers. The Park has the highest plant diversity of the national park system and supports over 1,600 vascular plants. However, throughout the park, social trails are often created and leave plants trampled, affecting the survival of native species.

Edwin was Native Plant Propagation assistant, and he worked to restore and monitor areas where native plants have been disturbed due to visitor use. Using methods such as ArcGIS mapping, measurements of trail length, width and depth, and documentation of impacts through photos, he gathered information that will be used to develop a revegetation plan.

Jorge Vargas-Barriga
Homestead National Historical Park, NE

The watersheds in Nebraska were once home to at least 30 species of mussels. Unfortunately, the introduction of dams, livestock, and other anthropogenic factors have led to a decline in many populations. Some species may have been eradicated. In 2020, the park re-introduced 1000 native mussels of the species Plain Pocketbook (*Lampsilis cardium*) and Fatmucket (*Lampsillis siliquoidea*) to the Big Blue River basin. They were also tagged with passive integrated transponder (PIT) tags for monitoring.

Jorge worked as a resource and interpretation intern to monitor the freshwater mussels. He followed up on the reintroduction by counting mussels with a PIT tag within the park. Additionally, he collected water quality parameters that provided insights as to how the populations have changed in the past year. His results found that the mussel reintroduction was successful, which then led to the authorization of another mussel reintroduction.

Ana Arce
Isle Royale National Park, MI

Isle Royale National Park is one of the least visited national parks due to its remoteness. On the island are green forests, rocky shorelines and inland swamps. Also on the island is the longest running predator and prey study examining the relationship between wolves and snowshoe hare.

Ana studied this dynamic by working in the field with the Isle Royale's Natural Resources Management team. She conducted snowshoe hare surveys to explore the population density of hares on the island. Her work included recording the number of hare pellets and the habitat where hares are typically found. Vegetation data included recording dominant tree and canopy cover at various points. After collecting data at each point and adding the information to a dataset, she participated in data analysis to understand where snowshoe hares are most abundant and their preferred habitat.

She gathered over 109 points of data during her internship. From the study, the management team concluded that snowshoe hare density is highest in coniferous forest and that canopy cover strongly influences hare density. The snowshoe hare is an important part of the island's ecosystem. They help to maintain lower growing plants and are an important source of food for predators, such as wolves. Ana's assessments will contribute to future management decisions.

Jenelle Booker
Mojave Desert Inventory and Monitoring Network, NV

The Mojave Desert Inventory and Monitoring Network conducts various research projects that influence and inform park management decisions. Public awareness of these projects is vital to improving understanding of the park and its environment. Jenelle worked to prepare science communication that shared park activities, such as inventory and monitoring efforts.

Janelle did a thorough review of the park's social media platforms, examining relevant hashtags, identifying follower demographics, and categorizing the most engaging content. She then adapted content to appeal to diverse visitors by creating engaging hashtags, highlighting various celebrations to reach followers, and by providing pertinent and relevant content. Jenelle increased social media reach and engagement by more than 700% and page following by 10%. By raising participation in the park's website, Janelle also increased readership of posts that provided details about research projects, ultimately allowing for greater public understanding of I&M research and impacts.

Jenelle Booker,
Mojave Desert Inventory & Monitoring Network, NV

Words From Supervisors/Mentors

"It has been great to work with everyone on the team. They have been supportive but also provided structure and have high expectations which help me to do my best job!"

- Stacy McDonough
North Cascades National Park

"EFTA is a great program. It is rewarding to not only assist an intern in career development, but to accomplish objectives for the park's science division that otherwise would not be possible."

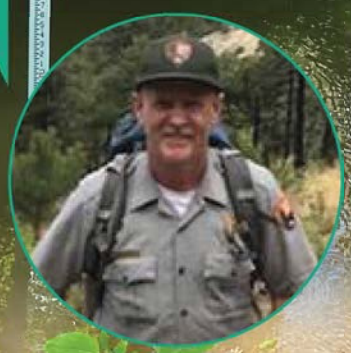
- Leah Kainulainen
Pictured Rocks National Lakeshore

"Great communication! Really like the rating process that provided me with the short list of top applicants. Great preparations and clear expectations! Staff were always responsive!"

- Jon Altman
Cape Lookout National Seashore

"No improvements needed! I have had previous MIS experience, and have always felt comfortable reaching out. Great communication so far! The handbook has been very helpful! No issues so far, we are very appreciative."

