

# 2015-2016 ANNUAL REPORT

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CAPITOL  
REEF  
FIELD  
STATION



UTAH VALLEY UNIVERSITY



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## STAFF

**Michael T. Stevens, Ph.D.**  
*Director*  
 Associate Professor of Biology

**Keith White**  
*Associate Director*  
 Associate Professor of Developmental Mathematics

**Gina Gilson**  
*Site Manager*

**Annette Harrington**  
*Administrative Support & Assistant Site Manager*

**Lesa Dean**  
*Custodial & Maintenance Support*

## CRFS ADVISORY BOARD 2015-16

Advisory Board Members are Utah Valley University (UVU) faculty and staff who serve for ~3 years on a rotating schedule.

**Maria Blevins, Ph.D.**  
 Assistant Professor of Communication

**Daniel Horns, Ph.D.**  
 Associate Dean, College of Science & Health

**Travis Lovell**  
 Assistant Professor of Art & Design

**Mary Sowder, Ph.D.**  
 Associate Professor of Education

**Kevin Eyraud**  
 Associate Professor of English Language Learning

**Betsy Lindley, Ph.D.**  
 Associate Professor of Exercise Science & Outdoor Recreation

**Linda Shelton**  
 Instructor of English & Literature

**Paul Weber, Ph.D.**  
 Assistant Professor of Physics

This year we received a grant from the National Science Foundation to develop a strategic plan for our station. As part of the grant we have been studying our cohort of university-operated field stations located in U.S. national parks. We discovered that there are only eight such field stations in the United States. We conducted a survey of these stations to determine the opportunities and challenges of a university-national park field-station partnership and to study how these field stations help both their university and national park fulfill their missions. The results of our study have been published in *BioScience* and a photograph of the station that our site manager, Gina Gilson, took was selected for the cover of the journal. This winter, Gina visited the Desert Studies Center located in the Mojave National Preserve and I visited the Santa Rosa Island Research Station located in the Channel Islands National Park. These site visits and our survey data will help inform our strategic plan. As part of our planning, we have determined that a new classroom/laboratory building would benefit our visitors and help them better meet their goals associated with engaged learning, scholarly activities, and environmental ethics. Stay tuned for future details and please read about the things we've already accomplished this fiscal year.

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





# ABOUT CRFS

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## OUR MISSION

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Capitol Reef Field Station (CRFS), in partnership with Capitol Reef National Park, promotes and supports engaged learning, research, scholarly, and creative activities, and environmental ethics through the exploration of the Colorado Plateau.

## OUR PLACE

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Beyond the paved roads, 2.5 miles past the end of the aptly named Scenic Drive, our buildings sit atop a mesa in the heart of Capitol Reef National Park. Amidst unobstructed views of postcard-perfect scenery, one can hear the calming sounds of Pleasant Creek as they loft over historic pastures. The sun rises over the last mountain range in the continental United States to be mapped, the Henry Mountains, framed by towering sandstone cliffs. To the west lies Boulder Mountain, which supported small glaciers during the last ice age. Looking up, casual stargazers and serious astronomers alike appreciate the amazing night sky, which recently received a Gold-Tier International Dark Sky designation. Only 3.5 hours from UVU and the Wasatch Front, our incredible location provides an unparalleled opportunity for place-based learning. CRFS welcomes students and faculty from all institutions of higher learning who seek to experience the natural and cultural legacies of the Colorado Plateau.

## OUR VISION

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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 that focus on 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 area's biological diversity and rich cultural history.

## OUR HISTORY

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From CRFS, visitors can see hundreds of millions of years into the past. The rocky landscapes tell stories of shallow seas, tidal flats, swamps, and sand deserts. Pleasant Creek has carved its way through the canyon walls to create the oasis that has attracted life for millennia including Paleo-Indian, Desert Archaic, Fremont, and Numic-speaking (Ute and Paiute) people.

More recently, Mormon pioneers began to set the scene that we see today. In 1882, Ephraim Hanks established his ranch in Pleasant Creek Valley, building the first permanent home in what would become Capitol Reef National Park. This same ranch changed hands many times over the years, and had been converted into a tourist destination called Sleeping Rainbow Ranch when the national park was created in 1971. The ranch's owner, Lurt Knee, deeded the ranch to the national park in a transaction that included life tenancy. The land was handed over to the park in 1995. A few years passed before UVU approached the park with the idea of converting the unoccupied site into a field station. It was agreed that a field station would support the mission of each organization, and after years of close collaboration on the project, the idea became a reality. CRFS opened its doors in October of 2008.

## OUR PARTNERSHIP

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The success of our mission is made possible through the partnership between UVU and Capitol Reef National Park. This unique 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 and is operated under the direction of UVU and the park in accordance with our General Agreement.



# VISITATION SUMMARY

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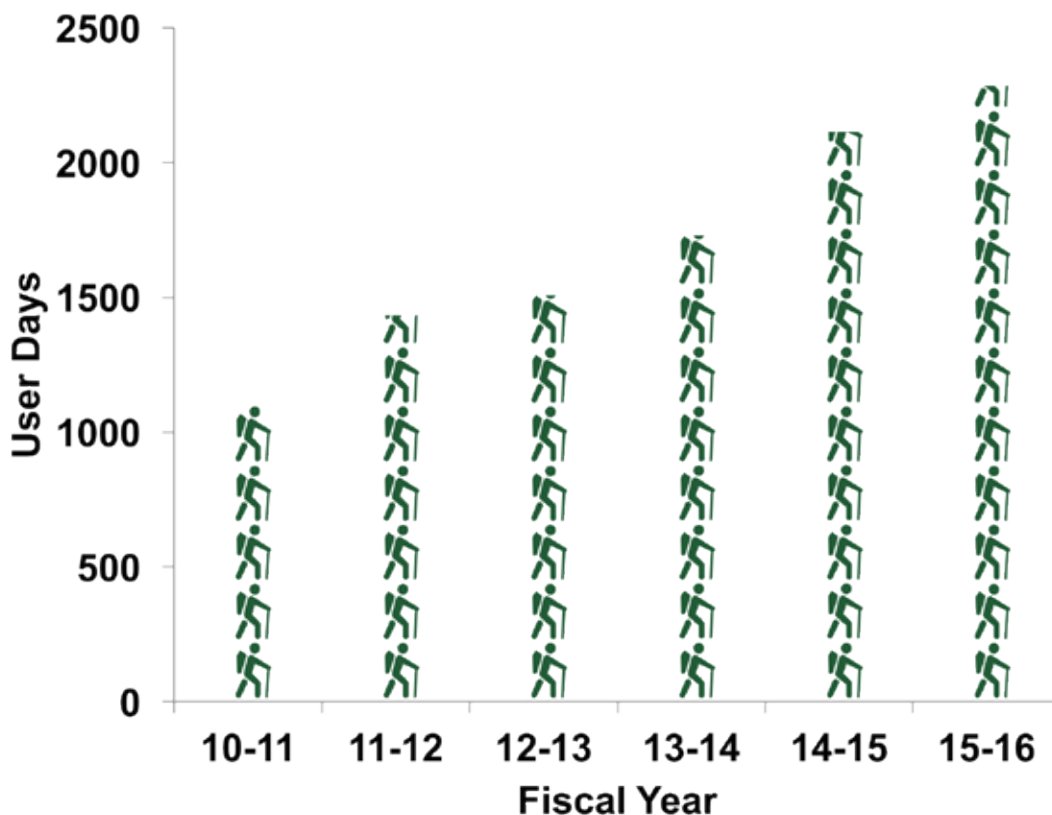
Visitation to CRFS has steadily increased since opening in 2008, and this year was no exception. User days, calculated by multiplying the number of visitors by the number of calendar days they spent at the station, totaled 2,280 (Fig. 1). This represents an 8% increase over the previous fiscal year. Our current use is three times greater than our first complete fiscal year with visitors (2009-10). We credit this substantial increase to our ongoing marketing efforts as well as our new approach to reviewing and scheduling reservation requests.

