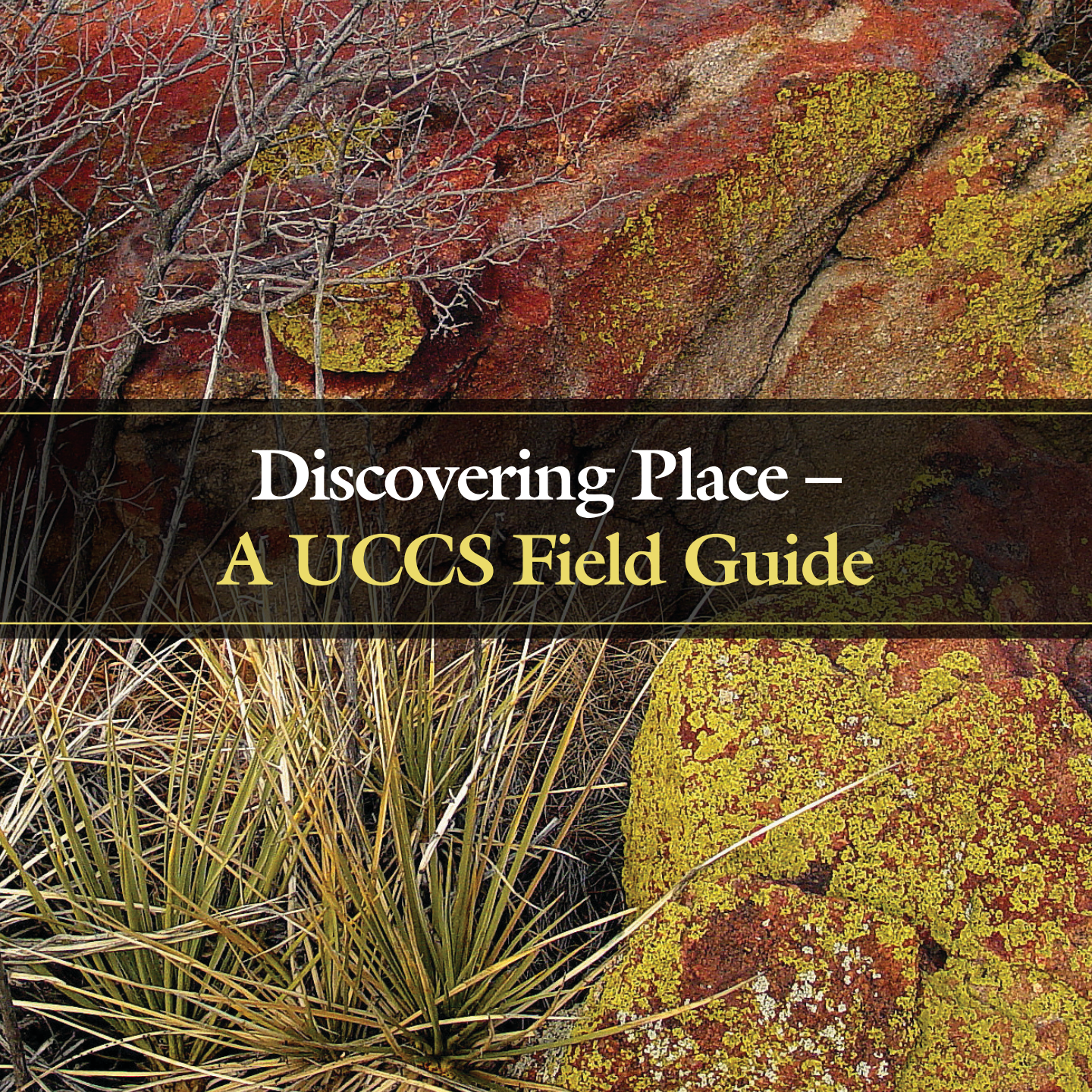


Discovering Place –
A UCCS Field Guide

Discovering Place – A UCCS Field Guide

EDITED BY TOM HUBER AND CAROLE HUBER

University of Colorado
Colorado Springs

University of Colorado
Boulder | Colorado Springs | Denver | Anschutz Medical Campus

A publication of the University of Colorado Colorado Springs
Est. 1965

THE REGENTS OF THE UNIVERSITY OF COLORADO, a Body Corporate
Website: http://www.cu.edu/regents

University of Colorado Colorado Springs
Website: http://www.uccs.edu/

University of Colorado and University of Colorado Colorado Springs
are trademarks of the University of Colorado

FIRST EDITION Designed by ImageStudios.net
Cartography by Paddington Hodza, Eric Billmeyer, Ayers Saint Gross, and Tapis Associates
Production Management by Jeffrey M. Foster

Library of Congress Cataloging-in-Publication Data
Huber, Tom
Huber, Carole
Discovering Place – A UCCS Field Guide

1. Ecology—Colorado. 2. Ecology—North America—Identification. 3. Plants—Colorado—Identification. I. Huber, Tom II. Huber, Carole. III. UCCS. IV. University of Colorado. V. Title.

PRINTED IN THE UNITED STATES OF AMERICA

RMT 10 9 8 7 6 5 4 3 2

Table of Contents

Foreword

Pam Shockley-Zalabak, chancellor

As the University of Colorado Colorado Springs prepares to celebrate its fiftieth birthday, I am honored to introduce a first-ever field guide for UCCS that tells the story of the university from the perspective of time and space written by university faculty, staff, and students whose passion knows no boundaries.

While 50 years of organizational existence is worthy of celebration, this field guide provides valuable perspective on the people whose efforts formed the university as well as the events that created its unique natural environment over the last several million years.

The pages that follow are not sanitized versions of university history. This is no coffee table book designed to evoke happy memories of days gone by. Instead, editors and authors Tom and Carole Huber of the UCCS Geography and Environmental Studies Department created a guide to UCCS that explains how UCCS began, our unique features, our mistakes, and the challenges that lie ahead. The Hubers assembled a cast

of contributors with long associations with the university known for their directness and their scholarship, pillars upon which UCCS stands. These individuals include Eric Billmeyer, Cerian Gibbes, John Harner, David Havlick, Paddington Hodza, and Steve Jennings from the Department of Geography and Environmental Studies; Matt Barton, Carol Dass, Pauline Foss, Suzanne MacAulay, Curtis Smith, and Glen Whitehead from the Department of Visual and Performing Arts; Mary Jane Sullivan from the Department of Philosophy; Jeremy Bono from the Department of Biology; Minette Church, William Arbogast, and Roche Lindsay from the Department of Anthropology; Margaret "Peg" Bacon, provost emerita; Judith Rice-Jones, a retired Kraemer Family Library instructor and current Geography and Environmental Studies student; Cathy Mundy, a retired Kraemer Family Library instructor; Kirsten Ortega from the Department of English; Rebecca Webb of the College of Engineering and Applied Science; Gary Reynolds of Facilities Services; Jeffrey M. Foster of University Advancement; Perrin Cunningham of the Heller Center for Arts & Humanities; and students Sara Santa Cruz and Katelyn Stover.