- Don Swann
Saguaro National Park

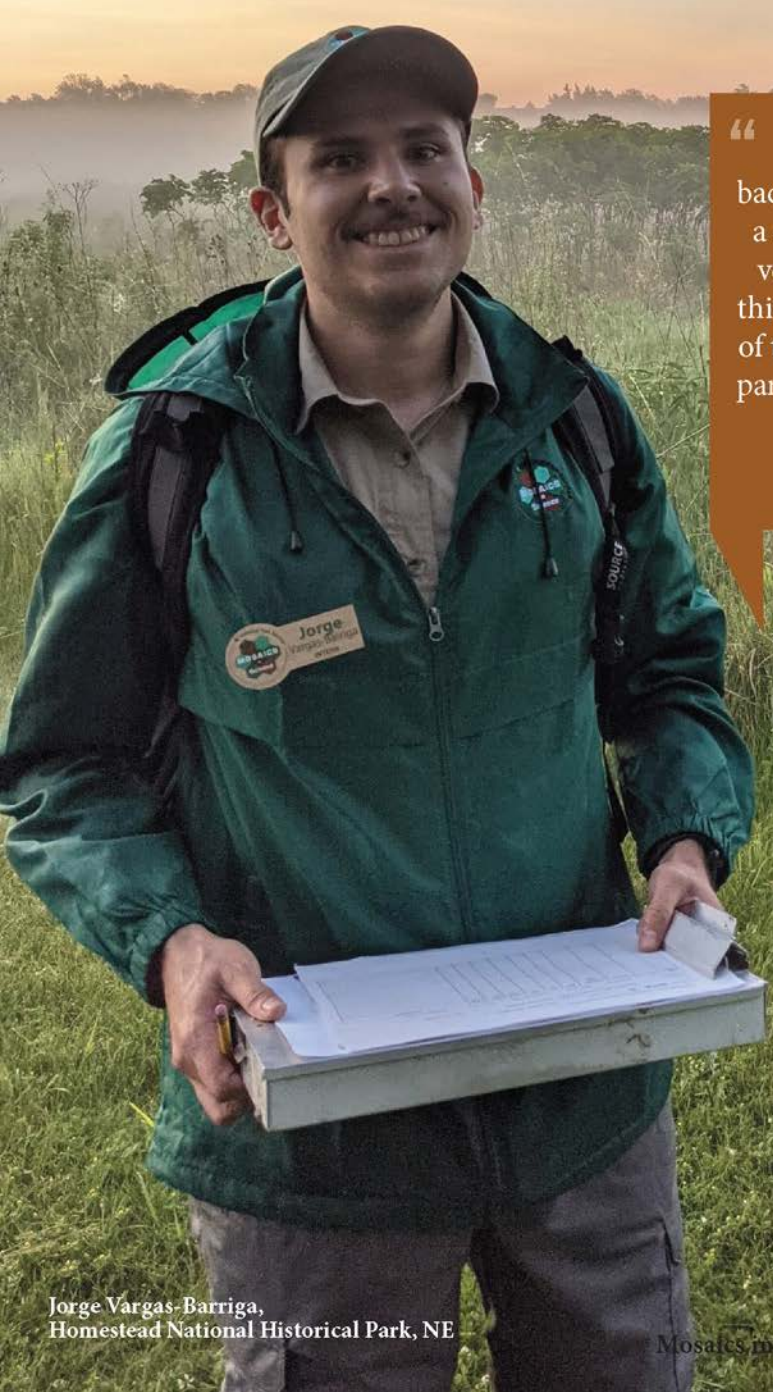


Jenna Aubrie Heckel,
Monocacy National Battlefield, MD

Words From Interns

"It is my eventual goal to work as a scientist for the National Park Service full-time because I believe in their mission to preserve resources for the enjoyment, education, and inspiration for current and future generations.
- Jenna Aubrie Heckel"

"This Mosaics In Science program is an opportunity that can give me the necessary tools and skills to learn about the professional opportunities aligned to the social and environmental dimensions of planning.
- Andrés L. Pérez Cintrón"



"Not unlike many people from backgrounds like mine, I tend to carry a sense of imposter syndrome. I feel very fortunate to be able to say that this experience helped me shake some of that off. On top of that, I got to take part in all sorts of awesome things like the park's annual bird survey!
- Jorge Vargas-Barriga"

"I am so incredibly thankful and blessed to have partaken in this internship. Everyone was so incredibly nice and supportive in training me in the field. I am really sad to leave but have a feeling this magical seashore will draw me back for future visits.
- Cristal Espinosa"

Jorge Vargas-Barriga, Homestead National Historical Park, NE

This word cloud illustrates how intern views on stewardship, conservation, and preservation. The larger the word, the more often it was mentioned by interns.

Andrés L. Pérez Cintrón, Biscayne National Park, FL

Acknowledgements

This program could not have happened without the vision and dedication of our many partners. We gratefully acknowledge the work and support of the following:

NPS UNITS HOSTING MIS INTERNSHIP

- Biscayne National Park
- Boston Harbor Islands National Recreation Area
- Cape Lookout National Seashore
- Colonial National Historical Park
- Congaree National Park
- Grand Canyon National Park
- Homestead National Historical Park
- Isle Royale National Park
- Lava Beds National Monument
- Mojave Desert Inventory & Monitoring Network
- Monocacy National Battlefield
- Mount Rainier National Park
- Natchez Trace Parkway
- North Cascades National Park Service Complex
- North Coast and Cascades Inventory & Monitoring Network
- Ocmulgee Mounds National Historical Park
- Padre Island National Seashore
- Pictured Rocks National Lakeshore
- Point Reyes National Seashore
- Rocky Mountain National Park
- Saguaro National Park
- War in the Pacific National Historical Park
- Wind Cave National Park, Mount Rushmore National Memorial, Jewel Cave National Monument, and Northern Great Plains Inventory & Monitoring Network
- Yukon-Charley Rivers National Preserve
- Urban Ecology Research Learning Alliance, Washington, D.C.

