



CAPITOL REEF FIELD STATION

ANNUAL REPORT

2021



2022

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**2021-2022
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CAPITOL REEF FIELD STATION

STAFF

DIRECTOR

Michael T. Stevens, Ph.D.
Professor of Biology

ASSOCIATE DIRECTOR

Keith White
Professor of Mathematical
and Quantitative Reasoning

SITE MANAGER

Joseph Ceradini
(July-October 2021)
Michael Hague
(October 2021-present)

ASSISTANT SITE MANAGER

Ann Ehler

ADMINISTRATIVE ASSISTANT

Jessamy Bowie





CAPITOL REEF FIELD STATION

ADVISORY BOARD

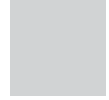
Maria Blevins, Ph.D.

Associate Professor
of Communication



Joel Bradford

Associate Professor
of Earth Science



Karen Cloward

Assistant Director,
Community Education



Reid Elem

Assistant Professor
of Art & Design



Kevin Eyraud, Ph.D.

Associate Professor
of English Language Learning



Karl Haisch, Ph.D.

Professor
of Physics



Kumen Louis

Assistant Director, Multicultural Center,
Multicultural Student Services



Amber Smith-Johnson

Lecturer
of English & Literature



Ethan Sproat, Ph.D.

Program Director of Proposal Development,
Office of Sponsored Programs



Scott Williams

Associate Professor
of Exercise Science & Outdoor Recreation



DIRECTOR'S INTRODUCTION



Capitol Reef Field Station (CRFS) offers immediate access to a protected natural environment where the next generation of thinkers and doers experiences in situ training in their discipline, working side-by-side with their professors, mentors, and fellow students. The field-station environment fosters innovative approaches to teaching, research, and creative work, and is a venue for the translation of the abstract and the theoretical into the real and the tangible.

It has been so gratifying to see faculty, staff, and students coming back to the field station after 15 months of being closed due to COVID-19. Visitation soared in 2021-22, making it our third busiest year ever. In addition to a wide variety of education-focused visitors, we hosted researchers from the natural, physical, and social sciences, as well as artists doing creative work.

Our goals for the coming year include facility improvements, fundraising, partnership building, and initiatives in diversity, equity, and inclusion. We're so happy to be open to visitors again and hope you enjoy reading about our accomplishments and aspirations in this report. Please reach out to us with a reservation request, a research proposal, or a donation. We hope to see you at the field station soon!

Michael T. Stevens, Ph.D.
Director,
Capitol Reef Field Station



ABOUT CRFS



Our Mission

CRFS, in partnership with Capitol Reef National Park, promotes and supports engaged learning, environmental ethics, and research and creative work through the exploration of the Colorado Plateau.

Our Vision

Our vision is that visitors leave the field station having learned more than the content of their coursework. Far away from many of life's daily distractions, visitors are able to immerse themselves in educational experiences enriched by the natural world that surrounds them. Practicing conservation encourages all visitors to think about their role in the environment and deepen their understanding of environmental ethics. We hope that every visitor connects to the landscape and develops an appreciation for the natural and cultural legacies of the Colorado Plateau.

Our Place

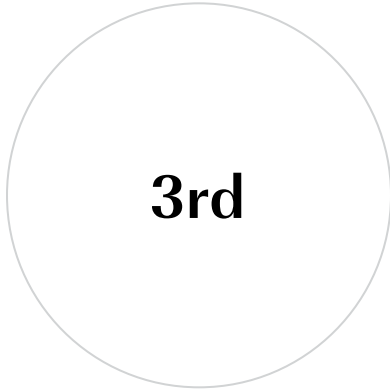
Beyond the paved roads, our buildings sit atop a mesa in Pleasant Creek Valley in the heart of Capitol Reef National Park. The field station is surrounded by stunning views of canyon country. The sun rises over the last mountain range in the continental United States to be mapped, the Henry Mountains, and sets over Boulder Mountain, which was an active volcano tens of millions of years ago and supported glaciers during the last ice age. At night, casual stargazers and serious astronomers alike can see the Milky Way and abundant constellations against a sky so dark that it's certified by the International Dark-Sky Association. Only 3.5 hours from Utah Valley University (UVU) and the Wasatch Front, our incredible location provides an unparalleled opportunity for place-based learning.

Our Partnership

The success of CRFS is made possible through the partnership between UVU and Capitol Reef National Park. There are only ten other university-operated field stations located inside U.S. national parks. Our uncommon partnership allows CRFS to provide its visitors with educational experiences that are as remarkable as the landscape in which they occur. CRFS is property of the National Park Service (NPS) and is operated by UVU in accordance with our 10-year general agreement with Capitol Reef National Park.

VISITATION SUMMARY

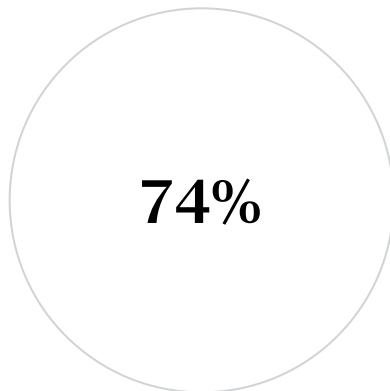




This was our third busiest year ever. Our total number of user days (2,578) was nearly five times the previous fiscal year's number, when our operations were limited by COVID-19 (Fig. 1). User days are calculated by multiplying the number of visitors by the number of calendar days they spent at the station. Our comeback after the pandemic shows that people are clamoring for the type of in-person, hands-on learning that the field station is so good at providing.



Visitors from UVU represented six out of eight of UVU's colleges and schools as well as ten other UVU organizations (Fig. 3). This is strong evidence that a field-station experience is applicable to many areas of interest. The fact that a third of our visitors were from Continuing Education shows that we spark interest in the community at large. The College of Humanities & Social Sciences, the School of the Arts, and the College of Science were other top sources of visitors.



Seventy-four percent of our user days were associated with UVU this year. The University of Kansas and University of Utah were other leading sources of user days. Groups from The Traveling School, Nebo School District, and Wilderness Individual Leadership & Development (WILD) visited CRFS for the first time this year (Fig. 2).



During the 2021-22 fiscal year, 689 people (including 280 undergraduates) visited CRFS in 53 groups. The average group size was 13 and the average stay per group was 4 days. Women and men comprised 61% and 39% of visitors, respectively.