As someone who has spent the bulk of her professional career at UCCS, I thought I knew the institution. At some level, I did. However, this field guide provides new knowledge for those who appreciate UCCS, now and in the future. Events shared by the writers range from student pranks, including a water tower rebranded as Campbell's Elephant Soup as told by professor of education and provost emerita Margaret "Peg" Bacon, to reminders of the importance of water in the American Southwest and the emergence of campus conservation efforts. These are important issues, ones we must remember and respect in the years ahead. In this work, the contributors' collective passion for the subjects of conservation and the natural world, as well as for the university's mission, is clear.

While vital that we remember the individuals who helped create UCCS, people such as David Packard, Virginia Trembly, Larry and Dorothy Heller, to name just four, it also is important to remember the lessons shared by all those writing.

We know that people have inhabited the area we know as UCCS for more than 11,000 years. The reasons they came, and whether Apache, Comanche, Kiowa, or Ute, are unknown. It is important to recognize UCCS has long been known as a special setting. The marks of our predecessors are indelible and worthy of respect.

A fiftieth anniversary, an important milestone for the university and in a human lifespan, is a reminder both that our time here is short and that we are but a speck on the globe's timeline. It is imperative that we learn from our past in order to build a better future for those who will follow. Finding a hoodoo and understanding it may have preceded you by ten million years is a not so subtle reminder of our place on campus and in life. I encourage you to use the UCCS Field Guide to find those hoodoos and much more.

Introduction

Carole Huber and Tom Huber
Geography and Environmental Studies

"People who know a place may come to care about it more deeply. People who care *about* a place are more likely to *take better care of it*. And people who take better care of places, one place at a time, are the key to the future of humanity and all living creatures."
Robert L. Thayer, Jr.

The place we know as the University of Colorado Colorado Springs is defined as much by its lands and landscape as it is by its buildings and walkways, its classrooms and laboratories, its academic strivings and intellectual ideas. The land is a quintessential part of what defines our place in the larger community. We are fortunate, indeed, that the land we call the campus of UCCS is a singular and unique piece of the Colorado landscape. As Thayer and others who care deeply about the

earth and our place on it remind us, we are more likely to love our place if we know our place. To love our place is to value it, protect it, and enhance it. This *Field Guide* explores the amazing gift of bluffs and gullies, grasslands and woodlands, and, of course, history that comprise UCCS. In so doing we hope others will love and thus preserve the incredible gift that is UCCS – our place.

People have known and inhabited this part of Colorado for millennia. Native Americans used the tangible resources of rock and plant that the land offered and the more ethereal resources that the place provided. Today we can find stony evidence of both spread across the campus lands. In more recent centuries General William Palmer came to the region and built his dream city nestled below Pikes Peak. Others during that era, including Ferdinand Hayden, came to survey the land and appraise the resources that they felt would 'build' the West. The landscape panoramic drawing by William Henry Holmes, a member of Hayden's 1873 Survey, was drawn from the top of Pulpit Rock just outside the northern limits of UCCS. The beautiful pen-and-ink panorama and the "re-photograph" show much of the North Campus (the left side of the drawing and photo). These images provide a dramatic visual perspective of where the place of UCCS sits in relation to the larger place we call the Pikes Peak region.

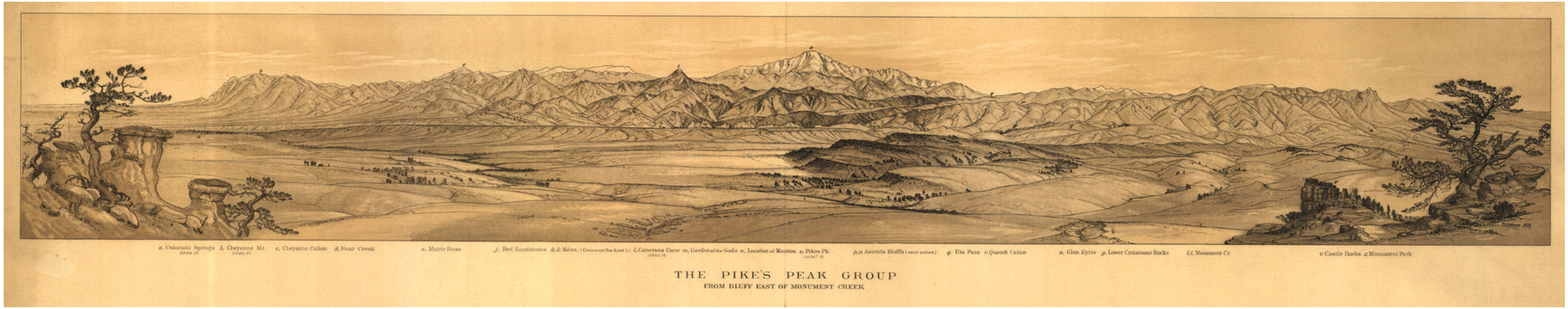
The inspiration for this *Field Guide* came several years ago when we were attending a conference on campus sustainability in Arizona. At the evening reception we were introduced to Steven Marx, a professor from California Polytechnic State University at San Luis Obispo, who was presenting *Cal Poly Land – A Field Guide* that had just been published. It was an exquisite piece of work for which a multitude of campus people contributed various sections of the book. We returned to Colorado Springs with the intent to produce a similar guide for UCCS. It has taken some time to pull together all of the various contributions from campus authors, artists, cartographers, and photographers. This guide is the result of our long ago commitment but more essentially the incredible collaboration of our many selfless and talented colleagues.

The UCCS campus actually is not a place but a collection of interrelated places. Would we be the same "place" if the bluffs did not loom over our shoulders each day? Would our campus awe visitors without the spectacular south/southwest-facing view of Pikes Peak and downtown Colorado Springs? Would we be the up-and-coming campus of the University of Colorado without the benevolent foresight of Virginia Trembly who provided most of the land for our future growth that has become the North Campus?

We hope this guide serves as a starting point for your explorations of our campus and its special places. Envision the life-place of the Native Americans as you explore the bluffs above the campus, climb Eagle Rock or discover the geological jewels scattered about the campus lands. Consider the TB patients drawn to the region and the Cragmor Sanatarium as you visit Main Hall, stroll the bluffs or enjoy the spectacular vista. Reflect on the incredible gift of Dot and Larry as you walk the bucolic and serene

setting of the Heller Center, watching and listening for the birds and other wildlife that populate these wonderfully preserved grasslands. Contemplate how humans have changed and continue to change this place and the larger world beyond. What impacts are we having on the physical systems – the climate, the water, the soils, the ecosystems – that are vital for our future and the future of all living beings? How might our human creations enhance the beauty of the land and leave a legacy for future generations?