RECRUITING PARTNERS

- Brandeis University
- California State University, Chico *
- California State University, Monterey Bay *
- Central Washington University
- College of William & Mary at Williamsburg, Virginia
- Colorado State University
- Cornell University
- Drake University
- Florida International University *
- North Carolina Agricultural & Technical State University *
- Northern Arizona University
- Texas A&M University
- The College of Wooster
- The University of New Orleans
- University of Alaska Fairbanks
- University of Arizona *
- University of Colorado, Boulder
- University of Guam
- University of Michigan
- University of Notre Dame
- University of Puerto Rico, Humacao Campus *
- University of Washington
- Wake Forest University

*Hispanic Serving Institution

Appendix I
Intern Profiles

Ana Arce • University of Michigan

Isle Royale National Park, Michigan / Natural Resource Management Assistant

I was born and raised in Saginaw, Michigan. My father worked laborer jobs, while my mother worked small sales jobs at various shops. Exploring the idea of higher education was never talked about nor given a second thought. I am proud to say I became the first college graduate in my immediate family. I recently graduated from the University of Michigan in December of 2020, where I obtained a degree in Wildlife Biology. While in school, I learned and studied the role that the predator and prey relationship has on the environment around it. The delicate balance that these two roles play has always fascinated me. As a Michigan native, a long sought goal has been to set foot on Isle Royale, so this is a dream come true. My project explores the impact that this relationship plays on the island's current ecosystem. I hope to gain field experience that challenges me both physically and mentally and increases my confidence in the field. I also want to gain guidance and mentorship from experienced professionals, to help me navigate a career in wildlife biology. I know I will make cherished memories that will be with me forever.

Ashleyann Bacay • California State University, Chico

Lava Beds National Monument, California / Fire Ecology Assistant

I obtained my B.S. in Physiology and B.A. in Environmental Studies at the University of California, Santa Barbara. I am now a first year Master's student enrolled in California State University, Chico's Interdisciplinary Studies: Wildland Management program. I am studying the influence of liability, legislation, and policies in regard to the conduction of prescribed fires in California and identifying barriers of Rx fire's current usage. My interest in the Mosaics in Science program is tied to personal and professional reasons. Finding Asian representation (and diversity in general) in the environmental and natural resource fields poses a challenge in itself already, but finding diversity in the specific field that is "fire" is also a challenge of its own! Being able to work in this Fire Ecology Assistant position at Lava Beds National Monument will allow me to be that representation in the natural resource and fire fields and also help further my studies from another point of view. My future career goals involve working in a natural resources management position. I want to be a role model to younger women of color who aspire to work in the environmental sector. I also want to utilize my understanding of policy, legislation, and field work experiences to advocate for the introduction of restorative fire and other conservation or stewardship techniques and to convey the importance of my work to the general public. I know that this internship through Mosaics in Science will provide a big leap toward those goals!

Jenelle Booker • The College of Wooster

Mojave Desert Inventory & Monitoring Network, Nevada / Ecological Monitoring Intern

I am a graduate from The College of Wooster in Ohio. After pursuing an undergraduate degree in chemistry with a German and environmental focus, I decided to pursue environmental and ecological experiences as the next step in my career. As a woman of color, the internship opportunities that Environment for the Americas offers through its Mosaics in Science internship program seemed like the perfect entry point into the world of environmental education and field work. In the future, I intend to complete a master's degree in natural resource management in Berlin after my time in the Mojave Desert.

Lynneva Carroll • University of Alaska Fairbanks

Yukon-Charley Rivers National Preserve, Alaska / Biology and Science Communication Assistant

I am earning my B.S. in Biological Sciences at the University of Alaska Fairbanks. I am exploring different areas of my interests to determine a career field I would like to focus on. These include biology, ecology, and natural resource management. I particularly enjoy field work and encountering new environments. Researching the environment, such as the impacts of climate change on the Arctic, is something that I aim to do in my career. During my Mosaics in Science internship last summer (2020), I learned more about conservation and ecology, as well as video editing. It was my first encounter with videography, and I enjoyed the experience immensely. The video I made was about the conservation of Yellow-billed Loons, and how they were threatened by environmental contaminants. I researched the story, and wrote and narrated the script with the help of some fantastic mentors. Then I organized and edited preexisting loon footage to create the video. This summer, I will be doing more field work, including surveying Peregrine Falcons on the Yukon River. I will continue to put my video skills to work developing a piece on a video about these birds and their conservation story, expanding my skills in videography. I am looking forward to a second season with Mosaics in Science.