Three-quarters of visitors to CRFS were associated with UVU this year. The University of Kansas was another major source of visitation (Fig. 2).

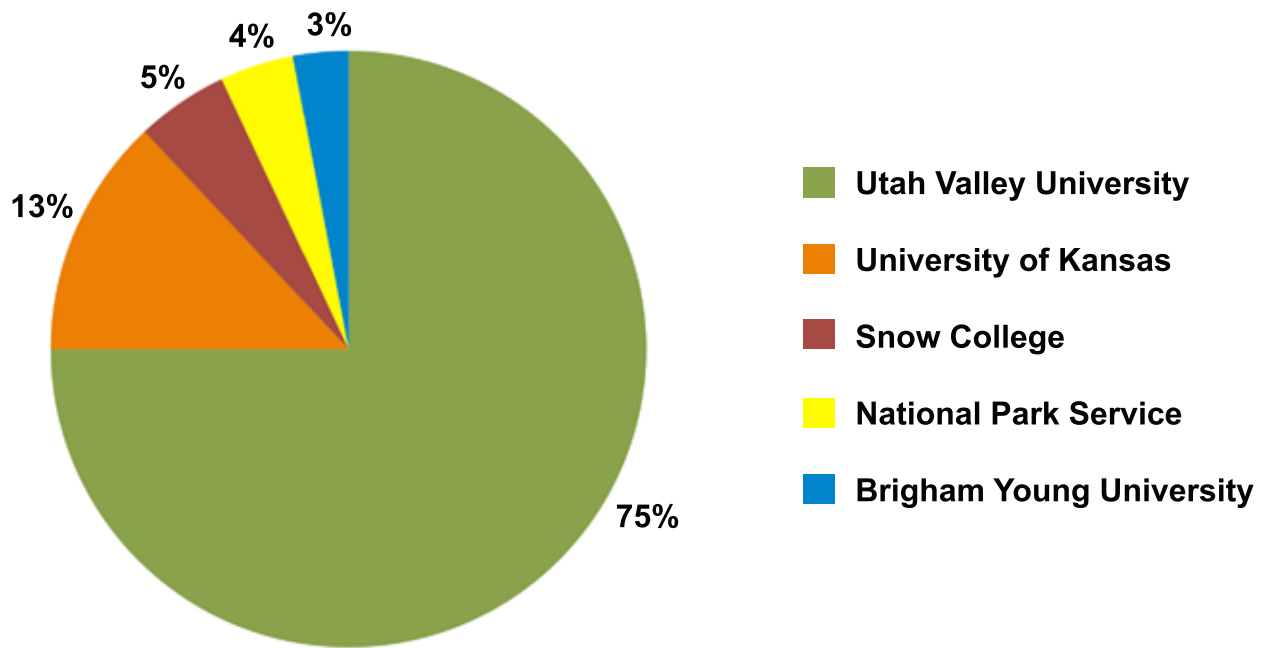
Visitors from UVU represented a variety of colleges, programs, or schools (Fig. 3). Our top three sources of visitation were the College of Humanities & Social Sciences, the College of Science & Health, and the School of the Arts. Our interdisciplinary relevance is shown by the ten different colleges, programs, or schools that we served this year.

This is the first year we had groups from the College of Technology & Computing. We are excited to expand our use by multiple disciplines within this college. The wide variety of user groups included student-initiated assessments, capstone projects, and a digital media course with foreign exchange students from across the world. One group performed an assessment of our facilities and plans on creating a way for us to show our energy use data on our website for all to be able to see and monitor. Another group of students created virtual tours of our facilities allowing us to better market and show off our beautiful location and facilities to those who have never visited. We look forward to future student projects from the College of Technology & Computing over the years.

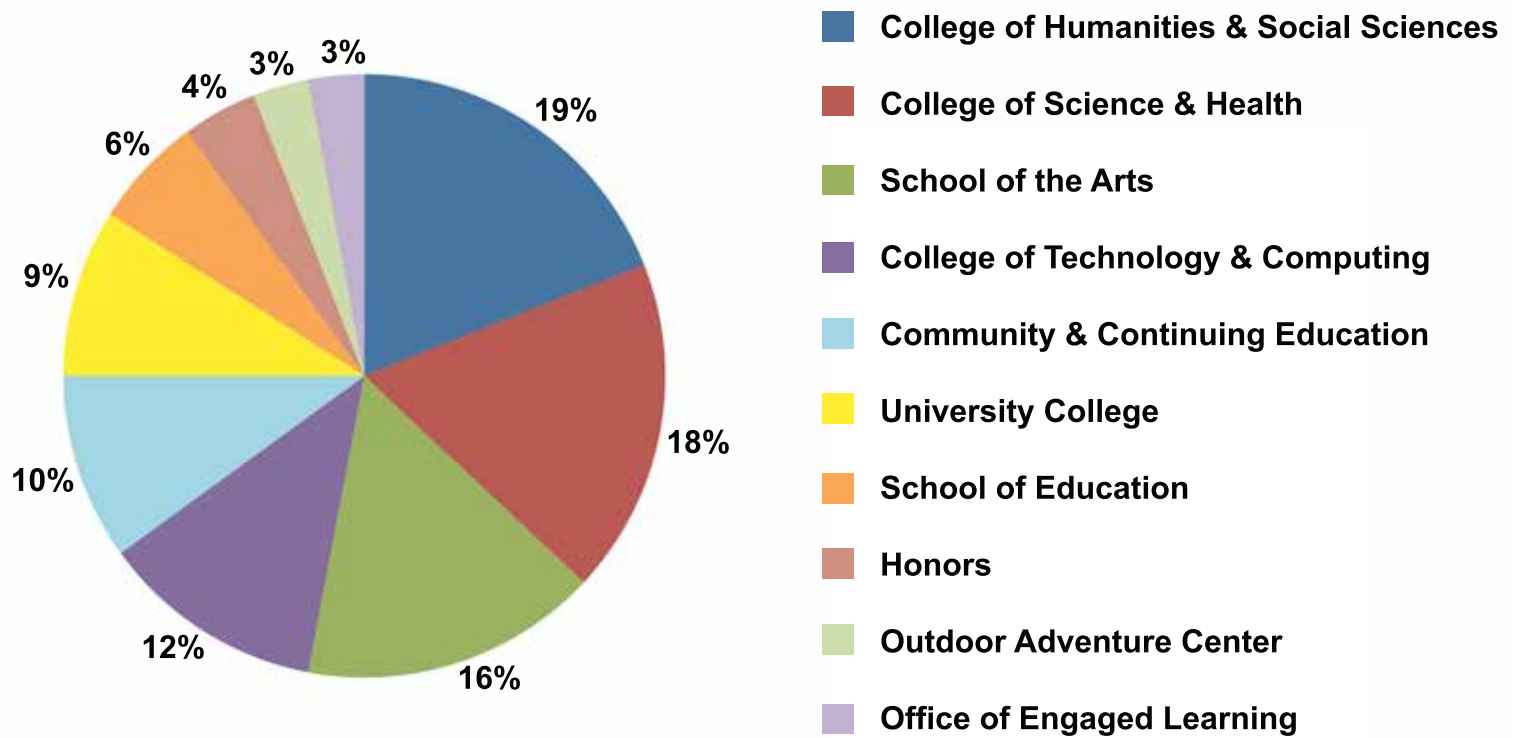
During the 2015-16 fiscal year, 625 people (including 471 undergraduates) visited CRFS in 46 groups. The average group size was 14 and the average stay per group was 4 days. In terms of gender, 56% of our visitors were female and 44% were male.