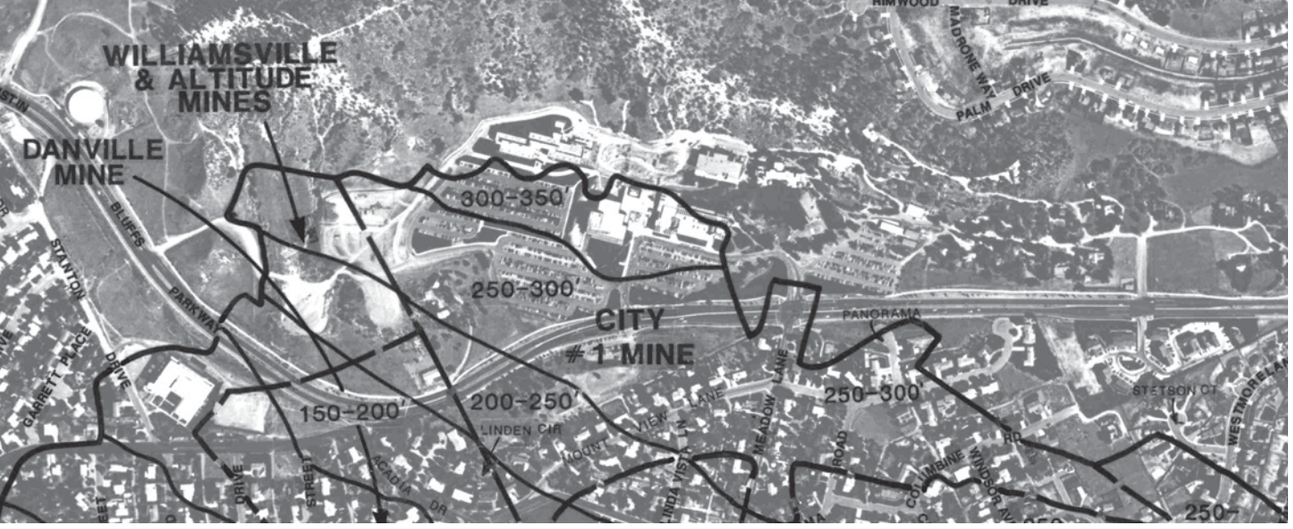
The Holmes panorama pictured on the next page depicts a larger, more complex place in which our campus is but a small segment. As Thayer suggests, we hope exploring this small piece of the region will help us know more about, care more about not only "our place" but the entire region, the state, and beyond.


a, Colorado Springs 5984 ft. b, Cheyenne Mt. 9466 ft. c, Cheyenne Cañon d, Bear Creek e, Monte Rosa f, Red Sandstones k, k, Mesa, (Cretaceous Nos 4 and 5.) l, Camerons Cone 11460 ft. m, Garden of the Gods n, Location of Manitou o, Pikes Pk. 14147 ft. p, p, Austin's Bluffs (coal series) q, Ute Pass r, Queens Cañon s, Glen Eyrie g, Lower Cretaceous Rocks t, t, Monument Cr. v, Castle Rocks x, Monument Park
THE PIKE'S PEAK GROUP
FROM BLUFF EAST OF MONUMENT CREEK

Geology

Tom Huber and Eric Billmeyer
Geography and Environmental Studies

Although the UCCS campus land is not in the mountains, it is of the mountains. This will become evident as we weave the geologic story of the rocks and landforms of our place. The oldest rock exposed on campus is the Laramie formation (Kl/Klu/Kls on the CGS geologic map). The Laramie is named for the type location of the rock first described near Laramie, Wyoming. Small outcrops of this formation occur on the very southern and western edges of campus. The Laramie is of the middle to upper Cretaceous age (roughly 75,000,000 years ago or 75 mya) and developed as the ancient Cretaceous Sea was retreating from eastern Colorado – yes, we were at or below sea level and under water back then. As the sea slowly retreated, fine-grained muds and beach sands were deposited in the wet margins. There was lush vegetation growth that, in many cases, eventually produced strata of coal deposits that we can still find all along areas of the Front Range, especially from Colorado Springs to the southern border of Colorado near Trinidad. Mining of these coal deposits in Colorado Springs was extensive during the first half of the 20th century. Mine shafts



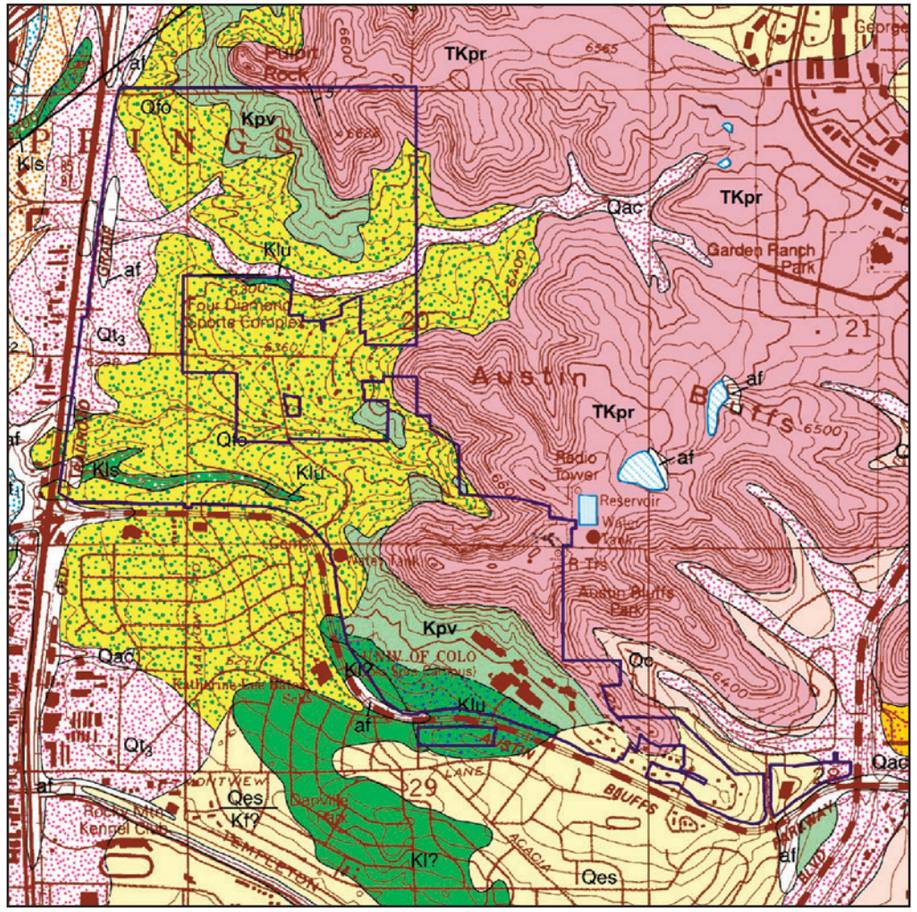
Part of the coal mine subsidence map produced by Dames and Moore in 1985 for the City of Colorado Springs

still honeycomb the subterranean from Rockrimmon southeast almost to Peterson Field — this includes the depths from 200 to 350 feet below the southern parts of UCCS along Austin Bluffs Parkway.