Sahil Duvadie • Brandeis University

Boston Harbor Islands National Recreation Area, Massachusetts / Biological Resources Assistant

I am a second-year student at Brandeis University working towards a bachelor's degree in Environmental Studies. Six years ago, I had my first adventure on the Boston Harbor Islands. I was a Live Blue Ambassador cleaning the shoreline of Lovells Island so that Piping Plovers, a native bird species found in certain areas of the Atlantic Coast, could use the island as a breeding ground. I was enthralled by the experience and kept coming back out to the islands with both the same and different organizations. My goal was to meet the community that calls the Boston Harbor Islands their home. Since then, I have worked with both the New England Aquarium and National Park Service (NPS) extensively in different positions to plant native species on the islands and remove invasive species, document invasive marine species, and educate local Boston youth about the history and natural beauty of the islands. Conservation has always been my passion. I believe this internship opportunity will allow me to gain valuable skills and pursue a career with the NPS. It will be my honor to continue the role of protecting biodiversity through this internship opportunity in Boston Harbor Islands as a Biological Resources Assistant.

Sasha Escamilla • California State University, Dominguez Hills

Grand Canyon National Park, Arizona / Botanical Resources Assistant

I recently graduated from California State University with a bachelor's degree in Biology with a concentration in Ecology. I have a passion for conserving and maintaining native ecosystems, my goal is to become a restoration ecologist with the National Park Service. In the future, I also hope to attend graduate school. Attending graduate school will give me the opportunity to become more knowledgeable about habitat restoration efforts and how to approach and develop best practices for preserving our most threatened ecosystems. That is also why I applied for an internship with Grand Canyon National Park. The work involves active research on an endangered plant species, analyzing the current threats it is facing and gathering supporting evidence for how we can better protect it. This program will not only prepare me for success in graduate school, but also prepare me for a future career with the National Park Service. There will be a significant amount of collaboration between different agencies, and presenting our findings to others will allow for various networking opportunities. Above all, the DHA status associated with the completion of this internship is a huge advantage to have when applying for permanent positions.

Cristal Espinosa • Florida International University

Cape Lookout National Seashore, North Carolina / Marine Biological Conservation Assistant

I was born and raised in sunny Miami, Florida and received my B.S. in Biological Sciences from Florida International University in 2019. I am a first-year graduate student pursuing a Master's in Environmental Science at Florida Atlantic University. I am interested in the Mosaics in Science Diversity Internship Program as it will provide me the opportunity to increase my comfort and gain research and field experience, while celebrating and being inclusive of students in diversity. I am eager to complete my internship at Cape Lookout National Seashore and get my hands dirty with sea turtle surveying and data collection. My professional interests lean toward conservation biology, specifically marine conservation. Ultimately, I would love to bridge the gap between important conservation work and educating and bringing awareness to the public. I am thrilled to be a 2021 Mosaics in Science Intern!

Sebastian Espinosa • Northern Arizona University

North Coast and Cascades Inventory & Monitoring Network, Washington / Biological Resources Assistant

I have a B.S. in Environmental Science from Northern Arizona University and am now working on my Master's degree in Climate Science and Solutions. The fields of conservation and environmental science are typically not dominated by Latinos, but as a child of two immigrants from South America, who instilled in me a passion for the outdoors, I grew to have a longing to protect and conserve the natural world. I hope to develop my career as an environmental scientist, with an emphasis on mitigating the effects of climate change on the natural world. I am interested in this opportunity because I am very passionate about the protection of our national parks and their flora and fauna. This opportunity will undoubtedly support my professional goal of building my career as an environmental scientist with an emphasis on climate change mitigation and adaptation.

Charles Hambley • University of Guam

War in the Pacific National Historical Park, Guam / Marine Ecology Assistant

I am an undergraduate student pursuing a B.S. in Biology at the University of Guam. I plan to apply to graduate school for the 2022 academic year. I am interested in the study and research of corals and algae. Growing up surrounded by these ecosystems motivates me to help protect the natural resources my home island has to offer. For my profession, I aspire to work with organizations that make change and play a role in protecting and understanding coral reefs, such as the National Park Service and National Oceanic and Atmospheric Administration. My professional goals are to attain a graduate degree, come back to my home island, and work with other programs and organizations that could help maintain and manage the marine systems that are helping support the island's communities, whether it be through social or environmental means. Through Mosaics in Science, I hope to gain new skills and solidify previous skills gained through my education.