**FIG. 1** User days at CRFS have steadily increased over time. Visitation for 2015-16 increased by 8% compared to the previous fiscal year.



**FIG. 2** Percentages of CRFS user days from various institutions and organizations.



**FIG. 3** Percentages of CRFS user days from colleges, schools, or programs associated with UVU.



### UVU CLASSES WHO VISITED CRFS

DEPARTMENT	COURSE	TITLE
Art & Design	ART 371R, ART 471R ART 300R	Historic Processes & Photographic Illustration Special Topics in Landscape Photography
Biology	BOT 4300 BOT 3700/ 3705	Native Trees & Shrubs of Utah Plant Ecology
Communication	COMM 350R	Communicating Environments
Digital Media	DGM 3540 DGM 3320	Cinematography II Digital Photography and Compositing
English & Literature	ENGL 2050, 3050 ENG 2010, 3020 ENGL 3070, 3460, 4450	Editor's Workshop Intermediate Writing & Modern English Grammars Environmental Stewardship
English Language Learning	ESL 2110, 2120, 2130, 2140 ESL 2120, 2130, 2140	Fall ESL Program IV Spring ESL Program IV
Exercise Science & Outdoor Recreation	REC 4400	Natural Resource Management
Honors	HONR 100R	Honors Colloquium
Physics	PHYS 1800	Energy You and the Environment
Political Science & History	POLS 1000	American Heritage
School of Education	EDUC 5750	Provo STEM Endorsement
Technology Management	TECH 200G	Technology & Human Life

### UVU RESEARCH GROUPS WHO VISITED CRFS

PROJECT	PRINCIPAL INVESTIGATOR
High Altitude Research	Kim Nielsen

### UVU AFFILIATED GROUPS WHO VISITED CRFS

SPONSORING ORGANIZATION	GROUP
Accessibility Services	Accessibility Services
Art & Design	Photography
Capitol Reef Field Station	Open House Digital Media
College of Science & Health	Botany Club Nature to the Classroom
Community & Continuing Education	Astronomy Plein Air Photography Astronomy
Office of Engaged Learning	AJC Architects
Outdoor Adventure Center	Wilderness First Aid

### CLASSES FROM OTHER UNIVERSITIES WHO VISITED CRFS

UNIVERSITY	DEPARTMENT	CLASS
Brigham Young University	English and Biology	Integrated Natural History
Snow College	Physics Geology	Honors Astronomy Honors Geology
University of Kansas	Geology	Field Geology

### OTHER GROUPS WHO VISITED CRFS

HOST	EVENT
Snow College & SENA Colombia	Center for Global Engagement
Capitol Reef National Park	Wayne High School Outreach



# ENGAGED LEARNING

Spend a little time on UVU's campus, and you will undoubtedly hear the phrase "engaged learning." It's a core theme of the university and a defining characteristic of the UVU student experience. A key goal of engaged learning is to apply learning in authentic contexts, to take learning out of a passive textbook, and make it active.

The field station is an unparalleled location for engaged learning. While at the field station, students are immersed in the Colorado Plateau and its study. Of note, engaged learning at the field station involves a wide variety of disciplines. Please read about some of our visitors this past year.

## HISTORIC PROCESSES & PHOTOGRAPHY, UVU, July 13-25, 2015

Please read the following summary written by Travis Lovell:

*"Travis Lovell and John Rees from the Art & Design department took their two classes, ART 371R and ART 471R, to the field station for two weeks. While there they partnered with Leah McGinnis, who is the superintendent of Capitol Reef National Park, and Sami Prestwich, who is a UVU graphic design student, to create a small booklet about the orchards in Fruita. It was a great chance for students to get a truly engaged experience working for a client and also answering to a designer giving art direction to create photographic imagery based on the specific needs of a project. The booklet was created as part of Capitol Reef National Park's effort to celebrate the centennial of the National Park Service. The booklets are now available in the visitor center. You may also notice new signs at the entrance to each orchard that were part of the rebranding effort."*

*"Students also created photographs that could be used by the park in educational and promotional material showing people experiencing the wonders of the park. Students donated their images to the park and they are now being used in social media and in print to celebrate what makes Capitol Reef such a treasure. We also spent time looking back at photographic history and learning photographic and printing processes that would have been used when the town of Fruita was an active farming community. Students made tintypes and made cyanotypes, salt prints, kallitypes, albumen prints, and palladium prints. They truly immersed themselves in the history of the area and the people who have lived here."*

## AMERICAN HERITAGE, UVU, October 28-31, 2015

Dr. Andrew Bibby brought American Heritage students to the field station in the station's first ever visit from a political science class. POLS 1000 students followed an ambitious schedule at CRFS, including a discussion of "gateway communities" and group hikes to Cassidy Arch, Hickman Bridge, and the Goosenecks. Dr. Bibby relates:

*"The national parks play an important story in American history – in the 'American Heritage.' Students were encouraged to think 'outside the textbook' and to relate their trip to CRFS directly to their course readings. Drawing from*



LITERATURE OF THE OUTDOORS



TECHNOLOGY AND HUMAN LIFE

*Eric Foner’s ‘Give Me Liberty,’ students were encouraged to think about and draw connections to ‘The First Americans’ differing views of land and property in American history; the 1800s and the settlement of the West; continental expansion and the transformation of the ‘Old West;’ and ‘The Progressive Era,’ including the role of the progressive presidents in transforming the West, the conservation movement, and the expanding role of government.*

*“Students also had the unique opportunity to meet and learn about local history from the Williams family, Torrey residents and longtime ranchers. Throughout the trip, students also benefited from group tours led by CRFS’s Gina Gilson, and a special volunteer tour of the Gifford Homestead and the Fruita Rural Historical District.”*

**LITERATURE OF THE OUTDOORS,  
SNOW COLLEGE,  
February 12-13, 2016**

English Brooks from Snow College spent two days with his students at the field station. He summarizes the trip:

*“This Snow College group consisted of 18 students from my Literature of the Outdoors class, and for all of them this was their first visit to the field station, though many of them had previously visited the park, and some even grew up in Wayne County. All of them were very impressed with the station and the park, both the*

*location of station, and the facilities, as well as the library, the dark skies, the overall mission and purpose of the facility, and so on.*

*“In the class, we had just recently finished reading Henry David Thoreau’s Walden, and were just at the point of beginning Edward Abbey’s Desert Solitaire, and students recognized and discussed the relevance of these texts to the field station experience (remoteness, landscape, seclusion, heightened awareness of resource use, close interaction and careful attention to the more-than-human world, etc.). Site manager Gina Gilson provided an excellent orientation, facilities tour, night sky viewing, and guided hike. And we were then able to work with park volunteer staff on refinishing and painting signage for the park’s orchards, as well as several bat houses to provide improved habitat for the several species of bats in the park. Park volunteers also gave us an overview of the decline of bat and other pollinator populations (within the park and otherwise), and the critical need for these bat houses in the park. Following this, we were able to conclude our time in the park with a hike up to the overlook above Hickman Bridge, which was a spectacular way to see so much of the park from above, and get a better sense of the larger geography and scale of the places we had been during our time there.”*

**TECHNOLOGY AND HUMAN LIFE,  
UVU, February 19-21, 2016**

Dr. Anne Arendt from the Technology Management department brought two groups of students to the field station in February. She describes the trips as follows:

*“UVU’s Technology Management department brought students from a Technology and Human Life (TECH 2000) course to Capitol Reef Field Station in February of 2016. They were accompanied by five faculty from three disciplines. During their*