Visitation Summary

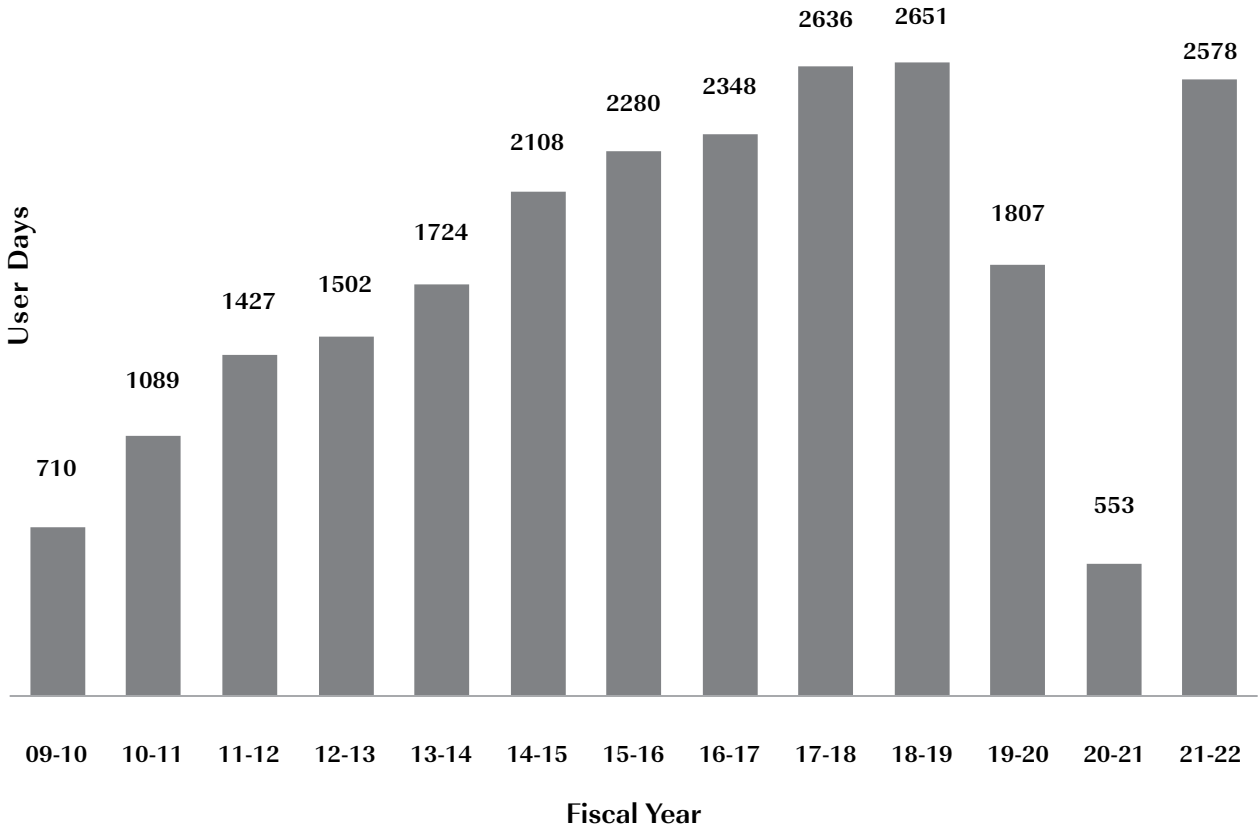


Fig. 1

The number of user days across fiscal years. After steadily increasing each year for a decade, visitation was negatively impacted by COVID-19 in 2019-20 and 2020-21. Visitation rebounded in 2021-22, making it our third busiest year ever.

Visitation Summary

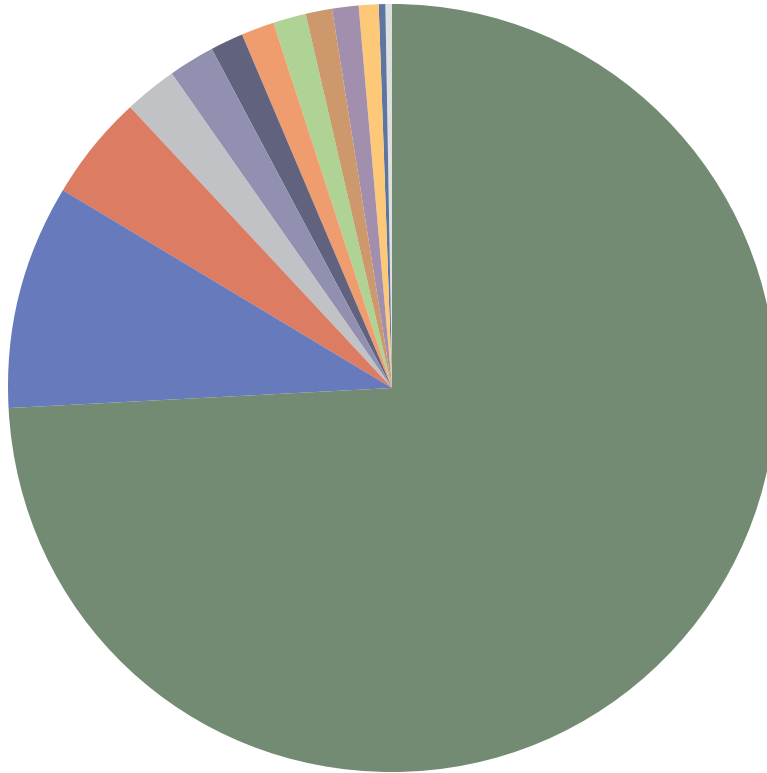















Fig. 2 Percentages of CRFS user days from various institutions.

	Utah Valley University	(74%)		WILD	(1%)
	University of Kansas	(9%)		National Park Service	(1%)
	University of Utah	(4%)		Weber State University	(1%)
	The Traveling School	(2%)		Summit High School	(1%)
	Nebo School District	(2%)		University of San Diego	(<1%)
	Utah State University	(1%)		SRI International	(<1%)
	Snow College	(1%)			

Visitation Summary

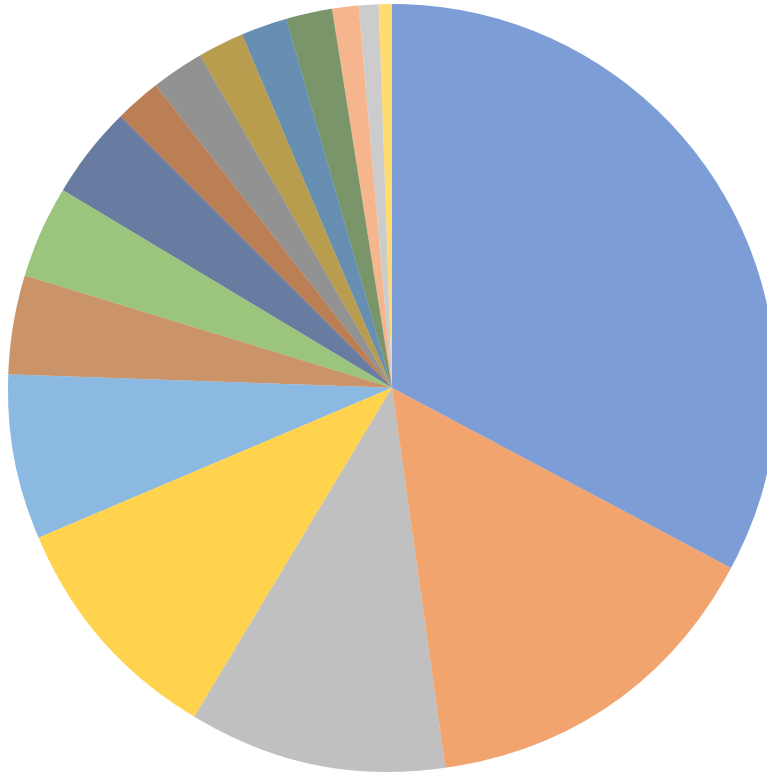


















Fig. 3 Percentages of CRFS user days from UVU's programs, colleges, or schools.

	Continuing Education	(33%)		College of Health & Public Service	(2%)
	College of Humanities & Social Sciences	(15%)		First-Year Experience	(2%)
	School of the Arts	(11%)		GEAR UP	(2%)
	College of Science	(10%)		Office of Sponsored Programs	(2%)
	University College	(7%)		Woodbury School of Business	(2%)
	Capitol Reef Field Station	(4%)		Innovation Academy	(1%)
	Honors	(4%)		Center for Social Impact	(1%)
	Outdoor Adventure Center	(4%)		Academic Affairs	(<1%)

Visitation Summary

UVU CLASSES WHO VISITED CRFS

COLLEGE/SCHOOL	COURSE#	TITLE
College of Humanities & Social Sciences	COMM 3115	Environmental Communication
	ENGL 2250	Creative Writing
	ENGL 225H	Creative Writing
College of Science	BOT 2050	Field Botany
	BOT 2100	Flora of Utah
	BOT4050/4055	Plant Ecology
	GEO 202R	Science Excursion
	REC 4400	Public Land Management
Honors	HONR 100R	Honors Colloquium
	HONR 2100	Wilderness Writing
School of the Arts	ART 300R	Special Topics in Photography
University College	ESL 1310, 1320, 1330, 1340	ELL Learning Level IV
	ESL 2110, 2120, 2130, 2140	ELL Advanced Level VI



Visitation Summary

UVU GROUPS WHO VISITED CRFS

AFFILIATION	GROUP
Academic Affairs	Provost Trip
Capitol Reef Field Station	Joe's Farewell/Elliot Bird Day
Center for Social Impact	Alternate Fall Break
College of Health & Public Service	Community Health Outreach Clinics
College of Humanities & Social Sciences	Scholar-in-Residence
Continuing Education	Fall Digital Photography Workshop
	Spring Digital Photography Workshop
	Mindfulness Workshop
	Fall Plein Air Watercolor Workshop
	Spring Plein Air Watercolor Workshop
	Science Fiction Writing Workshop
	Tapestry on the Colorado Plateau
	Fall Writers' Weekend
Spring Writers' Weekend	
First-Year Experience	New Student Orientation Team
GEAR UP	Navajo Nation Students
Innovation Academy	Associate Provost Trip
	Internship Services
Office of Sponsored Programs	Grants & Research Management Workshop
Outdoor Adventure Center	Natural History Excursion
	Trip Leader Training
Woodbury School of Business	Dean's Book Club