Jenna Aubrie Heckel • California State University, Monterey Bay

Monocacy National Battlefield, Maryland / Hydrology Assistant

Hafa Adai! My name is Jenna Aubrie Heckel and I am from Monterey Bay, California. I have a B.S. in Biology with an emphasis on Ecology and Evolution, and a minor in Environmental Science and Sustainability. It is in the Central Valley where I fell in love with the mountains and started working for the National Park Service, delivering educational programs that connect the local community to the parks and fulfilling my dream of becoming a scientist. I am currently in graduate school at California State University, Monterey Bay furthering my scientific skills and earning a M.S. in Environmental Science. Although I am interested in plant biology and restoration, an internship at Monocacy National Battlefield as a hydrological assistant will help broaden my knowledge of non-biological (non-living) components of ecosystems. It is the physical environment that ultimately drives what plants and animals can live in certain area - including humans! Therefore, through this internship, we can evaluate the health and any changes in the Monocacy River so the National Park Service can make management decisions in the best interest of all communities. It is my eventual goal to work as a scientist for the National Park Service full-time because I believe in their mission to preserve resources for the enjoyment, education, and inspiration for current and future generations. I am also excited to meet other participants in the program and network with park scientists and managers.

Jailyn Hoskins • The University of New Orleans

Padre Island National Seashore, Texas / Marine Biological Conservation Assistant

I am a third-year Biology major at The University of New Orleans. I have always been interested in finding a career that continuously challenges me, satisfies my constant desire to always grow and learn, and allows me to give back. I am excited about this internship position I have been offered as a Marine Biological Conservation Assistant because it combines many of my interests: conservation, research, photography/videography, and sharing knowledge with others. I want to help bridge the gap between underserved communities and the sciences, and work to help inform the general public about environmental education and conservation issues. This position would not only help me gain field experience but would also help me pursue a career with the National Park Service. I believe that with this program I'm on the path to a fulfilling meaningful career in the sciences.

Devante Jones • North Carolina Agricultural & Technical State University

Ocmulgee Mounds National Historical Park, Georgia / Botanical Resources Assistant

I am a junior at North Carolina Agricultural and Technical State University pursuing a bachelor's degree in Environmental Science. I am interested in this program due to my passion for environmental science and nature. As I dive deeper and gain more exposure to my field of study, I have realized I am quite interested in conservation, research, and pollution. To reverse the mistakes of our past in order to see a better future is the essential goal that I pursue. I believe this internship will help me gain experience and skills vital for my future aspirations and serve as a fundamental stepping stone for greatness. My ultimate goal is to work for the Environmental Protection Agency or be a part of a team whose research and goals align with conservation or pollution solution efforts. Because Ocmulgee is a national park working with invasive species and conservation, the program suits my interest and needs perfectly. I hope to gain as much experience as possible with an opportunity like this, not only to gain connections and make it easier for me to be in a position of power when it comes to environmental issues but also to be confident within myself that I have what it takes to make a change and place my mark environmentally on this planet. I expect ups and downs and curveballs to be thrown my way, but by putting myself out there through experiences and opportunities such as this one, I can confidently say I am on the right path to success.

Marwa Mahmoud • University of Washington

Mount Rainier National Park, Washington / Wildlife Conservation Assistant

I graduated in 2020 from the University of Washington with a degree in environmental studies and a minor in environmental science. My professional interests lie in natural resources. I consider myself a generalist, as I am drawn to a variety of topics within natural resources. These include landscape scale climate change, wildlife interactions with a changing snowpack, climate education, and management and policy implications in a time of a changing climate. My long-term career goals revolve around working in climate science and policy. Outside of my research interests, I enjoy hiking, skiing, and potlucks. I am excited to work in the Mosaics in Science program because I think there is a lot to learn in and from our national parks. I am especially eager to work in Mount Rainier National Park because I have been involved in studying water resources, wildfire, and wolverines in the area. These research positions have drawn me close to Mount Rainier National Park and I am excited to continue working in the glacial landscape. Growing up in the western Washington region, Mount Rainier has always loomed large in the skyline, giving it a special place in my heart. Through the Mosaics in Science program, I hope to foster new connections to places and people. I am open and excited for what is to come with this experience. As the pandemic rolls on, I hope the Mosaics in Science program will offer a healing and rejuvenating experience for all the interns.

Veronica Mantha • College of William & Mary at Williamsburg

Colonial National Historical Park, Virginia / Geological Resources Assistant

I am a senior at the College of William and Mary in Williamsburg, Virginia. I have been primarily studying geology, and am minoring in environmental science. Throughout my studies I have been focusing on paleontology, mineralogy, and sedimentation. I have taken part in GIS, biology, and chemistry as well, and I am deeply passionate about conservation and the protection of nature and the earth. While I have not had a chance to take any hydrology courses in my department due to a lack of a professor, I am interested in water dynamics and am ecstatic to learn about these topics this upcoming summer. I am thrilled to take part in the salinity and chemical testing on groundwater and soil on Jamestown Island in Virginia. My interest in this specific program on Jamestown Island stems from my love of the unique combination of history and geology that occurs in the area. I am also excited to be able to share my unique perspective within Colonial National Historical Park, as I believe that diversity in cultures and experience can allow a team to grow stronger and better able to work together. Furthermore, I am so happy to be able to gain experience taking soil and water samples, as due to COVID I have not had an opportunity to take part in fieldwork such as this, which ties together my interests in conservation, biology, chemistry, and, of course, geology. Working for the National Park Service or U.S. Geological Survey has also been a dream of mine, and just this summer internship is something I am beyond grateful for.