DIGITAL MEDIA

# ENGAGED LEARNING

*two-day visit, the students worked with faculty to consider six primary areas of Leadership in Energy & Environmental Design (LEED) building construction practices: a) sustainable sites, b) water efficiency, c) indoor environmental quality, d) materials and resources, e) energy and atmosphere, and f) innovation. After touring the facility, students discussed each assessment category by answering questions that related to ways in which CRFS seems to implement technologies or practices, recommendations they would make, and questions they have. At this point, CRFS facilitator, Gina Gilson, would answer their questions. Next, they addressed what has been and could be implemented into the larger community (from local to global). This was followed by discussing why some actions are not being taken, along with ethical, legal, and social considerations. Having these discussions take place in a location as immersed in best practices and in such a geographically-significant area played a significant role in student perspectives, engagement, and learning outcomes. Being able to have students take walking tours, view the dark sky through telescopes, and have similar activities, magnified the educational experience and immersion.*

*“During the second day, Technology Management also had a group of six students visit CRFS for their senior capstone class (TECH 4910) along with two additional students from TECH 3000. The goal of this group for the term is to complete a technology needs assessment and analysis for CRFS to include, at a minimum: a) needs assessment, b) fit gap analysis, c) recommendations, d) specifications, and e) implementation proposal. Then, next term, we will have our first cross-departmental capstone project in which one of the CRFS technology recommendations are designed and implemented cooperatively between Technology Management and Computer Science. It is our hope to continue our relationship with CRFS long into the future.”*

## DIGITAL MEDIA CAPSTONE, UVU, March 18-19 and May 13-14, 2016

CRFS is very excited to work with Digital Media Capstone students on their senior project. Please read project manager Katelyn Earl’s description of the project and their trips:

*“As students in the Digital Media Department at UVU, we are working with Capitol Reef Field Station to complete our senior project. As part of this project, we have been developing virtual tours that will be hosted on the school’s website and be used to promote the facility, as well as give visitors an idea of what to expect when they visit the UVU Capitol Reef Field Station. We will also begin to design and develop an app that gives visitors the opportunity to research/plan their engaged learning activities, monitor their water usage while visiting, assist in learning about different terms and features of the facility, give directions to the property as well as give them information such as fuel and maintenance sites along the way, all to make their trip more enjoyable and efficient. This app will be added to and improved over the course of multiple semesters, but the information described is the basis for our portion of the project.*

*“Our team first traveled to Capitol Reef from March 18-19, 2016. This trip was intended to research the facility, get a better idea of the space we would be documenting, and understand the typical experience of educational groups. During*



*this trip, we decided to begin taking pictures for the tour, determine how we organized everything, and make initial tours for the CRFS team to critique and make further requests as to what they wanted to see. After this trip, we were able to develop a majority of the tours for the Chinle, Moenkopi, and Kayenta buildings, with a few minor adjustments, but decided that the outdoor areas needed to be photographed a second time when the greenery was at its best.*

*“We traveled to the property a second time May 13-14, where we made minor adjustments to the indoor tours, retook pictures that will be included in the informational pages that pop-up from the tours, and reshot outdoor areas of the field station. We also planned and stopped at various points of interest, hikes, etc., to take pictures and research the locations we would like to highlight in our app. We were able to visit a majority of said locations, with the exception of a few locations and hikes that will be visited at a later date.”*

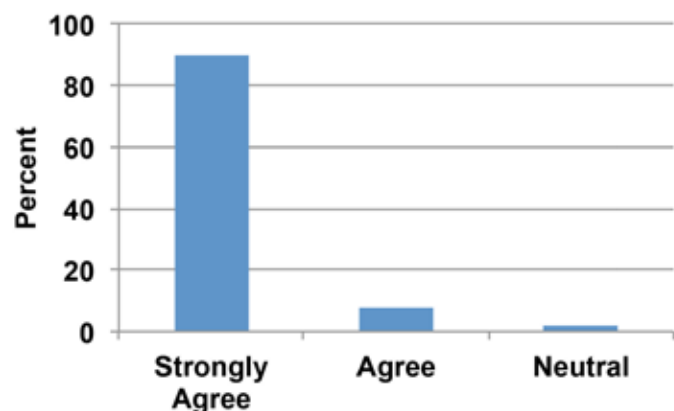
## **INTEGRATED NATURAL HISTORY, BRIGHAM YOUNG UNIVERSITY, May 7-10, 2016**

Dr. John Bennion from Brigham Young University brought a group of students to the field station as part of an Integrated Natural History of Utah course. The field station provided an excellent location for field activities coupled with research and writing.

He describes:

*“Our program studies the intersection of human and natural history. We also study writing and recreation management. So for our integrated program, the field station is ideal for sustainability education, study of geology, study of the intersection of human and animal presence on the landscape. The station gave us easy access to Capitol Reef and to a place where we could read, discuss, and write out of the weather. We appreciate greatly the opportunity to use your facility.”*

Not only did the groups highlighted here have a great experience, but so did the many others who visited. In fact, 90% strongly agree and 8% agree that they’d encourage other students to study/learn at the field station (Fig. 4).



**FIG. 4** Ninety-eight percent of our visitors strongly agree or agree that they “would encourage other students who have the opportunity to study/learn at the field station” (n = 341).



# RESEARCH

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This has been an exciting year for research at CRFS. Ongoing research efforts at the station have resulted in our first two peer-reviewed publications. The first, Covert et al. 2015, involved UVU alumna Megan Covert and biology professors Dr. Emily Holt and Dr. Renée Van Buren. Their study examined four plant communities found near the station and assessed the influence of humans and other environmental factors on patterns of vegetation in the area. The next paper, Stevens and Gilson 2016, was authored by the director and site manager of CRFS. Their study examined field-station partnerships between universities and national parks, such as between UVU and Capitol Reef National Park. There are only seven other university-operated field stations located in U.S. national parks. Additional research at the station included Drs. Asti Bhatt and Elizabeth Kendall of SRI International and Dr. Kim Nielsen of UVU's Physics Department, who are all studying the ionosphere. Dr. Kim Nielsen's research resulted in four scientific presentations that involved a total of eleven UVU undergraduates.

## PLANT COMMUNITY ANALYSIS

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Megan Covert reports, *"In the summer of 2011, Nick Alvarado and Jen Summers, under the guidance of Dr. Renée Van Buren, established permanent transects in four vegetative community types (pinyon-juniper, sagebrush, riparian, and grassland) that occur within close proximity to CRFS. To better understand if field station activities were having a noticeable impact on the surrounding vegetation, each vegetative community had two transects located at a 'near' and 'far' distance to CRFS. Under the guidance of Dr. Emily Holt, we analyzed data from 2011 and 2012 using Excel and PC-ORD 6. To better understand what was influencing the community structure of our study area (the area around CRFS), we analyzed the relationship of the community*

*structure to factors such as cover type, soil texture, soil chemistry, and the proportion of annual/introduced species. Some factors we found that seemed to be influencing community structure were annual species frequency, soil nutrients, and soil texture. To see if proximity to CRFS was having an effect on closer vegetative communities, we compared community structure and the above mentioned factors between the 'near' and 'far' transects. Few factors showed a notable difference by distance to CRFS."*

## FIELD-STATION PARTNERSHIP RESEARCH

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Dr. Michael Stevens shares, *"Using funding from our planning grant from the National Science Foundation, Gina Gilson and I explored field-station partnerships between universities and U.S. national parks. Including CRFS, we found a total of eight university-operated field stations located in U.S. national parks. We gathered data about field-station demographics, the opportunities and challenges of their partnerships, the details of their missions, and how they benefit their associated universities and national parks. The results of our study, published in BioScience, will help inform our strategic planning process and improve operations at CRFS. Additionally, our in-depth analysis of a specific type of partnership will benefit a variety of professionals who are seeking to forge working relationships between various organizations, particularly between organizations that are large and complex."*