Visitation Summary

CLASSES FROM OTHER UNIVERSITIES WHO VISITED CRFS

UNIVERSITY	CLASS
Snow College	Literature of the Outdoors
University of Kansas	Geology Field Camp
University of Utah	February Geology & Geophysics Field Methods March Geology & Geophysics Field Methods
Utah State University	Utah Conservation Corps
Weber State University	Sustainability & Public Lands

RESEARCH GROUPS WHO VISITED CRFS

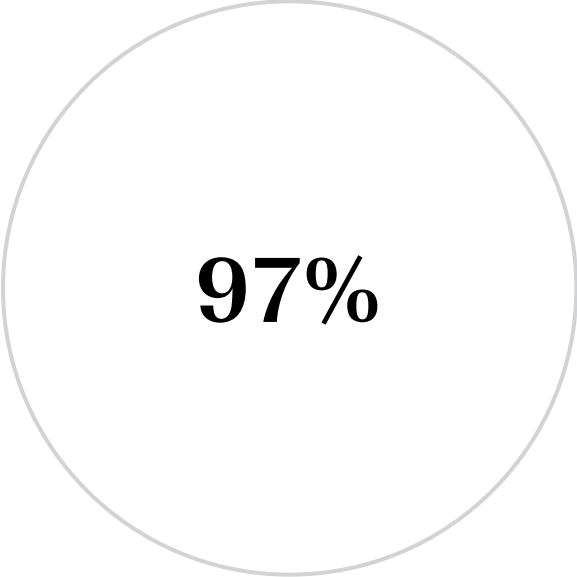
AFFILIATION	PROJECT
Capitol Reef Field Station	Monitoring Demographic Trends in Bird Populations
SRI International	GeoSpace Observations
University of San Diego	Quantifying Seasonal and Flash Flooding
University of Utah	Geology Learning Project
Utah Valley University	Microbes, Climate Change, and Invasive Plants Capitol Reef Social Science Research Sleeping Rainbow Ranch Digital Preservation

OTHER GROUPS WHO VISITED CRFS

GROUP	EVENT
Living Classroom Foundation	Wilderness Individual Leadership & Development
National Park Service	Capitol Reef National Park Resource Management
Nebo School District	Nebo Indian Education Program
Summit High School	Cross-curricular, Place-based Curriculum
The Traveling School	Western United States Semester

ENGAGED LEARNING





97%

Engaged learning lies at the heart of our mission. Even though the pandemic lingered, we were delighted to remain open for visitors the entire year, providing them with in-person, engaged-learning experiences unique to the field station. Our survey results indicate that students highly value the experiences they have at the field station, with 97% strongly agreeing (86%) or agreeing (11%) that they consider their field station visit an important, valuable part of their education (Fig. 4). Additionally, 95% strongly agreed (87%) or agreed (8%) that the field-station environment is difficult to replicate on campus (Fig. 5), and 99% strongly agreed (94%) or agreed (5%) that they would encourage other students to visit the field station (Fig. 6). As you can see in the Visitation Summary, we were able to host visitors from across UVU, the state of Utah, and beyond. Please take a moment to learn more about some of our visitors' experiences in Capitol Reef.

Fig. 4

The majority of our visitors strongly agreed that their field station visit was an important and valuable part of their education (n = 411).

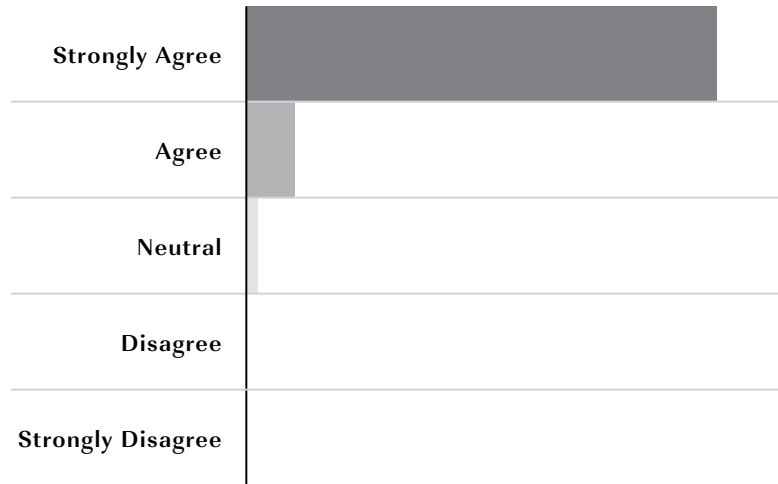


Fig. 5

The majority of our visitors strongly agreed that the environment at the field station is difficult to replicate on campus (n = 409).

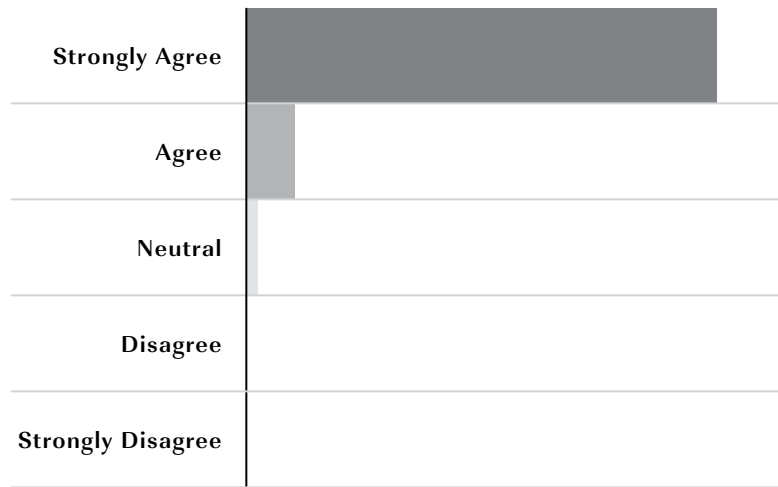
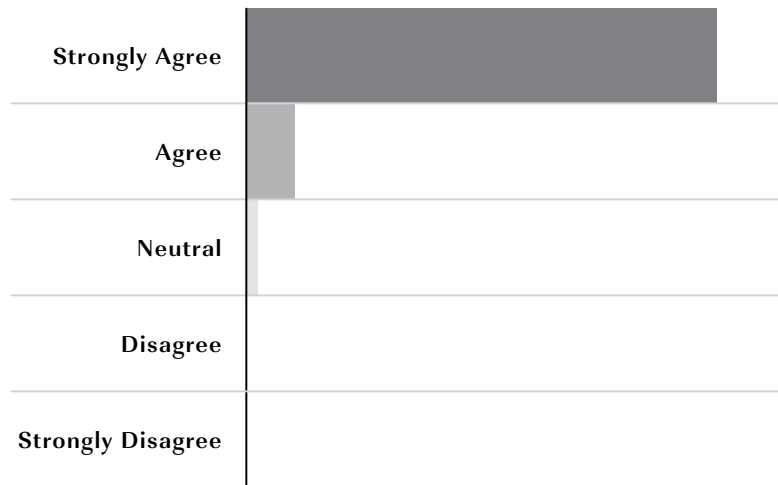


Fig. 6

The majority of our visitors strongly agreed that they would encourage others to visit the field station (n = 412).