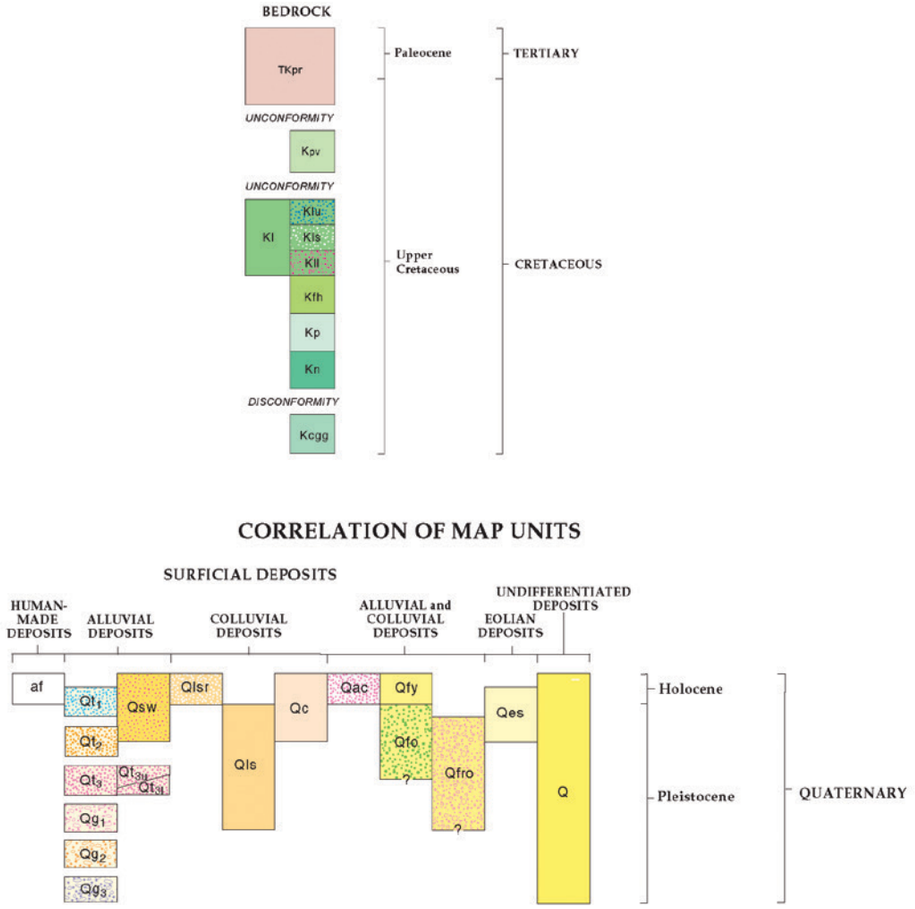
The rapid uplift of the land starting about 65 mya was the beginning of a major mountain building episode called the Laramide Orogeny – an orogeny being the geologic term for rapid, regional uplift of mountain systems. John Wesley Powell, the great explorer and geologist once observed that the faster mountains rise, the faster they erode. This is the simple physics of the potential energy of heights. The Laramide Orogeny was a very rapid geologic rise of mountains. When the mountains of the Front Range went up, vast amounts of erosion took place, and a lot of that rock debris came to rest just in the locale of the foothills and lowlands in which the campus now sits. Eventually, this loose rock detritus lithified into layer upon layer of the sedimentary rock we call the Pulpit Rock and Pikeview formations (TKpr/Kpv on the geologic map) – the formations that make up our bluffs. The Pulpit Rock formation is the higher part of the bluffs and is thus younger than the Pikeview, although both are composed of detritus from the rising mountains.

The older and lower Pikeview formation (Kpv) makes up the lower portion of the bluffs and the land where the Cragmor or Core parcel of the campus sits. The Colorado Geological Survey recently changed the name of this formation from the lower Dawson to the Pikeview formation. This is a massive (i.e., not thinly layered) sandstone that developed in part in the ancient drainage channels where the debris from the uplift was deposited. When these channels were actually streambeds many millions of years ago, they were lined by riparian vegetation including trees. After the trees were buried by the eroded mountain debris, minerals carried by ground water slowly replaced the organic cells of the living wood, and the trees became rock. During construction of some of the campus buildings, large “logs” of petrified wood created from some of these trees were unearthed.

A small amount of a culturally significant rock inclusion also occurs in the Pikeview. There must have been substantial moisture and relatively high temperatures caused by great pressure in the thick beds of sediment during the deposition of the material coming off of the mountains. Large amounts of



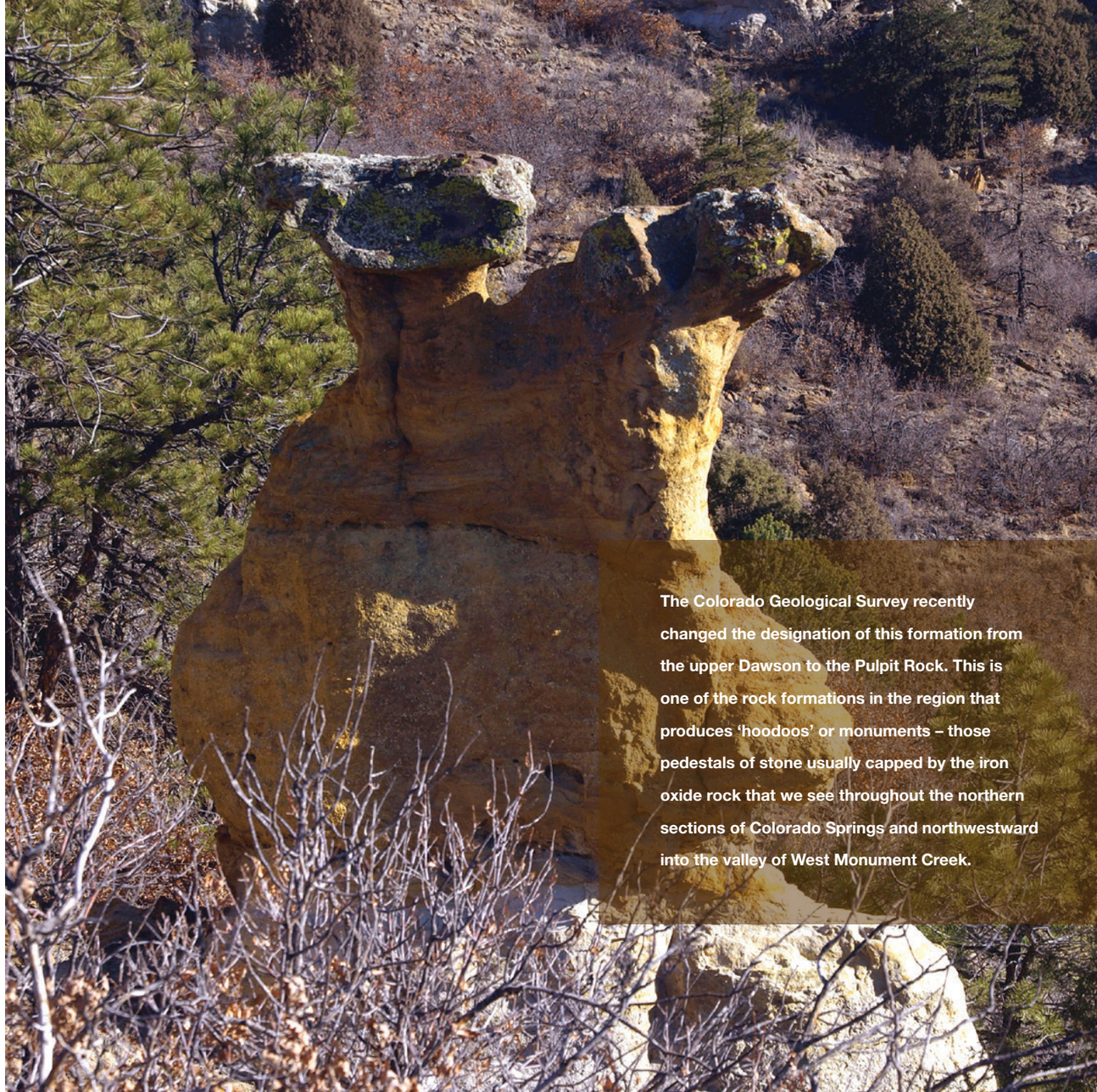
The 2001 geologic map of the Pikeview Quadrangle by the Colorado Geological Survey (CGS)