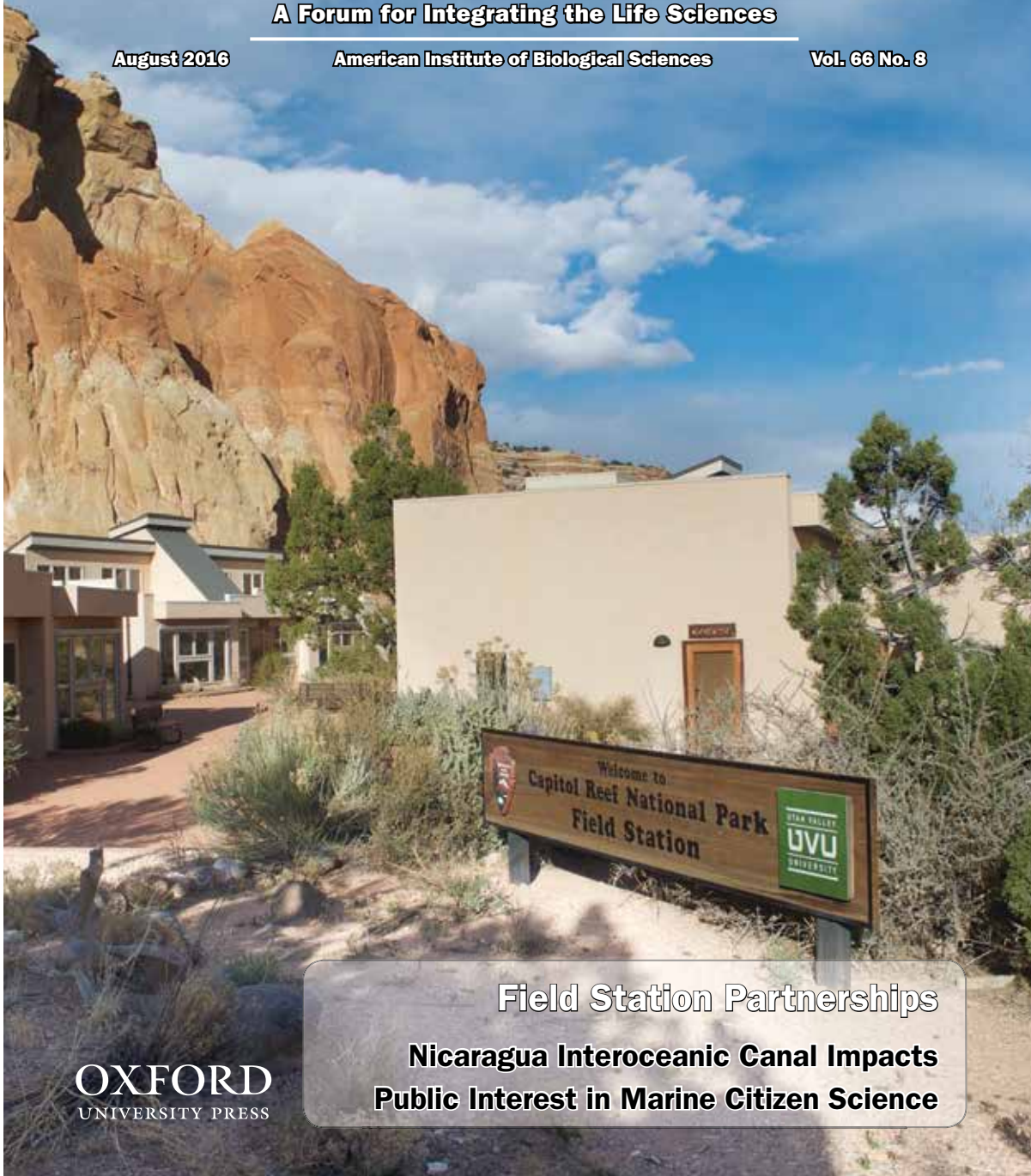
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**OXFORD**  
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**Field Station Partnerships**  
**Nicaragua Interoceanic Canal Impacts**  
**Public Interest in Marine Citizen Science**

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# RESEARCH

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## IONOSPHERE RESEARCH

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Dr. Asti Bhatt shares, *“An all-sky camera imaging ionospheric airglow in 630 nm wavelength was installed at Capitol Reef Field Station in March 2014 by a team from SRI International. This camera is part of a continental U.S.-wide camera network of nine cameras. The purpose of this network is to image large-scale processes in the earth’s ionosphere including medium- and large-scale traveling ionospheric disturbances and low latitude aurora. During the time that the Capitol Reef camera has been operational, there have been multiple major storms that resulted in stable auroral red (SAR) arc occurrences. Some of these observations have been presented at ionosphere-magnetosphere research conferences along with other results from CRFS.”*

## ATMOSPHERIC OPTICS RESEARCH

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Dr. Kim Nielsen discusses, *“My team of research students has been to the field station several times this past year. The main purpose has been to test the equipment they are designing and constructing. This past year, six students have built air pollution sensors, airglow cameras, and spectrographs. All of these instruments will be placed permanently at the field station over the coming summer. Having the research students together at the field station brings an increased awareness of each of the projects as the students work together and present short presentations on their goals for the weekend (Friday afternoon/evening) and their results (Saturday evening). It is quite amazing how much can be done over a few days with dedicated time and little disturbance. The students often ask when we are going next as they feel very accomplished after these trips.”*

## PUBLICATIONS AND PRESENTATIONS OF CRFS RESEARCH

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Bhatt A, Kendall E (2015) Auroral LSTIDs and SAR arc occurrences in northern California during geomagnetic storms. American Geophysical Union Fall Meeting, San Francisco, CA.

Bhatt A, Kendall E, Baumgardner J (2015) A mid-latitude 630 nm all-sky imager network. Measurement Techniques in Solar and Space Physics Conference, Boulder, CO.

Covert MC\*, Holt EA, Van Buren R (2015) Vegetation patterns associated with abiotic factors and human impacts at the Capitol Reef Field Station. *The Southwestern Naturalist* 60:193-206.

Dunn P\*, Davis E\*, Leavitt L\*, Burr Z\*, Johnson S\*, Graham J\*, Ricks K\*, Wilson A\*, Nielsen K (2016) Undergraduate high impact learning through local air pollution monitoring, Engagement Week, Utah Valley University, Orem, UT.

Johnson S\*, Gay J\*, Nielsen K (2015) Establishing a student-driven high altitude research program at UVU. NASA Space Grant Consortium, Salt Lake City, UT.

Kendall E, Bhatt A (2015) Observations of thunderstorm-related 630 nm airglow depletions. American Geophysical Union Fall Meeting, San Francisco, CA.

Nielsen K, Gay J\*, Johnson S\*, Dunn P\* (2015) Utah Valley University field station at Capitol Reef National Park: A venue for improved student learning and retention. American Geophysical Union Fall Meeting, San Francisco, CA.

Stevens MT, Gilson GG (2016) An exploration of field-station partnerships: university-operated field stations located in US national parks. *BioScience* 66:693-701.

Williams B\*, Nielsen K, Gibson Z\* (2015) Imaging spectrograph as a tool to enhance the undergraduate student research experience. American Geophysical Union Fall Meeting, San Francisco, CA.

\*denotes a UVU student or alumna/alumnus



NATURE TO THE CLASSROOM



CENTER FOR GLOBAL ENGAGEMENT

# OUTREACH

The field station serves as an important destination for university faculty and staff but also hosts visitors from the park service, the local community, and international countries. Please read about some of these visits this year.