Engaged Learning

Snow College
Literature of the Outdoors
February 25-26, 2022

Snow College's Literature of the Outdoors class visited the field station for the third time. Not only did they explore the region, enjoying hikes and the night skies, they also participated in a service project removing invasive species and reseeded native plants around the park's Visitor Center. They studied the work of area writers Everett Ruess and Edward Abbey, and also the writings of 8th century Chinese poet Li Po and 17th century Japanese haiku master Matsuo Bashō. The students even composed their own poetry. Trip leader Brooks English details:

"One of the students' assignments for the weekend was to compose their own haiku about their experience at the field station and in the park. Here's one example:

*A footprint in snow
there until it melts or more
covers the mistake.*

"In anticipation of the park's dark skies, the class had also completed some shorter readings by artists, writers, historians, and physicists, about light pollution, pre- and post-industrial night, and our changing relationship with the cosmos. And some of our previous classwork with Camille Dungy's collection, Black Nature: Four Centuries of African American Nature Poetry, helps students

better contextualize their own volunteer work in revegetation, in comparison to other individuals' and communities' relations with the land produced by various forms of labor on the earth. Finally, we were able to consider petroglyph panels as deep-time palimpsests where inscriptions are made by human (recent and earlier indigenous, often settler, sometimes tourist/vandal) and nonhuman (rain, snow, wind, sun) interactions on the sandstone surface. These firsthand encounters in the field with such forms of 'literature of the outdoors' productively challenge some of our basic understandings of what constitute writing and language. Thank you, once again, for allowing us to make the field station such a valuable part of our class this semester!"



Engaged Learning

UVU

ELL Level IV and Level VI

March 29-April 1; April 6-8, 2022

UVU's English Language Learning Department was able to take two trips to the field station this year. While there, students had an immersive language experience that exposed them to language about sustainability, ecology, geology, and many other topics. Trip leader Dr. Kevin Eyraud reports:

“While at the field station, we explored and practiced sustainability by engaging English with content on water conservation, light pollution, and noise pollution. Students also engaged with academic English through tangible aspects of the Colorado Plateau. They learned about lichen, desert varnish, biological soil crust, and the visible geological layers at Capitol Reef. It was a valuable experience to see the desert in a new light on our hikes to Pleasant Creek, Cassidy Arch, Cohab Canyon, and Hickman Bridge.

“Students were truly immersed in language and content during our trip. They were presented with multiple opportunities to recycle concepts and vocabulary for natural repetition and learning. The movement and immersion in spectacular settings combined with the content learning to create a curricular convergence that supported emotional learning. In other words, emotional learning has staying power and the connections across topics helped students

see their world in a new way. The content, and therefore the language, sticks with the students and is more durable. ... It is clear that the trip is very meaningful to all who participated! Thanks!”



Engaged Learning

The Traveling School Western United States Semester April 17-20, 2022

The Traveling School, a place-based semester high school for girls, visited the field station as part of a tour of the American Southwest. As trip leader Meredith Nass tells:

“Our three-night visit to Capitol Reef Field Station was a highlight of our 105-day-long semester. ... We arrived at CRFS from weeks spent in the southeast corner of Utah, speaking to different community members about the impact of climate change and climate-related issues affecting the people and land of the area. Much of these conversations swirled around the topic of water—who owns it, who has rights to it, and the changing landscapes (physically and socially) amongst such severe droughts. One of the highlights of our time at CRFS was the continued conversation about water usage. Michael and the field station brought some of these concepts to life as the students were forced to think about their own water usage and waste creation. ...

“While at CRFS we also utilized the many learning spaces to continue our History, English, and Global Studies curriculums. In English class, the students read and discussed the work of Terry Tempest Williams, a Utah-based writer and long-time climate activist. In Global Studies, we continued our lessons on

environmental justice and the intersections of environmental policy on BIPOC communities such as those whose ancestral lands surround CRFS such as Ute, Paiute, and Navajo. In History, the students discussed the complicated history of national parks and the settler history of the area. Importantly, we utilized the opportunity of Capitol Reef Field Station to bring climate change discussions to life through scientific investigations of the ecosystems in and near CRFS.

“Amongst all of this, the students’ own reflections on ways they can make a difference in regard to conservation and resource preservation was certainly pivotal and continues to influence the students’ choices on this program and we hope will stay with them into their life beyond this program. Michael’s facilitated activities such as birdwatching and stargazing rounded off the experience in supporting the students to be still, listen, and think of the many complicated systems (both scientific and social) beyond themselves. The experience reinforced for the students a better understanding of their own connection to nature and land, and made them think about ways they can live their life in better care and support of the environment.”



Engaged Learning

UVU
Excelerate Field Botany (BOT 2050)
June 12-16, 2022

This summer, as part of the UVU Excelerate program, Dr. Ashley N. Egan taught a section of Field Botany using service-learning and project-based learning. With project-based learning, students work on an assignment throughout the entire semester as the foundational medium for content learning, assessment, and interaction. Their project focused on identifying native plants on the CRFS mesa for which signs will be created, enabling subsequent visitors to learn the common and scientific names and plant family, along with other information, as a public education learning tool. The entire course was taught over five days at the field station via accelerated and experiential learning. Dr. Egan explains:

“CRFS was the perfect place to enable students to immerse themselves in a project that would create a beneficial outcome for other CRFS visitors while promoting content learning, higher-level transitional skills, and teamwork. CRFS provided the outdoor laboratory and plants the students interacted with to learn botanical terminology, plant identification, and botanical field techniques. The facilities at CRFS, especially the classroom with its open space and internet, enabled students to have everything they needed at their fingertips to learn, create, and innovate—all while building friendships, skills, and memories.”

Every waking moment was spent together working on our project, whether that meant roving the mesa to identify plants, studying botanical terms around the dinner table, or brainstorming scenarios for an interactive game about economic uses of native flora. The students came away with deep and abiding friendships forged in intense, immersive-learning experiences that could have only been created at CRFS.”



Engaged Learning

UVU
Flora of Utah (BOT 2100)
June 17-19, 2022



Flora of Utah visited CRFS for the first time. Not only were students exposed to more than 60 plant species (~45 of which are endemic to the Colorado Plateau), they were also able to explore several areas in and around Capitol Reef National Park. They covered a wide range of plant species and plant communities that would not have been possible without the field station. They learned a great deal about science and about each other. As Dr. Mike Rotter explains:

“Students had free time to relax and work at the field station as well as prepare all meals and clean as a group. Even though we only stayed a few days, this arrangement provided a great sense of community with many of the students establishing friendships and getting to know their classmates. In this more casual and relaxed environment, the focus on learning was enhanced as it was seen as a way to learn about not just plants but each other. This to me was one of the best parts of staying at the station. ... The field station provided us with a wide range of opportunities that enhanced this class. I have no doubt that this trip will be a highlight of the students’ careers at UVU. This station is a one-of-a-kind opportunity and I plan on bringing classes here for the foreseeable future.”



ENVIRONMENTAL ETHICS



A visit to the field station has a profound effect on our visitors and their understanding of their relationship with the environment. We actively work to help students better understand their connection to the land and the importance of conservation. Students not only learn new ways to conserve, they also learn how much water they use and how much garbage they produce while at the field station.

This year, 92% of our visitors reported learning new methods to reduce their personal environmental impact in their day-to-day activities. In addition, 97% strongly agreed (88%) or agreed (9%) that their visit to the field station made them more aware of their personal environmental impact (Fig. 7), and 98% strongly agreed (88%) or agreed (10%) that they place more value on protected public lands because of their stay at the field station (Fig. 8).

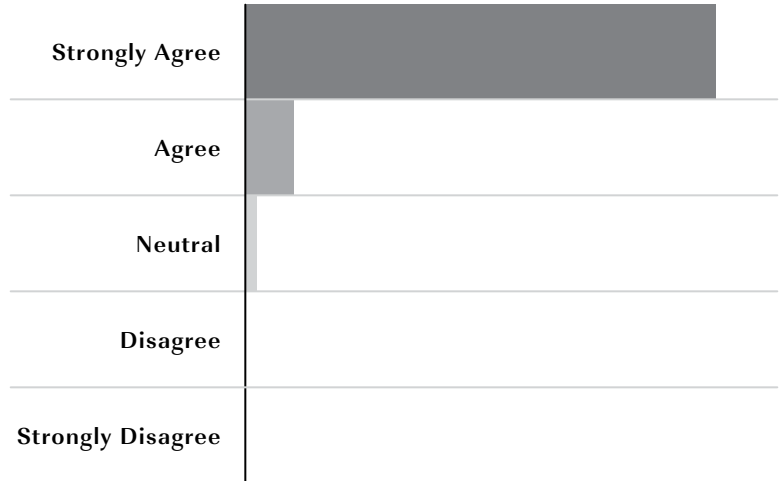


Fig. 7

The majority of our visitors strongly agreed that staying at CRFS made them more aware of their personal environmental impact (n = 411).