Legend for the CGS geologic map

hot water carried dissolved silica and small quantities of other minerals that eventually precipitated out of solution to become the rock called chert. This chert is very hard and, when broken or knapped, creates a conchoidal fracture that can become quite sharp. The chert found in many areas of campus was prized by Native American groups for hundreds, if not thousands, of years. This particular chert was so valuable because it contains microscopic grains of quartzite and opal that make the sharpened blades of the stone tools and points last much longer than normal.

The younger or upper member of the bluffs is the Pulpit Rock formation (TKpr) and is what we refer to as a cliff former. It also is a massive sandstone but contains a mix of several sub-categories of sedimentary rock including arkosic (or feldspar rich) sandstones, thin beds of silt- and claystones, andesitic volcanic inclusions, and highly erosion resistant iron oxide-cemented sandstones. The Colorado Geological Survey recently changed the designation of this formation from the upper Dawson to the Pulpit Rock. This is one of the rock formations in the region that produces "hoodoos" or monuments – those pedestals of stone usually capped by the iron oxide rock that we see throughout the northern sections of Colorado Springs and northwestward into the valley of West Monument Creek. In fact Monument Creek gets its name from these outcroppings, and on 19th century geologic maps, the area at the very southern end of the Air Force Academy where many of these hoodoos can be found was labeled Monument Park.



The Colorado Geological Survey recently changed the designation of this formation from the upper Dawson to the Pulpit Rock. This is one of the rock formations in the region that produces 'hoodoos' or monuments – those pedestals of stone usually capped by the iron oxide rock that we see throughout the northern sections of Colorado Springs and northwestward into the valley of West Monument Creek.

'Hoodoo' of Pulpit Rock sandstone high up on the bluff

The remainder of the land of the campus is not covered in solid rock but rather with varying amounts and types of loose sediment. Most of these "geologic units" date from the very late Pleistocene (10,000 to 12,000 years ago) and into the present geologic epoch called the Holocene. Near the end of the Pleistocene epoch, the climate was warming and drying as the massive valley glaciers in the high mountains of Colorado melted and retreated. The ice of those glaciers deposited very large amounts of weathered and eroded rock fragments. Strong, predominantly western and southwestern winds picked up much of the smaller material in these glacial deposits. The smallest sized debris, the silts and the clays, were taken hundreds to thousands of miles to the east. Much of the next smallest size fraction, the sands, were deposited in eastern Colorado and western Nebraska. The eastern side of campus from Cragmor Village to University Hall is underlain by ten to sixty feet of this "Quaternary eolian sand" (Qes on the map) or what we usually refer to as sand dunes. There are other, smaller, sand dunes in various places around the campus, including the ridge just to the west and across Stanton Road from Alpine Village. On a bigger scale, much of northeastern Colorado Springs and the eastern Colorado plains is covered in similar sand deposits, and nearly one-third of the entire state of Nebraska is buried in hundreds of feet of sand – these are the appropriately called the 'Sand Hills.'

Much of the western part of the North Campus is underlain by Quaternary debris also. All of these units have been deposited by water or in some cases fallen rock caused by gravity. They include the Quaternary alluvium (Qac), alluvial fan deposits (Qfo), and stream terraces (Qt3). This material almost exclusively came from erosion that has occurred on or near the campus itself. The alluvial fans that cover much of the Eagle Rock neighborhood are all derived from innumerable small streams eroding material from the bluffs and depositing it into the large valley below. The intermittent streams that still drain the bluffs today continue to erode, transport, and deposit sediment into the stream channels (Qac). And the stream terrace material shown along Nevada Avenue (Qt3) was deposited when Monument Creek was a much larger stream and erosion/deposition was occurring on a large scale throughout the central corridor along Monument/Fountain Creeks through what is now Colorado Springs.

A guiding principle of geology that dates from the discipline's inception in the early 19th century is uniformitarianism. This concept essentially says that the processes that have shaped the Earth in the past and the processes that shape the Earth today are the same. The type of erosion and deposition that formed the Pikeview and Pulpit Rock formations so many millions of years ago is the same kind of intense erosion and deposition we get from landforms today. We can see this at

An alluvial fan spreads out below Eagle Rock

One of the significant erosion gullies behind Summit Village

work currently, especially on the bluffs that rise relatively high above campus. The natural erosion of the bluffs in our human time frame is rather slow, if insistent. But because we have occupied the campus for 50 years or so, and have added buildings, roads, walkways, trails, and other human artifacts, we have stressed parts of the bluffs in myriad ways that have led to increasingly severe gully erosion in some places. This is anthropic, or human caused, erosion and is much faster and more intense than geologic erosion would be without our impacts as humans.

The worst of the gullies on campus are on the slopes behind and above Summit Village and on the slopes above Alpine Village along the "Sherpa Trail." Some of these gullies are deeper than a person is tall. Large amounts of sediment have been removed from the bluffs, mostly during intense storm events that hit the campus with hard, driving rains.

Once any gully starts it is very difficult to slow additional erosion because the running water is inherently funneled into the existing gully, and more erosion is likely. The campus is working on plans that may help ameliorate the current gully scars and, with some luck and a lot of expert work, will begin to address this kind of severe erosion in the future.

The UCCS campus is unique in its geologic history, variety, and visibility. We can see the remnants of mountains in our bluffs, remnants of our bluffs in our sediments, and remnants of our sediments in our soils. All of these landform elements are interconnected and interactive. We, quite literally, have an amazing natural science laboratory at our fingertips – there for our students and our campus community for study and pleasure.