Quenten Masters • University of Arizona

Congaree National Park, South Carolina / Fisheries Assistant

I am currently attending the University of Arizona and I am in my junior year of studies. My educational goal is to graduate with a bachelor's degree in Natural Resources with an emphasis in Fisheries Management. Along with Fisheries Management, I have taken courses that qualify me to work with terrestrial wildlife in the future. My goal in participating in this program is to expand my knowledge of natural resources and the efforts that are put into managing those resources. This program presented the perfect opportunity to grow my expertise in fisheries management, as it will allow me to not only communicate with the local anglers daily but it will also allow me to gain experience writing and developing a fisheries management plan. My professional goal is to become a fisheries or wildlife manager for either a federal or private institution. While in this position I hope to use my experience from my childhood and my work career, to spread awareness about the importance of protecting the outdoors as well as help bring more diversity to the field of resource management. One of my dreams is to help provide more opportunities for people of lower incomes to experience the outdoors closer to home, whether it be by expanding community fishing programs or by implementing programs to help take people to iconic natural wonders. My goal is to make it easier for people to not only experience the outdoors but to grow to love and cherish the environment, so that future generations can continue to enjoy them.

Matthew Millado • University of Notre Dame

Pictured Rocks National Lakeshore, Michigan / Hydrology Assistant

I am currently a senior at the University of Notre Dame and will be graduating in May 2021 with a B.S. in Environmental Sciences and a minor in Sustainability. I am excited to be participating in the Mosaics in Science internship program this year because I am passionate about natural resource management and conservation. I am particularly excited to be working at Pictured Rocks National Lakeshore in Munising, Michigan because I grew up in Marquette – a town just one hour away from Munising. I have an immense love for Lake Superior and the Upper Peninsula of Michigan, and I spent a lot of time exploring Pictured Rocks during my teenage years. For example, I backpacked 25 miles along the lakeshore during my junior year of high school and, despite getting rained on and attacked by black flies, I loved every minute of it. I cannot wait to continue exploring the park and to help manage it as a scientist in the aquatics program this summer. As a Mosaics in Science intern, I am looking forward to gaining first-hand experience in natural resource management in the Great Lakes region, meeting other National Park Service employees, and getting to know the natural environment of Pictured Rocks by living and working in it. Further down the road, I am passionate about finding a long-term career that actively contributes to the conservation of natural spaces for all. This could very well be with the National Park Service, or with any other government agency or non-profit organization that is geared towards environmental conservation.

Deja Olumba • Texas A&M University

Point Reyes National Seashore, California / Fisheries Monitoring Assistant

My name is Deja Olumba, and I am currently enrolled at Texas A&M University and am pursuing my bachelor's degree in Wildlife and Fisheries Sciences and a minor in Horticulture. I just completed my sophomore year, and I am so excited to be a part of the Mosaics in Science program! I have participated in field research in the past with a lab here at Texas A&M. This internship involved two months of observing the mating rituals of hummingbirds, as well as capturing and collecting samples from live birds. My professional goals are to eventually lead my own field research on animal behavior. To achieve this goal, I plan on getting as much field experience as I can while I am still an undergraduate. I would like the chance to work with all kinds of species in a variety of environments so I can get as much enrichment as possible before choosing a professional path in graduate school and beyond. This opportunity to work for the National Park Service would be a huge boost in my professional goals due to the amazing experience and networking opportunities. Point Reyes National Seashore is very far from my home and offers a new environment and ecosystem that I haven't had the opportunity to work with, and I'm excited for the new experience. I'm also excited to work for an organization as important to me and to the nation as a whole as the National Park Service. When I was a child, I had posters from several national parks hung on my walls and it's an honor to be able to work for them. I'm incredibly grateful for this opportunity and I'm so excited to start working!

Viridiana Orona • University of Texas at El Paso

Saguaro National Park, Arizona / Biology Monitoring Assistant

I am currently a second-year master's student in the Environmental Science program at The University of Texas at El Paso. I am interested in the Mosaics in Science internship program because it fits perfectly with research I have assisted with in the past and the current research I am conducting for my master's degree. Most of my research has been done in a desert ecosystem so I am used to the climatic conditions when doing fieldwork, plus I am familiarized with desert plant ecology. I really enjoy the desert and genuinely admire its beauty. Another aspect of this internship position that I am looking forward to is the ability to do community outreach. I believe it is important that we communicate our findings to the non-scientific community and learn how to effectively communicate science. This will create awareness about the environment and more opportunities to do interdisciplinary work. Being bilingual helps me communicate with a broader audience and I hope to share my work and experiences with Spanish speakers as well. I would love to meet new people and work with other scientists, which will help me establish new network connections. I am always happy to learn new things and be part of exciting opportunities such as this one. The skills gained from this internship will help me become a better scientist and I am more than proud to represent women and the Hispanic community within STEM fields.