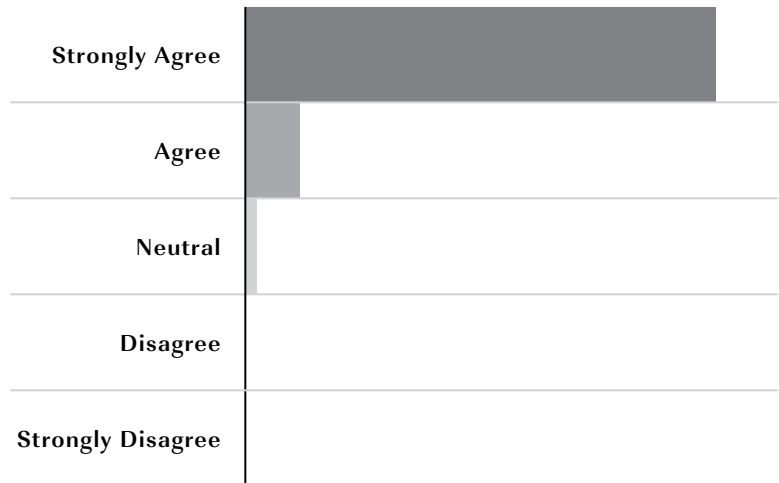


Fig. 8

The majority of our visitors strongly agreed that they place more value on protected public lands, such as Capitol Reef National Park, because of their stay at CRFS (n = 410).

RESEARCH & CREATIVE WORK

The breadth of research and creative work conducted at CRFS this year really highlighted the field station's relevance to a variety of disciplines. We had six research projects focusing on the natural, physical, and social sciences, as well as an interdisciplinary art project.



Monitoring demographic trends in bird populations along Pleasant Creek

Michael Hague (CRFS site manager) received a Quick Grant from the Grants for Engaged Learning program at UVU to start a bird banding station in Pleasant Creek. Michael summarizes the research:

“The Institute for Bird Populations operates Monitoring Avian Productivity and Survivorship (MAPS) banding stations through a continent-wide collaborative effort among public agencies, non-governmental organizations, and individuals. These banding stations allow scientists to examine key demographic trends in bird populations, while also providing opportunities to teach members of the public about avian ecology and conservation efforts.

“CRFS, in the heart of Capitol Reef National Park, is an educational centerpiece for UVU students. It exists, in large part, to promote and support engaged learning and research through the exploration of the Colorado Plateau. Establishing a MAPS banding station along Pleasant Creek has allowed CRFS to integrate hands-on learning into the outreach and education we provide while simultaneously providing Capitol Reef National Park employees and UVU faculty with research opportunities focusing on the neotropical bird migrants that breed in the park.”



Research & Creative Work

Microbes, climate, and invasive plants

UVU Botany major Josh Leon collaborated with Dr. Mike Rotter, Dr. Lauren Brooks, and Trevor Thurgood to work on a project that examined how microbes and an invasive plant species interact in the context of climate change. Josh shared their CRFS-funded work at the Utah Conference on Undergraduate Research. Josh gives an update:

*“The species of interest for our research is the African mustard, *Strigosella africana*. Of the 126 listed invasive species in Capitol Reef National Park, the African mustard is one of 12 species that is actively controlled because of the threat it poses to native communities. First, we collected plant samples for our pilot study, which examined whether increased heat, drought conditions, and/or fertilizer affected plant survivability. We found the increased heat and/or drought caused changes to the African mustard survivability, suggesting that some individuals are able to survive future climate scenarios better than others. After the pilot study, we collected full plant samples in Capitol Reef National Park using sterile techniques and separated them by shoots and roots to have their DNA sequenced. The collected samples are meant to provide a picture of the natural microbiome of the African mustard. Our next steps will use seeds collected from Capitol Reef National Park to be grown in greenhouse conditions and then transferred to growth chambers to model the predicted changes in climate. DNA sequenced from plants that survived these*

trials will then be compared to the natural microbiome to spot any differences in the composition and/or community.”



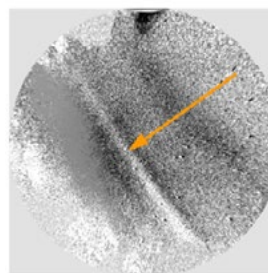
Research & Creative Work

Midlatitude Allsky-imaging Network for GeoSpace Observations (MANGO)

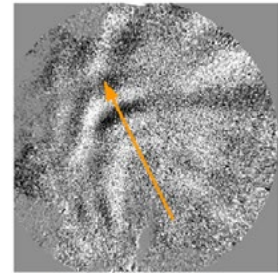
Dr. Asti Bhatt of SRI International, an independent non-profit research institute, uses cameras at CRFS as part of MANGO. CRFS provides an ideal location for imaging because of its location in a national park with little light pollution. Dr. Bhatt provides more information about the research:

“MANGO is a collection of all-sky cameras and Fabry-Perot Interferometers (FPIs) spread across the continental United States with the goal of imaging large-scale airglow and aurora features in multiple wavelengths and measuring neutral winds and temperatures associated with the observed dynamics. MANGO is used to observe the generation, propagation, and dissipation of medium- and large-scale wave activity in the subauroral, mid- and low-latitude thermosphere. The network of seven imagers observing emission from atomic oxygen at 630 nm wavelength (red line) was deployed starting 2014, later funded by National Science Foundation (NSF) Atmospheric and Geospace Sciences award #1452357. This network is currently being augmented through NSF Distributed Array of Small Instruments award #1933013 with a network of atomic oxygen 557.7 nm (green line) imagers in the western United States, along with four FPIs that measure both red- and green-line winds. ... At completion, there will be nine green-line imagers in this network. These imagers form a network providing continuous coverage over the western United States, including California,

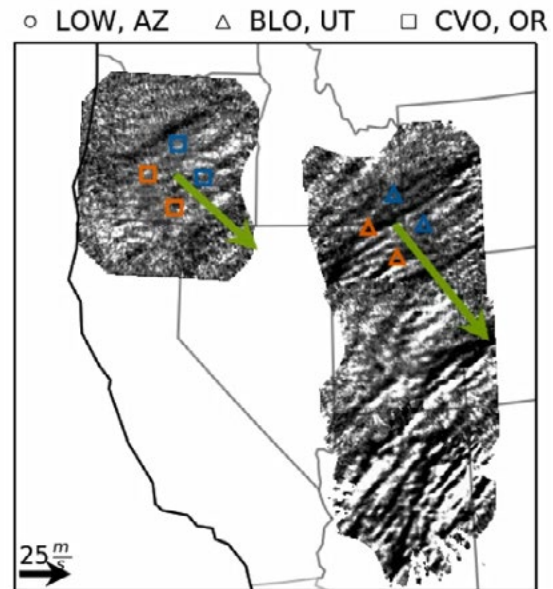
Oregon, Washington, Utah, Arizona, and Texas extending south into Mexico. This network sees high levels of both medium- and large-scale wave activity.”



Utah, May 08, 2016, 042858 UT



Utah, Aug 18, 2014, 034832 UT



Research & Creative Work

Quantifying seasonal and flash flooding in Pleasant Creek

In August 2021, a University of San Diego research team including Dr. Suzanne Walther and two students, Eleanor Lazar and Miranda Skinner, surveyed Pleasant Creek to quantify changes in the creek's channel and surrounding floodplain due to flooding. Dr. Walther elaborates:

“We built on previous work at the same site with UVU students from 2013-2015. Investigating the same channel area over time is an excellent opportunity to identify controls on mobility, volumetric change in the surface, and impacts of floods on the channel. We did so in two ways: 1) by measuring channel shape, flow velocities, and grain size at multiple cross-sections and 2) by capturing imagery using a pole camera and collecting Global Navigation Satellite Systems ground control points. We used these data to create a digital terrain model of the study area for geomorphic change detection (GCD) comparison to data collected in 2013, 2014, and 2015. Over fall and winter, students analyzed grain-size data and cross-sectional changes and, in the spring, they created the terrain models and analyzed changes between years.