Facing Elements

Kirsten Bartholomew Ortega
English

Water scars these dry and porous hills,
carves cubbyholes and footpaths
into yellow stone. Seeks its source beneath
the walls of human ingenuity. If
poems save spaces in our minds, these
rocks are words, these paths are
stories and we who follow the
water that will find a way
are witness and voice.
On a February morning

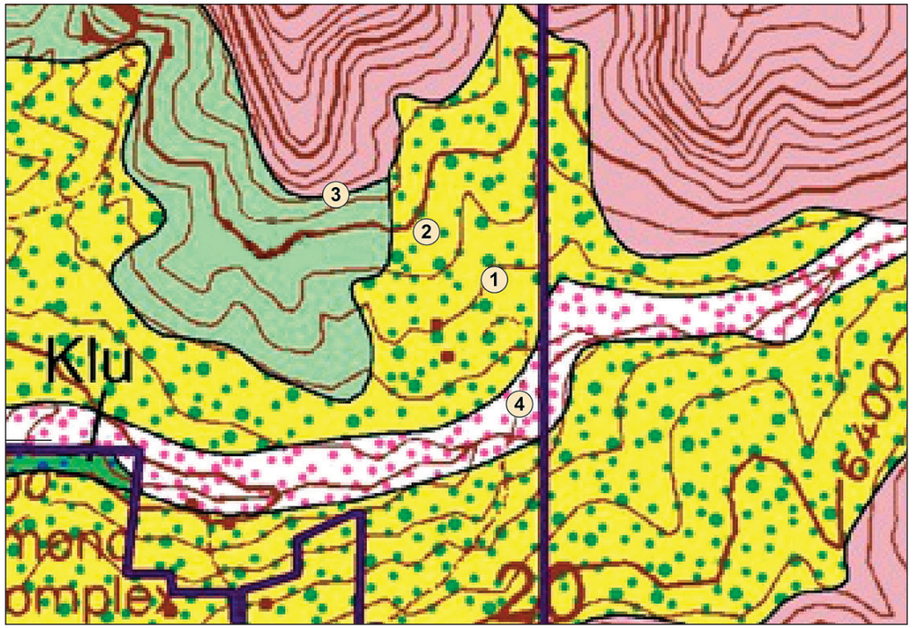
the campus faces an echo.
I hear the amplified voice
of a student, liquid between the
buildings and the sandstone,
finding natural pulpits. His poem
reminds us to “Recycle!” rhyming “debris”
with “consequently” and “free.”
His cadences become staccato along
the bluff, above the faces of students
who step around the mountain
of rubbish. These rocks will face
the wind and water, elemental education
etching into the earth. We have
explored the surfaces to form
opinions. Looked out over the rooftops
to the mountain. Decided where
to place our feet, what to write
with our mouths. Wondered how to keep
the rain, if our voices will shape

the rocks and carve memories
into unexpected surfaces, leave
traces decipherable with
the proper tools. In the buildings
below, tools will be provided
by those who have seen them
reveal only questions
of purpose and value.

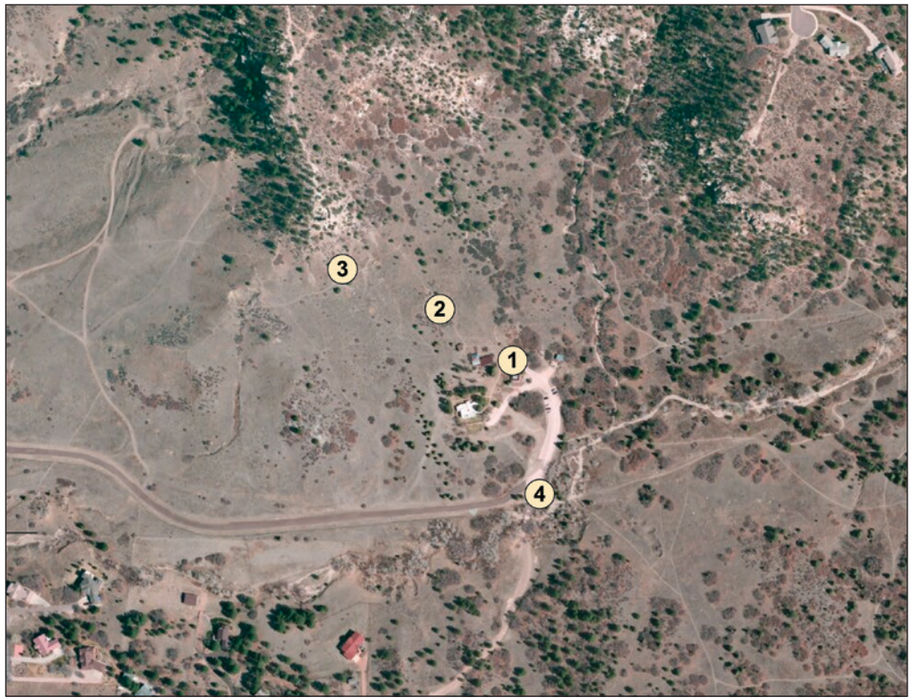
Heller Area Geology Tour

Eric Billmeyer and Tom Huber
Geography and Environmental Studies

The short geology walk around the Heller Center shows the geologic scope at UCCS from the minute scale of microscopic chert grains to the results of the grand mountain building episode we call the Laramide Orogeny.



Heller geology tour locations on geologic map



Heller geology tour locations on aerial photo

This convex fan is the remnants of material from the bluffs above

This black, hard, and fine-grained rock is typical of chert found throughout the campus

Site 1

Chert has been crafted by native peoples for millennia to create arrowheads and spear points among other items. Chert is useful as a tool stone because of the way that it fractures conchoidally when struck, often causing a sharp edge to form. Chert is a silica-rich, microcrystalline

(crystals not visible to the naked eye) sedimentary rock. In the Pikeview formation, it formed from silica that was dissolved by ground water flow through the surrounding rock that was rich in silicate materials. Over geological time, the silica precipitated into voids within the rock growing into microscopic crystals. Red, yellow, and black chert (such as the sample shown) is found throughout the lower Pikeview formation. Fragments of chert that have been worked by native peoples can be found scattered about at undisturbed sites on the western edge of the UCCS campus.

Site 2

Erosion of the bluffs has resulted in massive deposits of sediment at the base of the cliffs extending down into the valleys. These sediment deposits take the form of large colluvial fans. Colluvium is sediment that has moved downslope by gravity. Colluvium deposits are associated with mass wasting processes such as landslides or rock fall or by the action of precipitation running over the landscape as sheetflow. Over time these fans are stabilized by vegetation such as blue grama and yucca. The convex shape of the land below Eagle Rock gives a clue to the massive amount of material shed by the bluffs onto the lower slopes.