Andrés L. Pérez Cintrón • University of Puerto Rico, Humacao Campus

Biscayne National Park, Florida / Fisheries Resource Assistant

¡Hola! I am Andrés and I am from Humacao, Puerto Rico. I have a Bachelor of Science degree in wildlife management with a minor in education from the University of Puerto Rico, Humacao Campus. Currently, I am in my first year of a master's degree in planning with an environmental and social emphasis at the University of Puerto Rico, Rio Piedras Campus. This summer I will be a Mosaics in Science intern working with Environment for the Americas at Biscayne National Park, and I will be helping the park scientists with assessing the efficacy of the new fishing regulations implemented in the park. I am very excited to be able to work in a park where I can interact with the Latin community, giving me an opportunity to learn more about the multicultural nature of the visitors and the way they perceive and relate to environmental issues. My goal is to learn as much as possible through the courses that graduate school offers me and at the same time get involved in professional experiences that lead me to what I am studying, which is why I consider this a unique and excellent opportunity. In the future, I aspire to work with the federal government or in non-governmental organizations in natural resource management, or on environmental and social resource planning boards where I can offer my knowledge and help to implement plans for a resilient future that buffers the actions that cause climate change. The Mosaics in Science program is an opportunity that can give me the necessary tools and skills to learn about the professional opportunities aligned with the social and environmental dimensions of planning.

Brooke Su • Cornell University

Wind Cave National Park, South Dakota / Wildlife Habitat Survey Assistant

I am a recent graduate of Cornell University, where I majored in Environmental Science. The position at Wind Cave National Park, Mount Rushmore, and Jewel Cave National Monument aligns closely with my interests in studying mammals and builds upon my experience working with camera traps and GIS. After working a few years post-graduation, I plan to pursue a PhD in wildlife conservation and eventually work for a conservation NGO or government agency. I am extremely grateful to Mosaics in Science for working to create a space within the conservation field for people like me.

Edwin Torres • Central Washington University

North Cascades National Park, Washington / Native Plant Restoration Assistant

I am a student at Central Washington University. I will be graduating this year with a bachelor's degree in Geography. I am interested in the Mosaics in Science program because it provides opportunities for individuals from under-represented communities to enter the job field and work with the National Park Service (NPS). I feel that diversity within any job field strengthens and improves the work environment. Diversity allows for people with different perspectives to meet and learn from each other and move forward together. What I like about this program is that I feel it mirrors the NPS mission of "preserving the National Park System for the enjoyment, education, and inspiration of this and future generations" by not only providing opportunities for students and recent graduates, but also creating the opportunity for interns to inspire current and future generations from under-represented communities to venture into these areas that might seem intimidating or inaccessible to them. It has always been a dream of mine to work for the NPS. I view these parks as spiritual places that allow you to build your connection with nature. I have always considered that having the opportunity to work in these parks is a great privilege. With this internship I hope to gain a better understanding of the complexities of natural resource management as well as develop the skills and experience that will allow me to be successful in this field. I would also like to develop skills in community outreach and contribute to making my site as accessible as possible. Overall, I look forward to this opportunity and growing as a professional.

William Tsai • Drake University

Rocky Mountain National Park, Colorado / Natural Resources Field Lead

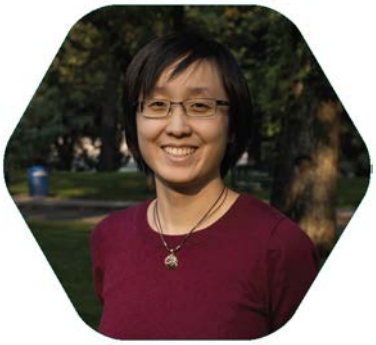
I am currently a Junior at Drake University and I am working towards a Bachelor of Science degree in Environmental Science in the Aquatic & Earth Sciences Track and a Bachelor of Arts in Political Science. I was introduced to the Mosaics in Science program through my older sister who had applied when she was an undergraduate student. Ever since I was young, I have always wanted to be a park ranger, however this dream felt less and less obtainable once I realized not many park rangers looked like me. Discouraged and hurt, I decided that I wanted to change that. Although my desire to become a park ranger has shifted, I still want to work in the field of environmental science while representing my culture and community; the Mosaics in Science program allows for me to do both. As a Mosaics in Science intern, I hope to not only encourage the community to get more engaged with the environment and national parks, but to also encourage under-represented communities and individuals to do the same. The Mosaics in Science program builds a bridge between the National Park Service and under-represented communities, which is why I love this program. Following graduation, I hope to utilize both my majors to eventually work at a federal science agency. Although growing up I wanted to be a park ranger, after learning more about climate change and the damage humans are causing, I decided that instead of just enjoying nature, I wanted to protect it. I believe that working at a federal science agency would provide paths to create more environmental protection laws at a national level.