“Analysis of the cross sections revealed that the most erosion occurred between 2013-2014, shifting the channel leftward at each site, while GCD analysis found greater aggradation than erosion along the channel between 2014-2015. Over the total 6-year timeframe, there was more aggradation than erosion at the lower site. Finally, we used

rainfall, discharge, slope, channel width, and vegetation cover data to create a flood hazard map for the park. This research may aid in our understanding of the pattern and extent of short-term and long-term geomorphic changes caused by floods in semi-arid landscapes to mitigate and reduce risk. Students presented this work at the American Association of Geographers annual conference in New York and at the University of San Diego Honors Thesis Colloquium in San Diego in 2022.”



Research & Creative Work

Understanding visitors' perceptions of crowding in Capitol Reef National Park

An interdisciplinary team of UVU researchers including Dr. Maria Blevins, Dr. Leandra Hernández, Dr. Hilary Hungerford, Dr. Betsy Lindley, Dr. Meaghan McKasy, Dr. Michael Stevens, and Scott Williams helped to address the park's interest in understanding the perceptions and motivations of visitors to Capitol Reef National Park. In addition to presenting their findings at an international conference, the team is currently working on a manuscript they will submit for publication. They summarize their study:

"We sought to understand visitors' perceptions of crowding in Capitol Reef National Park, in which visitation has doubled over the last decade. Our mixed-methods approach study yielded divergent results. Quantitative assessments showed that visitors did not think the park was crowded; however, qualitative responses highlighted problems with access to affordances—resources that visitors expect—such as parking spots, campsites, and uncongested roads. Our results elucidate two key takeaways: 1) the importance of using both quantitative and qualitative methods to assess crowding, and 2) how the strain on infrastructure impacts perceptions of crowding more than the actual number of visitors. Our findings have implications for land managers in a variety of settings who seek to balance increased visitation and visitors' expectations for amenities with preservation of the natural area itself."



Research & Creative Work

Using art to highlight water consumption in Utah

UVU faculty and students were working on the latest iteration of the Art & Design Fine Art Book Series, called *Utopia | State of Abstraction*, when an idea emerged at CRFS. UVU Associate Professor of Photography Travis Lovell describes the project:

“The prompt given to students for the project was, ‘How do humans interact with their environment?’ During the summer, we spent two weeks working at CRFS with photography, painting, and sculpture students on creating artwork with this idea in mind. While there, the conversation turned, with one of the sculpture students, Kenya Heiner, towards water usage in Utah. After seeing the stats around the field station about water usage coupled with the dryness in Utah, she began to explore how to portray that idea through installation art. We bounced several ideas around and she settled on a vision that used the ubiquitous grass that we find in most Utah yards and then contrasted that with an unmolested vista of the Utah desert. We were going to be unable to create the artwork during our stay at the field station due to our timeframe and the props needed for her artwork.

“Instead, we wrote and received a grant from the CRFS grant program to return and create Kenya’s vision. We came back to the Capitol Reef area in the fall with props that we created or purchased and then also secured some fresh cut sod from a local sod farm. Through

*acquaintances we had made over the years, we secured access to some land around the national park to set up for the envisioned tableaux. We looked at different activities that seem incongruous to the location based on the water demands to keep grass healthy. The scenes created included golfing, swimming, casual lounging, and even spotlighted excess watering. With the aid of Kevin Wellman, one of our photography students, and myself, we documented the installations Kenya envisioned. So far, we have been able to use the photographs in *Utopia | State of Abstraction* and were also able to construct an installation in the Art & Design Gallery on campus as part of the corresponding *Utopia* exhibit. For this installation we placed fresh sod in the gallery on the opening day of the exhibit without ever watering it. If you returned to the gallery over the course of the month you would see the sod slowly dying off from lack of moisture. This was a wonderful collaboration made possible entirely through the CRFS grant program.”*





Research & Creative Work

Educating park visitors about Sleeping Rainbow Ranch

UVU faculty Emily Hedrick of the Digital Media Department and Amber Smith-Johnson from the Department of English and Literature began their project with a desire to educate park visitors about the remains of Sleeping Rainbow Ranch (SRR), which lies just below the field station. In collaboration with the NPS, Capitol Reef National Park, and CRFS staff, and through an NPS grant, they brought Digital Media and English students to the site to capture both the visual aspects of the ranch and the layered history of the Pleasant Creek area. Amber Smith-Johnson shares:

“The students created an interactive pamphlet which showcases images of the ranch taken by UVU students, timelines of the area’s history, and augmented reality (AR) features, which would give SRR site visitors access to further information. Additionally, Emily and I brought vintage Jeeps to the site and affixed them with virtual reality (VR) cameras, capturing the experience of riding a Jeep through the off-road access trails Lurt and Alice Knee may have taken their guests on several decades earlier. We also took walking VR footage of the SRR site, creating an immersive experience that would allow visitors to virtually walk the paths around the site, enter the buildings, and view artifacts in 3-D, augmented, and virtual reality. While there, the students also interviewed local author Chip Ward, who had worked at the SRR in its heyday and written about the area extensively, as well as Capitol Reef National

Park Superintendent Sue Fritzke, to create a mini documentary. These media assets will be made available to Utah K-12 and postsecondary education sites, as well as in the Capitol Reef National Park Visitor Center and anywhere else the park might have use for the media.

“But the project didn’t end there. Taking the ideas from an adjacent project the UVU Digital Media team was testing at the Timpanogos Cave National Monument, the group decided to build a mobile web experience that could be accessed anywhere in the park with solar-powered minicomputers. These tiny computers are essentially the internet in a box, called SPARK beacons, which stands for Spatial Augmented Relay Kits. For the SRR Virtual Tour project, the UVU team designed the experience to take all the assets they have created (VR, AR, text, images, video) and essentially insert a guided field trip, all accessible from any smartphone. SPARK beacons are an unobtrusive way to bring history, interpretation, and images to a site—directly into the hands of the visitors. By scanning the trailhead or site marker code with their phone, they can access a world of information, without needing an internet connection, without the use of cell towers, and without large signage. This also cuts down on our dependence on paper pamphlets and maps, transmitting media directly to the visitor.”





RESEARCH & CREATIVE WORK

BIBLIOGRAPHY

Bhatt A, Makela J, Harding B, Navarro J (2022) Imaging thermospheric wave field and winds with green and red line imagers and FPIs in the MANGO network. Coupling, Energetics and Dynamics of Atmospheric Regions Program (CEDAR), Austin, TX.

Blevins M, Bergstrom M, Parks MM, Hernández L, McDermott V, May A (2022) Cultivating engaged education: using field stations for environmental communication courses and scholarship. Western States Communication Association 92nd Annual Conference, Portland, OR.

Hedrick E, Smith-Johnson A (2022) Virtual field trip of Sleeping Rainbow Ranch in Capitol Reef National Park. <<https://www.nps.gov/articles/000/virtual-field-trip-of-sleeping-rainbow-ranch-in-capitol-reef-national-park.htm>>.

Heiner K (2022) Utopia | State of Abstraction. Utah Valley University, uvu.edu/arts/books.

Leon J*, Rotter MC, Brooks L, Thurgood T (2022) Microbes, climate, and invasive plants: Do specific microbes support plant invasions under modeled climate change conditions? Utah Conference on Undergraduate Research, St. George, UT.

Makela J, Bhatt A, Harding B, Navarro J (2022) Early results from the MANGO distributed array of small instruments (DASI): Winds and waves in the mesosphere-lower thermosphere (MLT). Coupling, Energetics and Dynamics of Atmospheric Regions Program (CEDAR), Austin, TX.

*denotes a UVU undergraduate

OUTREACH & SERVICE



**Nebo School District
Nebo Indian Education Program**
March 3-5, 2022

Relying on the traditional tribal knowledge of some of the attending adults (as well as on Rosemary Sucec's book, *Fulfilling Destinies*), the Nebo Indian Education Program visited the field station in March to study the histories and practices of Indigenous people in the Capitol Reef area. The group's traditional tribal knowledge and expertise come from Paiute, Ute, Navajo, and Shoshone traditions.

Thann Baker, park archeologist and cultural resources program manager, Site Manager Michael Hague, and Assistant Site Manager Ann Ehler led the group on a hike to see the nearby petroglyph panel. On the way, the group stopped in a box canyon where the students shared traditional songs. They also had the opportunity to meet with Central Utah Water Conservancy District employees Shannon Babb and Shakotah Billie at the field station and learn how Utah's water resources have changed through time, and to discuss native fish management. Group leader Natalie Billie sums up their visit:

"The field station was an amazing venue and we really enjoyed our stay. Thank you so much for the opportunity!"