Site 3

Can rocks talk? Well, not exactly, but if you know how to interpret their visual clues, they can provide a detailed history of past environments. Bluffs made of sedimentary rock surround the UCCS campus. These rocks contain stream deposited sediments from an ancestral Pikes Peak that existed 65 million years

This is the obvious contact between the Pulpit Rock (above) and Pikeview (below) formations

The volcanic material (andesite) mixed with other sediments comprises 200 ft of the lower portion of the bluffs and is called the Pikeview formation. Stream deposited material known as alluvium forms the top 40-60 ft of the bluffs and is referred to as the Pulpit Rock formation. The contact between the Pikeview formation and the Pulpit Rock formation is an unconformity, essentially an erosional time gap in the rock record.

ago as well as material from a volcanic field in the southwest that existed at an even earlier time. The volcanic material (andesite) mixed with other sediments comprises 200 ft of the lower portion of the bluffs and is called the Pikeview formation. Stream deposited material known as alluvium forms the top 40-60 ft of the bluffs and is referred to as the Pulpit Rock formation. The contact between the Pikeview formation and the Pulpit Rock formation (as shown on previous page) is an unconformity, essentially an erosional time gap in the rock record. In this case approximately 8 million years of Earth's geologic history is missing.

Site 4

Most streams in the Pikes Peak region are ephemeral in nature, and the northern outfall stream near the Heller Center is an excellent example.

The culvert going below the road is almost completely blocked with sediment

Ephemeral or intermittent streams only carry flow during and immediately after a storm event within the stream's watershed. Typically these stream types experience short duration, high volume flows commonly described as flashy. The energy of these short duration flows allows great quantities of sediment to be carried downstream. The high sediment load carried by the stream near Heller requires constant maintenance of infrastructure such as the culvert under the access road to keep it functioning as designed. The road itself impedes flow and has caused severe erosion to the stream's banks just upstream from this location.

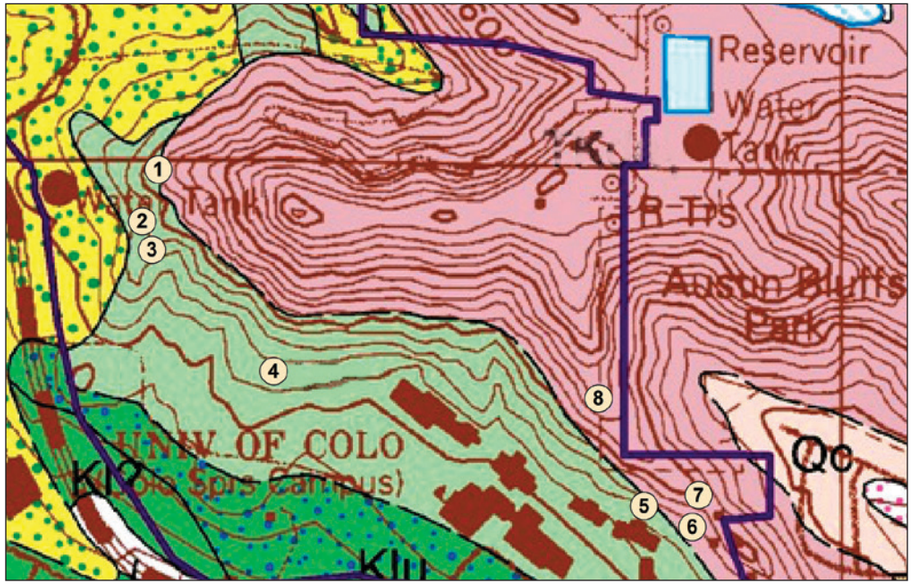
The coarse-grained sand just upstream from the road was deposited by fast moving, intermittent flooding

Although we see the miniscule with the magnificent in this little tour, the thing to take away is that the small things (stream erosion and deposition) are what over eons create the big things. Much of the rock in the bluffs was once sediment carried by streams of water and deposited to eventually become hardened rock. The geologic and geomorphic processes of the past are the same as the processes today, and will be the processes of the future.

Cragmor Area Geology Tour

Eric Billmeyer and Tom Huber
Geography and Environmental Studies

A walk below the bluffs along Mountain Lion Way reveals a multitude of geologic characteristics that display the varied and creative nature of geology. From old sand dunes to current landslides that span millions of years to the present time, one can see geology written all along the way.



Cragmor geology tour locations on geologic map

Cragmor geology tour locations on aerial photo

Site 1

Throughout the bluffs you'll notice many incised channels known as gullies. A gully develops where the erosional resistance of the land surface is overcome by an increase in concentrated water flow causing soil to wash away and a channel to form. The top of the bluffs has a network of user created "social" trails and many exposed bedrock surfaces which facilitate the concentration of water downslope. Due to the highly erodible nature of our soils on campus, once a small channel begins to form it will often develop over time into a gully like the one before you. Once established, a gully will continue to expand both in width and length until stability of the channel is achieved, often taking decades or more. Mitigation of gullies and their impact on destabilizing the bluffs through increased soil erosion will be an ongoing challenge for UCCS.

Gullies like this one behind Alpine Village start at the bottom and head-ward erode up the hill

Site 2

For most people's first visit to the main UCCS campus, there are two dramatic views of note. The first is that expansive vista of Pikes Peak to our southwest that defines our region. The second view is to look up – up to the

The high bluffs above campus are one of our signature landforms

The light tan colored, massive rock in these bluffs is the Pulpit Rock formation – formerly called the upper Dawson formation. From afar these rocks look homogeneous, but on closer inspection they are anything but uniform, ranging from sandstone to mudstone. The rocks record a highly varied environmental history. Within the rocks are evidence of high energy braided streams, massive mudflows, and ephemeral swamps.

high sandstone bluffs looking over the campus. The light tan colored, massive rock in these bluffs is the Pulpit Rock formation – formerly called the upper Dawson formation. From afar these rocks look homogeneous, but on closer inspection they are anything but uniform ranging from sandstone to mudstone. The rocks record a highly varied environmental history. Within the rocks are evidence of high energy braided streams, massive mudflows, and ephemeral swamps. The top of the bluffs is capped by a multitude of very hard, erosion-resistant iron oxide-cemented sediments that help protect the bluffs from rapid erosion.

Site 3

The rock outcrop here displays two interesting structures commonly found in the Pikeview formation. The first is called cross-bedding. Cross-beds

Cross-bedding is clearly evident in this sandstone

are structures that have preserved the inclined surfaces of wind or water deposited sediments in the form of ripples or sand waves. The direction of the dip indicates the direction of the paleo-current at the time of deposition. The cross-beds here formed when this area was covered by a series of braided stream channels that flowed from the southwest. The different cross-beds are identifiable by their direction of dip as well as changes in the texture (grain size) of the rock. Look for areas of

course grained rock dipping away from areas of finer grained rock to see a part of our geologic history locked in stone. The second structure noticeable here is the small, clastic dikes (intrusions) that are cutting across the surrounding rock. Clasts are eroded fragments of pre-existing rocks and minerals. In this case the clastic material is light gray silt and clay. Clastic dikes typically form from the seismic shaking that occurs during an earthquake. This causes sediments with a high water content to go through a process called liquefaction in which the sediments are turned into a liquid slurry and are injected into fractures within the overlying bedrock. All around you is a swarm of these clastic dikes.