Jorge Vargas-Barriga • University of Colorado, Boulder

Homestead National Historical Park, Nebraska / Resource and Interpretation Intern

I am a recent graduate with a B.S. degree in environmental engineering. The outdoors has always been a place where I find peace, so the opportunity to work with the National Park Service is amazing! Additionally, the variety in responsibilities drew me to the position. My professional interests are somewhat wide-ranging and uncertain, but at the moment I am especially interested in water treatment and ecology. I have been fortunate enough to do some water quality tests in my undergraduate career, but I am looking forward to expanding my knowledge in that area and learning from professionals. Water is so important for the survival of our planet and species, so I am always looking to learn more about the current issues and how to preserve our resources. Furthermore, the position gives the opportunity to not only apply and develop my abilities but also will give me the opportunity to teach younger students about STEM concepts. Another aspect of the Mosaics in Science program that I like is the focus on increasing diversity in the parks and STEM. I started seeing the importance of this myself in my undergrad and tried to help people from backgrounds similar to my own. For one summer I got to teach middle school students about 3D modeling online and its many uses. Helping future generations is absolutely something I want to do in my future and the fact that I get to do this while developing my own science and math skills is fantastic. For my own career, I would like to gain some experience in different areas of interest. All in all, I am prepared to step out of my comfort zone, visit new places, and learn new things!

Veronica Mantha,
Colonial National Historical Park, VA



Samantha Ye • Colorado State University

Urban Ecology Research Learning Alliance, Washington, D.C.
Natural Resources & Science Communication Intern

I am currently an undergraduate student pursuing degrees in journalism, economics, and ethnic studies. And I am less than two months away from becoming a college graduate! This internship opportunity ties in perfectly with what I hope to do long-term. Extracting information, developing multimedia communications, and finding new ways to engage public interest on issues of social importance: it all plays to my passions and what drew me to originally apply for a science communication position in the first place. I am specifically excited for my role with the Urban Ecology Research Learning Alliance because I really care about engaging communities on critical topics like climate change, history, and environmental resources. My personal experience is that the audience for all of these types of information is very much on the rise, so I cannot wait to help design and deliver the materials to where they are. People have so much curiosity that only needs some cleverly accessible material to connect with. Career-wise, I have always wanted to enter public service and I hope this experience will give me a better perspective of the work process at the federal level as well as opportunities to network and build relationships with those in National Park Service (NPS) communications. The work itself is also an extremely attractive opportunity for me to develop my multimedia strategic communications skills. Though I have done small scale projects in social media, the web, and public relations, I know I could expand my capabilities significantly through working on more intensive projects, and few things could be more intense than creating federally vetted material set for national publication. Coming from Colorado, the national parks here have been a cornerstone of my life and how I understand my community so, once again, it really is a dream to contribute my own skills to the NPS.

Tyria Zanders • Wake Forest University

Natchez Trace Parkway, Mississippi / Natural Resources Intern

I am finishing up my freshman year at Wake Forest University. Next semester, I plan on declaring as an Environmental Science major with minors in Spanish and/or Arabic. I applied to Mosaics in Science because, as a kid, I always wanted to be a park ranger or field biologist, just something where I would get to play all day outdoors. Growing up in Louisiana, I had access to the incredible unique landscapes throughout Louisiana and our neighboring states. Through many summers at camps and family fishing trips, I have grown deeply connected to the natural world. My passion for the outdoors is only exemplified by my love of outdoor recreation and sports such as running and backpacking. As I grow older, I realize more and more there are not many people that look like me or are from similar backgrounds that enjoy the same activities, and even fewer pursuing careers in environmental fields. Now, as I start my journey into finding a career, I still know I want to work in some way with the environment. This summer, I hope to experience multiple fields that involve working with the environment, from research and management to recreation and tourism. In high school, I was lucky to participate in a study abroad program that placed me on a sustainable farm in the Dominican Republic for the summer. The program really helped me realize that careers in environmental fields are possible and will be very important in the coming decades as we face the climate crisis. I also look forward greatly to working under experienced professionals who will be able to further help me define my career goals and finding a path towards them.

The Mosaics in Science program has allowed our park to create opportunities specifically for indigenous Chamorro and Asian/Pacific Islander youth in Guam. Our park's relationship with our MIS interns is mutually beneficial--our interns gain new practical skills, experiences, and connections that will help them be successful in their science careers, and our park staff come away with a fuller understanding of the local history, traditions, and culture. The MIS program helps us to build local capacity in the sciences and complete projects that we would otherwise lack the resources to accomplish.

Ashton Williams, Supervisor/Mentor
War in the Pacific National Historical Park, Guam

William Tsai, Rocky Mountain National Park, CO