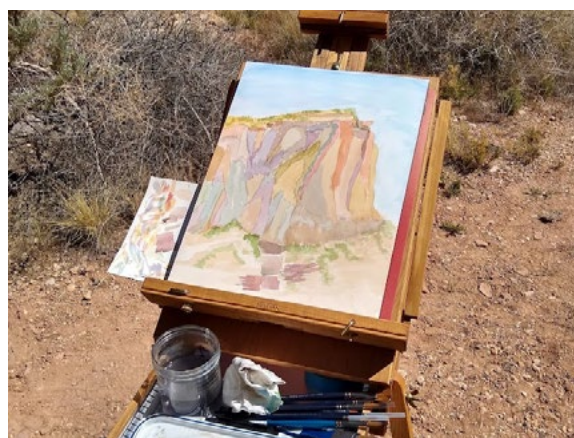
Outreach & Service

UVU Continuing Education Watercolor Weekend April 28-30, 2022

Continuing Education held a Watercolor Weekend at CRFS on April 28-30, 2022. Throughout the three days the group was there, students used the full gamut of amenities CRFS had to offer. The students painted on the deck, on the patios, out in the gravel beyond the classroom building, tucked away by the historic outhouse, and down along Pleasant Creek. The classroom afforded the instructor the opportunity to showcase, via computer access and the dropdown screen, those images he had created to emphasize certain aspects of watercolor techniques.

One evening, the group enjoyed a star-gazing experience led by Site Manager Michael Hague. Assistant Site Manager Ann Ehler took those interested on a hike to the petroglyph panel on Friday evening and highlighted points of interest along the way. Watercolor instructor Tom Howard shares his thoughts about the weekend:

“I love Capitol Reef National Park and the whole country surrounding it. The Waterpocket Fold is amazing to see, especially when one realizes what has gone on there geologically over the seemingly eons of time. The colors and cliffs are an endless source of wonder for me. I don’t think I’ll ever tire of this place. Capitol Reef Field Station is a real revelation on how one can learn to exist sustainably in this harsh high-desert environment, or in any other place for that matter. Would I want to go back? In a New York minute.”



Outreach & Service

UVU Community Health July 28-August 1, 2022

While visiting the field station, a group of public health students, faculty, and staff engaged in several learning and service opportunities in Wayne County. In addition to meeting with Park Superintendent Sue Fritzke, the group toured the Central Utah Health Department in Richfield, learning how public health activities are conducted in rural areas. The group also participated in wilderness survival and environmental health-related discussions, and were trained on how to conduct health assessments. Utilizing these skills and knowledge, the students conducted two health fairs (including health assessments such as blood pressure, glucose, cholesterol, and body composition screenings) in the Wayne County area. One fair was held at the Wayne Community Health Center in Bicknell and the other at the Torrey Farmers' Market. UVU faculty Dr. James Bemel and Dr. Brian Barthel, and Trevor Carter and Kelly Martin from UVU Wellness Programs provided leadership regarding the health fairs and assessments for Wayne County residents. According to Dr. Bemel:

“Capitol Reef Field Station provides an irreplaceable venue allowing students to not only learn about the park and surrounding area but also provide a valuable public health service to the rural population who may not receive such services otherwise. I’m extremely proud of the work our students do while we’re down there and I look forward to coordinating this trip for many years to come!”



INTERNSHIPS

All three of our interns received the Cordell Roy Scholarship this year, which covers their summer tuition for internship credit. The scholarship honors Cordell Roy, a long-time employee of the NPS. It is funded by a generous private endowment from G. Kevin Jones, who was an attorney in the Office of the Solicitor, U.S. Department of Interior, representing the Utah units of the NPS. Cordell Roy also contributed to the endowment.



Cultural Resources Intern

Austen Miller, a double major in botany and integrative studies (history and Spanish), was only the second cultural resources intern at Capitol Reef National Park! Austen worked extensively with the park archeologist on cultural resource documentation and management. He was immersed in both fieldwork and archival work, going to remote archeology sites to corroborate written records, while also helping to complete the park's annual inventory for the Western Archeological Association, which gave him a better understanding of what archeology and land management are like in practice. He also spent time in the Visitor Center helping staff the information desk, which

allowed him to reflect on the importance of the NPS and the inspiration it affords to young visitors. He even volunteered to help with the CRFS Pleasant Creek bird banding station and participated in the park's search and rescue efforts during a major flash flooding event in June. Reflecting on his time in Capitol Reef, Austin said:

"I remember being a child in national parks and feeling that awe. That is the de facto day-to-day function of the parks. Creating people who will support the preservation of nature and history, not just because they feel morally obligated to, but because they feel a connection."



Interpretation Intern

Laine Smith, a biology major at UVU, worked with the interpretation division of Capitol Reef National Park. She spent a lot of time in the Visitor Center, working side-by-side with interpretation staff, answering visitors' questions to help guide their park experience. While working at the Visitor Center, she was able to find friendship and mentorship in her coworkers, hone her interest in working for the NPS, and reaffirm her intention to finish her degree. She also created an evening program on ethnobotany, using her background in plants, as well as the park's extensive library, to guide her. Once the structure of her presentation was complete, she

leaned into her background in musical live performance and youth outdoor education to engage the crowd, providing a fun flourish of information during her program. When asked about working at the Visitor Center, Laine said:

“Meeting new people every day at the information desk, swearing in excited new Junior Rangers, hiking alone and pushing myself out of my comfort zone, and getting to spend so much time researching subjects of particular interest to me, all contributed to my growth this summer, but mostly, it was just so much fun. How lucky am I?”



Natural Resources Intern

Joe Fife, a botany major at UVU, worked with the park biologist and ecologist as the natural resources intern. Joe did fieldwork throughout the national park, conducting surveys on a variety of species, including rare cacti, large mammals, breeding birds, and fishes. The first two weeks of Joe's internship were dedicated to intensive cactus surveys, focusing on two endemic species found only in the state of Utah, *Pediocactus winkleri* and *Sclerocactus wrightiae*. Cactus monitoring efforts have taken place for the last eight years, and help ensure population viability through informed management practices. Joe also used motion-sensor cameras and audio recorders for wildlife monitoring, conducting surveys on some of the park's more elusive species: desert bighorn sheep and Mexican spotted owls. He even got to conduct fish surveys in the Fremont River, catching multiple species including the flannelmouth sucker (*Catostomus latipinnis*).

One valuable aspect to Joe's experience as the natural resources intern was the time he spent with professionals who were more advanced in their careers. Conversations with these professionals helped Joe to clarify what the future holds for him after graduating. When asked about a memorable experience from his internship, Joe said:

"I learned to push through limits I didn't even know I had, and to persevere. One time, I dealt with some heat exhaustion and had to push deep to climb this cliff that stood between me and the car. While being uncomfortable is something many of us try to avoid, I realized through these projects that I need to be uncomfortable to feel fulfilled. Those were simultaneously the worst and best days of the entire summer. I was gassed at the end of the day, but seeing the beautiful terrain, accomplishing goals, and expanding my backcountry skills were well worth that intensity."



SCHOLAR-IN-RESIDENCE



The summer of 2021 brought the first scholar-in-residence to CRFS. Associate Professor of Communication **Dr. Maria Blevins** came to the field station for three weeks to work on her book, *All Forward: Sexual Harassment in the Whitewater Rafting Industry*. In her time at the field station, she was able to write, think, and go on long walks. She also had the opportunity to present her research to employees at Capitol Reef National Park and to interact with students and groups that overlapped with her. Hopefully Dr. Blevins is the first of many scholars, scientists, and artists that will be able to complete a residency at the field station.



FINANCIAL REPORT

This year, the operating funds at CRFS came from three sources:

- 1) institutional support from UVU (\$224,841.56),
- 2) private donations (\$40,881.98), and
- 3) funds generated by user fees and product sales (\$22,671.25) (Fig. 9).

This funding supported: the salaries and benefits of the staff (\$220,189.56), student internships (\$19,062.26), operations and maintenance (\$14,010.94), marketing and outreach (\$10,038.04), and research and creative work (\$2,606.37) (Fig. 10).