## NATURE TO THE CLASSROOM, UVU, MARCH 4-6, 2016

Scott Williams from the Department of Exercise Science and Outdoor Recreation describes their trip:

*“Nature to the Classroom spent three days at Capitol Reef Field Station, March 4th through the 6th. The program, which is run by the Department of Exercise Science faculty and students, brought a group of 16 public school teachers to Capitol Reef for their annual conference on nature education for K-12 schools. The group spent most of their time at the field station facilitating as part of the conference, but were also able to do a night hike down Capitol Gorge to the tanks and another hike to Hickman Bridge. The teachers were really impressed with the interpretation at the field station from Gina and the emphasis on sustainability and conservation.”*

## CENTER FOR GLOBAL ENGAGEMENT, SNOW COLLEGE & SENA COLOMBIA, JUNE 11-12, 2016

Dennis Faatz of Snow College reports on his global engagement visit:

*“Our overnight stay at the UVU Capitol Reef Field Station was a great educational experience for all involved. The trip was a combination of students and teachers from SNA Educa in Chile, SENA Colombia, and Snow College’s Center for Global Engagement. The trip emphasized the sustainable architecture and design of the station, the local ecology, and geology. The trip was part of a two-week exchange the South Americans had with Snow College as part of a grant from 100K Strong in the Americas. This is President Obama’s initiative to increase the study abroad numbers between the U.S. and the rest of the Americas to 100,000 students.*

*“The teachers and students enjoyed the tour of the facilities at the station, especially the solar power, passive heating and cooling design, and the water system. The students also toured petroglyphs and hiked in the park. The National Park System of the U.S. is an impressive feat to many international students and teachers. Colombia and Chile are trying to protect more forest and geography from development and destruction. The physical place of Capitol Reef and the station were both highlights for the overnighter. Thank you very much for the generous sharing of such an amazing and unforgettable place!”*



STEM ENDORSEMENT PROGRAM

## STEM ENDORSEMENT PROGRAM, PROVO CITY SCHOOL DISTRICT, JUNE 13-17, 2016

Our outreach stretched into elementary schools with a STEM Endorsement Program organized by the Provo School District that brought 16 teachers from Provo and Park City to the field station. Please read excerpts from the trip summary provided by Jennifer Remy:

*“The moment we heard about the Capitol Reef Field Station, we knew that we had to take our Elementary STEM Endorsement teachers there for a class. We know the impact of field courses on teacher development and immediately recognized the potential this unique location held for providing an outstanding learning environment. However, nothing could have prepared us for the life-altering experiences that our teachers shared with us as they reflected on the five-day journey.*”

*“For many of our teachers, this was their first ever field experience and it was a paradigm shift for them. Many of them told us that they finally began to see the world as a complex, interconnected web of matter and energy that never stops moving. They told us that they would never look at the way they used water or energy the same way again.”*



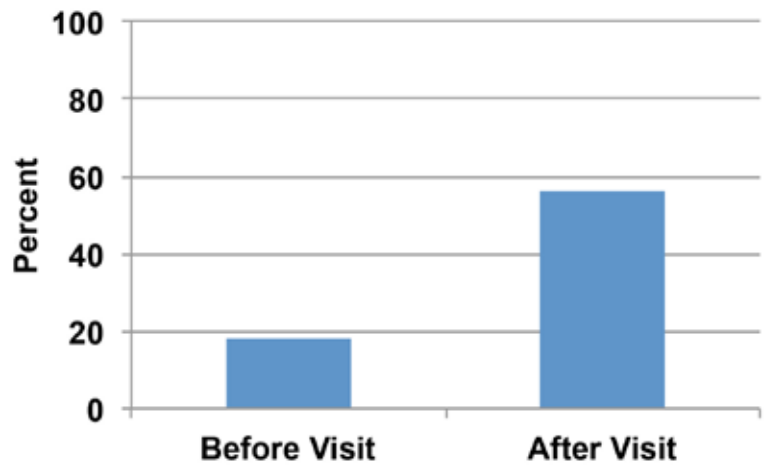


# ENVIRONMENTAL ETHICS

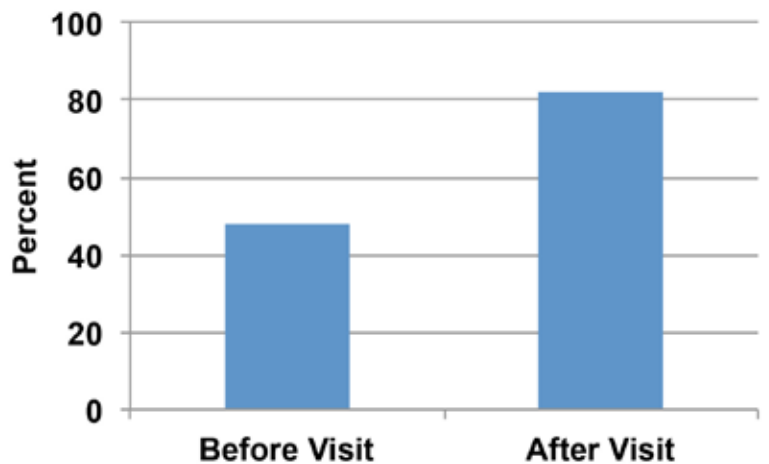
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Environmental ethics represent a key component of the field station’s mission. Our goal is to promote conservation and an appreciation for the environment with all of our visitors. We do this partially out of necessity, since the field station is a remotely-located, off-the-grid facility that produces its own electricity and treats its own water. More importantly though, we do this because it is a key focus for the field station and its staff. We aim to keep our environmental footprint small, and to help our visitors shrink theirs too. In fact, 84% of our visitors learned new methods to reduce their personal environmental impact in their day-to-day activities. Further, prior to staying at CRFS, only 18% of visitors rated themselves as “very aware” of their personal environmental impact. After staying at CRFS, this number jumped to 56%, three times as high (Fig. 5). Another focus of the field station is to teach visitors about the value of the National Park Service. Before coming to CRFS, fewer than half (46%) of our visitors placed a very high value on protected public lands such as Capitol Reef National Park. After staying with us, this number is much higher (Fig. 6).



**FIG. 5** The percentages of visitors who were “very aware” of their “personal environmental impact” before and after their visit to CRFS (n = 282).



**FIG. 6** The percentages of visitors who placed a “very high” value on “protected lands such as national parks and wilderness areas” before and after their visit to CRFS (n = 282).



MASON MCCORD

# INTERNS



22 INTERNS

JESSICA HARRIS



MATT WANG

## RIPPLE ROCK NATURE CENTER INTERNS – JESSICA HARRIS AND MASON MCCORD

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This year, we hired two UVU student interns to operate the Ripple Rock Nature Center. These students were Jessica Harris, who is majoring in Outdoor Recreation and minoring in Environmental Studies and Native American History, and Mason McCord who is also majoring in Outdoor Recreation.

Jessica Harris was designated as the Cordell Roy Intern. This named internship honors a long-time employee of the National Park Service. It is funded in part by a generous private endowment from G. Kevin Jones, who is an attorney in the Office of the Solicitor, United States Department of Interior, representing the Utah units of the National Park Service. Cordell Roy himself also contributed to the endowment.

Combining her education with her past experiences in interpretation, Jessica Harris worked to develop programs for visitors. In her free time, she diligently studied all aspects of the park to expand the scope of what she could share with visitors. While an intern, she achieved a great deal, helping over 4,000 visitors throughout the length of her internship. In addition, she wrote an article for the local newspaper that covered the many aspects of partnerships at Ripple Rock Nature Center. She claims her greatest achievement while an intern was making visitors happy while giving them a memorable experience. She states, *“The wonder of a child is possibly the greatest sight beheld to humanity but being the one that created that wonder is a priceless experience.”*

Mason McCord has ambitions to live, work, and play outside as much as possible. He states that working in a national park is his dream job. He loves the idea of fostering knowledge, joy, and respect for nature and the outdoors. When asked about his internship, he stated, *“If you spend any time at Capitol Reef, you’ll find out it’s the greatest national park in America, filled with amazing people who will want to protect and explore nature as much as you do.”*

## NATURAL RESOURCES INTERN - MATT WANG

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Matt Wang, majoring in botany, was welcomed back to the park for his second season working in the Resources Management and Science Division. Working alongside the park biologist, he assisted with research on threatened and endangered plant species within the park. The team’s work centered around two federally listed endemic cacti, *Pediocactus winklerii* and *Sclerocactus wrightiae*. He spent ample time outside in the northern district of the park. This work involved multi-day field surveys, collecting demography data, and collecting data on ungulate disturbance. In addition to the cactus surveys, Matt was presented with a variety of unique opportunities this summer. He discovered a peregrine eyrie, attended two ecological seminars, seined fish with the Utah Department of Natural Resources, monitored wildlife cameras, assessed health of riparian areas, and collected distribution data on a number of rare plants. The discovery of a new pest during the 2015 field season allowed for interesting work collecting and rearing moth larvae. For his independent internship project, he obtained a collection permit from the national park and established a small herbarium that will enhance educational opportunities at the field station. He says, *“I’ve built good relationships in the park and really enjoy working here. I hope to continue my work into the following field season.”*

# SPECIES SPOTLIGHT

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## PEREGRINE FALCON

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The name may sound familiar—peregrine falcons are often regarded as one of the most spectacular birds of prey. They are the world’s fastest bird, reaching over 200 miles per hour when diving to catch their target. As hunters, they perch or soar high above their prey and catch other birds (and bats) mid-flight.

From the 1940s through 1970s, widespread use of the pesticide DDT caused a drastic reduction in the falcon’s population. Through reintroductions and a ban on DDT, the species managed to recover and was removed from the federal endangered species list in 1999. They are uncommon in Capitol Reef National Park; however, there are periodic sightings.

Some park visitors have seen peregrines near the turn for Pleasant Creek Road. The birds are Utah natives who like wide open spaces and nest in the cliffs, either in holes or on ledges. Outside of nesting season, they may travel widely—the word “peregrine” means “having a tendency to wander.” To identify them, look for barred underparts and long wings. A black wedge under their eye meets a black crown and nape, giving the distinct appearance of a helmet.

*Photo credit: National Park Service*





# FACILITIES REPORT

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As user days have increased and user groups have continued to diversify, it has become obvious that our single, multi-purpose room has its limitations. It has been difficult for groups to share one room for classroom space, eating space, and social space. We are excited to announce that a new classroom building is in the works, which will feature a dedicated space for teaching and learning. With this new building, visiting geology groups won't have to put their maps away to make room for the salad dressing, and students who want to focus on their reading assignments can be physically separate from the students who are discussing their group project.

## OFF-GRID POWER

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At CRFS, visitors have the unique experience of knowing where all of their electricity comes from. We take advantage of the abundant sunlight and capture solar energy with seventy-two 200-watt panels, which also function as a shade-giving parking structure. Up to 14.4 kilowatts of power can be generated; excess energy is stored in a bank of 48 batteries. Four inverters convert the electricity into a usable form, from DC to AC. In the event we lose solar capability, CRFS has a propane-powered backup generator.

## HEATING & COOLING

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In the United States, nearly half of the energy used in our homes goes to heating and cooling. Using passive systems can dramatically reduce energy needs. At CRFS, our buildings have been designed to take advantage of natural processes. In the winter, trombe walls are used to help warm the buildings. These south-facing walls have been painted black and sealed with a pane of glass 4-6 inches in front of them. The sun's radiant energy is captured during the day and slowly conducts inward through the wall, even into the night. For the summer months, these trombe walls can be covered during the day with a solar shade to prevent heat absorption. To further promote cooling, the building design includes solar chimneys, or "cooling towers." Utilizing the principle of convection, these towers allow warmer air to move up and out of the tower as cooler air filters in, creating a natural current. Without the aid of air conditioning, building temperatures remain surprisingly comfortable throughout the summer. Proper insulation, quality seals around doors and windows, and white roofs that reflect sunlight also help in maintaining moderate interior temperatures.

## NATURAL LIGHTING

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The buildings at the field station were constructed with south-facing windows situated high on the walls. These windows supply ample pleasant light throughout the day while conserving energy. Once the sun is down, we continue to save energy by using energy-efficient bulbs.



# FACILITIES REPORT

## DARK-SKY RESOURCE

Of all the awe-inspiring views at the field station, one of the most spectacular is the clear night sky. Capitol Reef National Park and CRFS take special measures to ensure the preservation of this resource. To minimize our impact on the nocturnal environment, the field station uses low-wattage external lighting that points downward. All windows are equipped with blinds that are closed at night. Our 12-inch Dobsonian telescope gives visitors the opportunity to see the rings on Saturn or the Andromeda Galaxy, inspiring a deeper appreciation of the natural, dark night sky as a resource worth protecting.

## ON-SITE WATER TREATMENT

Water at the field station is pumped from a well adjacent to Pleasant Creek, a perennial stream that has supported life in the area for hundreds of years. A solar-powered pump brings water to the on-site treatment facility. To purify our water, CRFS uses a membrane-filter technique that uses a series of filters, including two nano-filters. Treated water is stored in a 10,000 gallon tank for later use. The water treatment system is state-licensed and operated by trained staff. Water is tested daily and meets or exceeds standards within the state.

## WATER CONSERVATION

Visitors have the opportunity to see our on-site water treatment facility and take care to use this resource wisely. When groups visit our remote desert location, we encourage them to think critically about how they are using water and teach water conservation strategies. All faucets have their flow rate displayed in gallons per minute. Reduced flow shower heads cut back on the amount of water used, with a flow rate of 1.5 gal/min instead of 2.5 gal/min for a typical shower head. Buttons on the shower heads allow the user to stop the water from flowing while taking time to shampoo, condition, soap up, or shave. In the kitchen, three separate tubs are used to wash, rinse, and sanitize, which allows guests to clean dishes without constantly running the water. Dual-flush kits on toilets allow a partial flush (1 gallon) for liquid waste, reserving a full-powered 2.25 gallon flush for when it's really needed. Rain barrels are used to collect precipitation that runs off our roof, which we can use for our raised garden beds.

## RECYCLING AND COMPOST

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At the field station, visitors are challenged to think about their waste and where it goes. Often, what we consider to be “waste” isn’t waste at all! Thanks to the system set up within the park, we are able to recycle plastic, tin, aluminum, paper, and glass. We also have a composter to convert fruit and vegetable scraps into nutrient-rich soil for our new raised-bed garden. These two methods allow visitors to lessen their environmental impact and significantly decrease the volume of trash they produce.

## RAISED BEDS

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Last year, CRFS intern Sarah Heelis installed two raised garden beds at the field station. The addition helps demonstrate the practical applications of composting. Waste from the kitchen is converted into soil and used to grow food on-site, further demonstrating ways to live sustainably.

## EROSION CONTROL

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Permeable pavement limits the amount of erosion caused by the existence of field station buildings. The interlocking pavers allow precipitation to slowly disperse into the soil below, allowing natural groundwater recharge. Permeable pavers also allow topsoil to capture contaminants before runoff re-enters the groundwater.