While UVU generously supports the station, CRFS relies on private donations to pay for new building projects and important programs such as student internships and research and creative work. This year, we're seeking donations for an education-focused observatory and housing for a scientist-in-residence or artist-in-residence.

If you value our mission, please make a donation at: www.uvu.edu/crfs/support.html.
Contact Dan Dimond at: ddimond@uvu.edu or (801) 863-5112 with questions about donating.

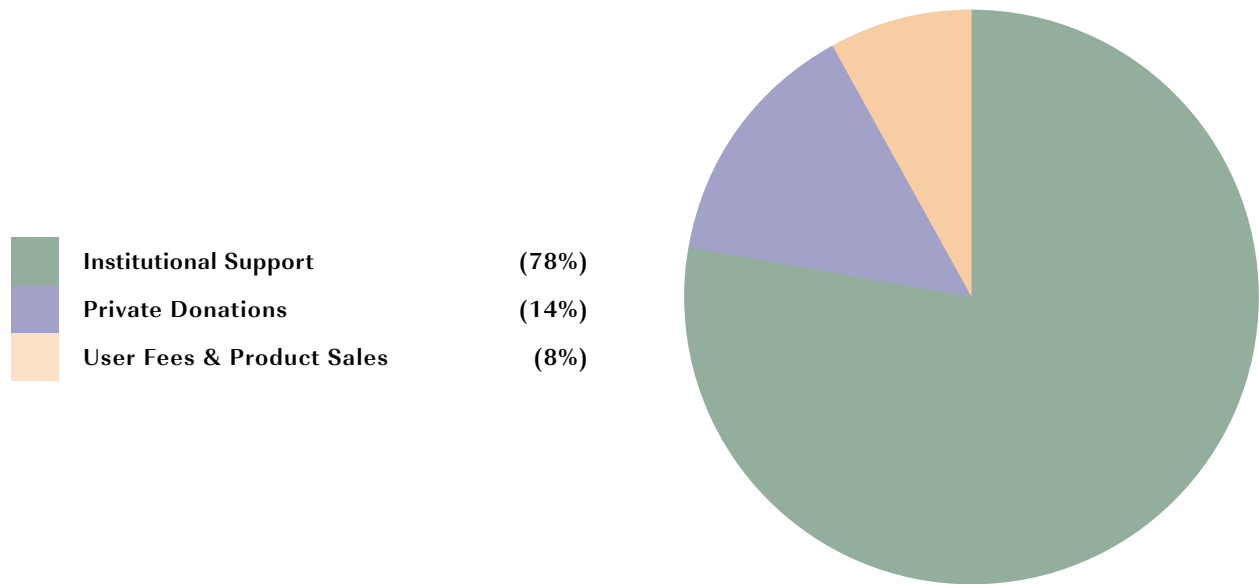


Fig. 9 CRFS funding by source.

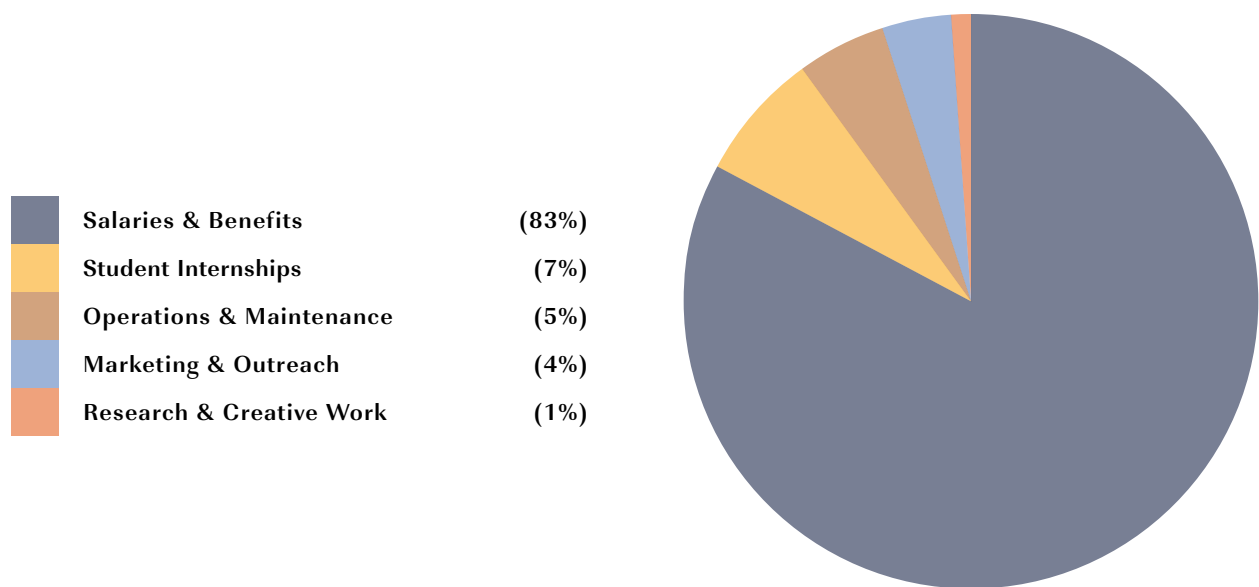


Fig. 10 CRFS expenditures by category.

STRATEGIC PLAN



In spite of the ongoing pandemic, our visitation was close to an all-time high. We hosted visitors from six of UVU's eight colleges and numerous other UVU entities, as well as groups from across Utah and outside the state. To increase online engagement, CRFS staff and advisory board members finished an in-depth Canvas course with a wealth of resources about the field station, Capitol Reef National Park, and the Colorado Plateau. The course, entitled *Capitol Reef Connections*, was published to Canvas Commons and is available to anyone in the Utah Education Network (UEN).

1.
Promote CRFS as a place for engaged learning utilized by a variety of disciplines and multiple institutions.

Conservation is an important part of our ethos that we share with all of our visitors. Ninety-seven percent of our surveyed visitors strongly agreed or agreed that their visit to the field station made them more aware of their personal environmental impact, and 92% of them reported learning new methods to help them reduce their environmental impact after they return home from the field station. Additionally, 98% strongly agreed or agreed that they place more value on protected public lands, such as Capitol Reef National Park, because of their visit to the field station.

2.
Develop environmental awareness and engage visitors in sustainable practices to be applied at home.

Dr. Maria Blevins was our first scholar-in-residence this year and spent three weeks at the field station working on her book and interacting with CRFS visitors. We plan to continue this program with additional scholars-in-residence in the future. CRFS supported researchers in the natural, physical, and social sciences, as well as an interdisciplinary team of artists. Details about these projects are provided in our Research and Creative Work section.

3.
Foster research and creative work that utilize CRFS as a venue from which to explore the Colorado Plateau.

Strategic Plan

4.

Continue to collaborate with our NPS field-station partners and build relationships with other relevant organizations.

In collaboration with Chief of Resource Management and Science Dr. Jim Roche, CRFS staff and our advisory board members developed an *Online Workshop About CRFS* for UVU faculty and staff to learn how instructors from a variety of disciplines utilize the field station and its location inside Capitol Reef National Park for place-based learning. Additionally, CRFS hosted an event at the field station that was attended by both UVU and park employees to celebrate Joe Ceradini's tenure as CRFS site manager and his transition to his new job as park ecologist. The event included an interpretative program given by Assistant Site Manager Ann Ehler about surveyors in the region including Elliot Bird who wrote his name on a large boulder near Pleasant Creek 100 years ago. To connect with the international field-station community, CRFS Director Dr. Michael Stevens attended an online Organization of Biological Field Stations conference to learn from and interact with other field station directors, managers, and scholars.

5.

Ensure that CRFS facilities, staffing, and services meet visitor needs.

This year, 406 of 410 (99%) of surveyed visitors strongly agreed or agreed that our orientation was helpful and informative. Similarly, 411 out of 412 (~100%) of survey respondents strongly agreed or agreed that field station staff were competent, helpful, and professional.



SUPPORT CRFS



Capitol Reef Field Station makes a difference—so can you!

Please visit www.uvu.edu/crfs/support.html to contribute. Donations are tax-deductible to the extent allowed by law, and we will honor your contribution by listing your name in our annual report. Contact Dan Dimond at ddimond@uvu.edu or (801) 863-5112 with questions about making a donation.

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2021-2022

ANNUAL REPORT

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