# FINANCIAL REPORT

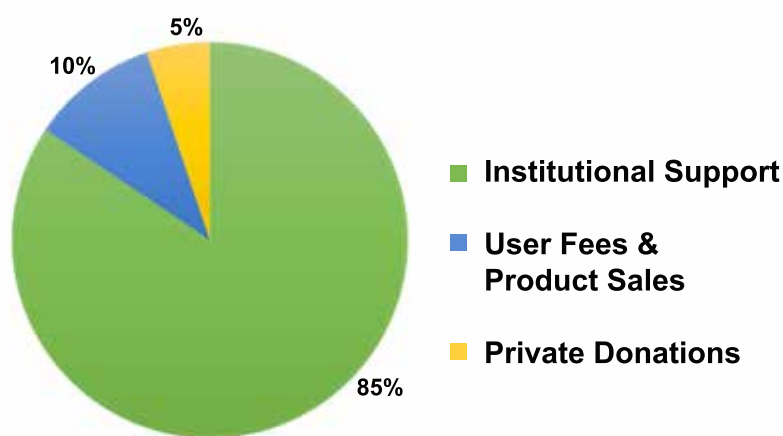


FIG. 7 Funding for CRFS by source.

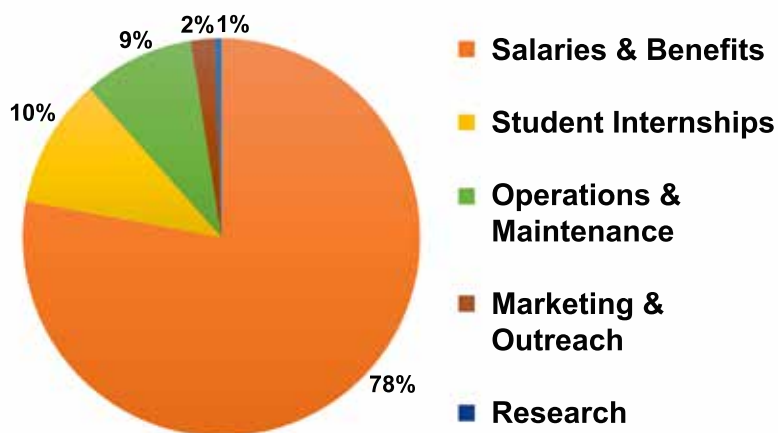


FIG. 8 CRFS outlays by category.

## CRFS IS SUPPORTED FINANCIALLY BY THREE MAIN SOURCES:

Institutional support from UVU (\$170,936), funds generated by user fees and product sales (\$21,076), and private donations (\$10,492) (Fig. 7).

This funding supports the salaries and benefits of the staff (\$143,843), student internships (\$19,421), operations and maintenance (\$16,731), marketing and outreach (\$3,600), and research (\$989) (Fig. 8).

While UVU generously supports the station, CRFS relies on private donations to fund important programs such as student internships and research.

If you value our mission, please make a donation at:

[www.donate.supportuvu.org/crfs](http://www.donate.supportuvu.org/crfs).



# WHERE CRFS IS HEADED

## LAST YEAR WE HAD FOUR MAJOR GOALS INCLUDING:

1. Strategic planning for a new classroom/laboratory building
2. Increasing staff funding
3. Marketing through social media
4. Demonstrating sustainable practices at the field station

Please read about our progress in each of these areas:

**1** With the help of UVU Associate Vice Presidents Fred White and Frank Young, we've hired AJC Architects to plan our new classroom/laboratory building. The architects, Jill Jones, Dijana Alickovic, and Ryan McMullen, are experienced designing buildings both for the National Park Service and for higher education. We met twice on campus and brought them to the field station to show them the inspiring grandeur of our setting. Since then, they have completed the conceptual drawings for the new building.

**2** Through the tireless efforts of Associate Vice President Fred White and Senior Vice President Jeff Olson, we secured ongoing, appropriated, base funding for our Administrative Assistant and Assistant Site Manager, Annette Harrington.

**3** Over the last year, we've substantially increased our activity on social media. Instagram has been a great way for us to engage with interested visitors and keep students connected after their trip. Since we created our account in August 2015, we have acquired 143 followers and the number continues to rise. We believe this is an effective and low-cost tool for marketing, specifically as we acquire more and more followers who have no affiliation with UVU or Capitol Reef National Park. Similarly, the notoriety of our Facebook page has grown. Compared to fewer than 8,000 views last year, this year's posts about engaged learning, sustainability, and the Colorado Plateau have reached over 29,000 viewers.

**4** Composting kitchen waste has substantially decreased the amount of trash our visitors produce. On average, our visitors' trash weighed 43% less than the trash produced in the previous year. At 0.33 pounds per person per day, CRFS visitors' trash weighs only 7.5% of the national average. Though most visitors were somewhat familiar with recycling, many of our visitors had never composted before—they were able to understand the composting process and see the final product that we added to our raised-bed garden. Our garden successfully produced zucchini, cilantro, carrots, onions, and radishes in the fall. The raised beds were also a great way to demonstrate how to utilize rainwater that is captured from the roof in rain barrels. Lessons in water conservation hit home this year: average group water use dropped 15.6% to 11.2 gallons per person per day. This is particularly impressive when compared to the national average. According to the Council of State Governments, the average American uses 98 gallons of water per person per day. The average visitor is using less than 12% of the water used by the average American. We hope that lessons in effective conservation practices will be carried into visitors' daily lives back home.



# WHERE CRFS IS HEADED

## FOR 2016-17, WE PLAN TO FOCUS ON THE FOLLOWING FOUR OBJECTIVES:

### **1** BEGIN CONSTRUCTION OF OUR PLANNED NEW CLASSROOM/LABORATORY BUILDING

In the upcoming year, we will strive to move our planned new building through all of the stages of approval and begin construction. The building will include a dedicated classroom with digital projection, whiteboards, sinks, cabinets, and ample work surfaces. The classroom will open out onto a covered patio that will offer additional teaching space outside with shade and spectacular views of the Henry Mountains. The building will also feature a telescope storage room with an adjacent observation platform, a space for research, and two restrooms accessible from the outside. The new building will enhance the field station experience for all of our visitors and increase our capacity for engaged learning and scholarly activities.

### **2** FUND-RAISE AND PLAN FOR A SITE MANAGER'S RESIDENCE

Per our agreement with the park, our site manager must be present at the station whenever the facility is scheduled with visitors. An ideal situation would allow for our site manager to remain on-site, available to visitors at any hour, but with a separate living space. Our current building design doesn't allow the manager to go "home" or find privacy, which is especially straining during our busy seasons in the spring and fall when we often have visitors at the station nearly every day of the month (weekends included). A site manager's residence would allow a work-life balance for

our dedicated staff member and also free up the current site manager's quarters for an artist- or scientist-in-residence. Donations for our site manager's residence will be matched one-to-one with funds from the Pope Endowment. Remember, we don't have a program without a site manager!

### **3** PARTICIPATE WITH THE PARK AS THEY DEVELOP AN ARTIST-IN-RESIDENCE PROGRAM

Capitol Reef National Park is working to start an artist-in-residence program. We plan to involve this artist in activities that will benefit UVU students both at the field station and on the main campus in Orem.

### **4** HOST A CONFERENCE TO DISCUSS UNIVERSITY-NATIONAL PARK FIELD-STATION PARTNERSHIPS

Using funding from our grant from the National Science Foundation, we plan to host a conference for personnel from university-operated field stations located in U.S. national parks. At the conference we plan to explore the opportunities and challenges of this unique type of partnership, get input from the participants on the development of our strategic plan, and develop ideas for future networking.



# SUPPORT CRFS

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## CAPITOL REEF FIELD STATION MAKES A DIFFERENCE—SO CAN YOU!

Big changes are underway at CRFS and you can be a part of it! With your financial support we will build a new classroom/laboratory building and enrich students' learning and research experiences. Large or small, all donations help build a bright future for UVU's Capitol Reef Field Station.

Please visit [www.donate.supportuvu.org/crfs](http://www.donate.supportuvu.org/crfs) to contribute. Donations are tax-deductible to the extent allowed by law. All those who contribute \$100 or more will be recognized in our annual report. Special thanks to our benefactors and donors.

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