Site 4

Watch out! That's a landslide right above you. Don't worry, you are safe for now,

This relatively large landslide (slump) is moving ever so slowly downhill – the photo is taken from the roof of Monarch House

but this type of mass wasting process is a real threat to the stability of the slopes above the UCCS campus. This type of landslide is called a slump. Slumps form when there is a plane of weaker material (usually clay) below the surface that gives way and the portion of soil above the plane becomes saturated with water, for example, after a major precipitation event. The additional weight of the saturated soil and the sliding potential of the clay plane can cause a failure of

the slope. The head scarp, the steep drop at the top of the slump, is where the land within the slump "broke" loose and began sliding down the slope. In the middle of the slump you'll usually notice that the terrain undulates or looks "hummocky." This is due to blocks within the slump that rotate outwards as the slump moves downslope. At the base of the slump a fan like ridge of pushed up earth indicates where the saturated soil stopped moving. This is called the toe of the slump, and here you'll see it about 10 feet above the road cut. There has been extensive mitigation at the toe of this slump to prevent sediment from inundating Mountain Lion Way just behind Monarch House.

Site 5

Many of the older structures found on the UCCS campus were built using native stone from the surrounding

Rock walls throughout campus are made from our local bluffs rock

bluffs. The rocks used to make this retaining wall are an arkosic (feldspar rich) sandstone that is part of the Pulpit Rock formation.

Site 6

Here is an example of some of the work that has been completed on campus to mitigate erosion and sedimentation from the bluffs. The channel has been lined with granitic rock in order to provide an erosion

The rough entrance to the trails system on the bluffs

resistant surface. The rocks also provide roughness to the channel to slow down or attenuate the water flow during storm events. As a result of this work, the former gully is now stabilized and sediment no longer is carried out into the street. This former gully is the de facto entrance to the trail system that winds its way to the top of the bluffs just behind Main Hall.

Site 7

Before you is a nicely exposed slab of bedrock of the Pulpit Rock formation. You can easily feel the gritty texture

Cracking and jointing show the forces that have moved this rock to the surface

of this rock identifying that it is a sandstone. The other notable features

here are the cracks within the bedrock itself. These joints form when the rock expands as it is exposed at the surface. These rocks are tens of millions of years old and were buried under hundreds to thousands of feet of sediment. The immense confining pressure helped turn all these individual sand grains into a coherent piece of rock in the first place. As this "overburden" was removed through erosion, the overlying pressure was lessened and the rock expanded and formed these joints.

Site 8

One of the more interesting features found on the bluffs above UCCS is the fantastically shaped pedestals like the one on display here. These features are known as monuments or hoodoos. Hoodoos typically form in sedimentary rock where a weather resistant cap rock protects the softer more erodible rock below. The hoodoos found on campus are primarily sandstone with a cap rock of sandstone that has been cemented by oxidized iron. This erosion resistant cap rock acts almost like an umbrella to protect the rock below and allows for differential weathering of the protected sandstone to form many interesting shapes.

Geologic processes may be slow, but they are inexorable. The constant attack on the rock and soil by water, wind, and gravity will eventually reduce our precious bluffs to nothing more than the proverbial "mole hill." That time, however, is eons down the road. The landforms of today remind us of what has happened in the past and of what we may look forward to in the future.

Hoodoos are some of the most dramatic, small scale landforms in the region

Climate and Water

Climate

Tom Huber | Geography and Environmental Studies
Sara Santa Cruz | Geography and Environmental Studies Student

Weather is that capricious occurrence of temperature, wind, precipitation, and cloudiness that is happening today or tomorrow or next week. In Colorado it can vary greatly from day-to-day and hour-to-hour. Climate is the more staid and steady phenomenon that happens over years and decades and generations. Officially, climate is the average of the weather for the days and seasons over at least 30 years. Climate is the trend line of what we should expect, and weather is the spatial and temporal variation on that general trend.

Anyone familiar with UCCS knows about this variation. We all have heard of students living in Ellicott who

cannot get to class because they are snowed in while those of us in town and on campus are having a nice, sunny day. We can also empathize with faculty members who live in the Black Forest and cannot get their cars started in below zero temperatures, while on campus the temperatures, although not balmy, are cool and not unpleasant. Why is our weather so fickle and our climate so wonderful?

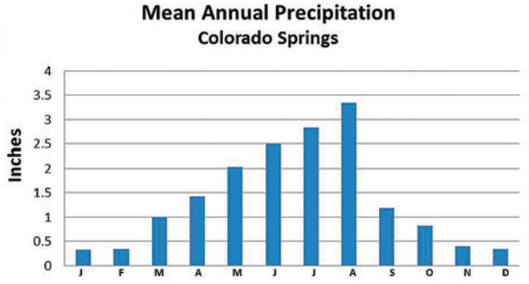
The answer to that question involves a multitude of factors. There are at least five characteristics that need to be considered when looking at weather and climate: the latitude of the place; the distance from a major source of moisture; worldwide circulation patterns; elevation (especially here in Colorado); and topography or the lay of the land. UCCS sits firmly in the mid-latitudes where the world wind patterns show a markedly western flow. Seldom, if ever, do we see storm systems coming from the east – almost always they come from the west, the southwest, or the northwest and are steered mostly by the shifts in the jet stream.

UCCS also lies deep within the continent of North America, more than 800 miles from the nearest source of significant moisture (the Pacific Ocean). The Pacific is the main source of water that we in the West must depend upon. Another more distant source that does provide us with erratic, yet at times substantial, moisture is the Gulf of Mexico. Even when large masses of moist air approach from the west, they encounter the expansive, north-south trending mountain ranges and orographic lifting that cause most of the moisture in the air to fall, often as snow, before it reaches Colorado Springs.

When you look at average precipitation maps for Colorado, you quickly see that we here on the eastern side of the Rockies get only a fraction of the rain or snow that the high elevations get to our west. In fact most of the municipal water supplied by Colorado Springs Utilities to UCCS comes from these same high mountains, including places west of the continental divide.

The National Oceanic and Atmospheric Administration (NOAA) summarizes the climate of Colorado Springs and UCCS quite succinctly in two sets of data – the mean annual precipitation (16.02 inches for Colorado Springs) and the mean monthly temperatures. It is evident that our winters are pretty dry, with less than an inch of precipitation on average for each of the months of November through February. As spring approaches the rate of precipitation rises. In fact we usually get our largest snowfalls in March and April. In mid to late summer, the regional air flow patterns often shift and moister air is brought into Colorado from the southwest. Most of the rain comes from nearly daily thunderstorms that can often be accompanied by hail and strong, localized winds. This shift in circulation is termed the 'summer monsoon' even though the true monsoons of Asia are far more intense. Precipitation rates fall off dramatically as we move into autumn. Many of us relish the dry, sunny, mild fall days that beckon us to the mountains to see the golden leaves of expansive aspen groves as they get ready for winter. We do get sporadic extremes in precipitation. The wettest year ever recorded was 1999 when 27.58 inches of precipitation fell. Much of that came in April when the heavy rains caused massive landsliding

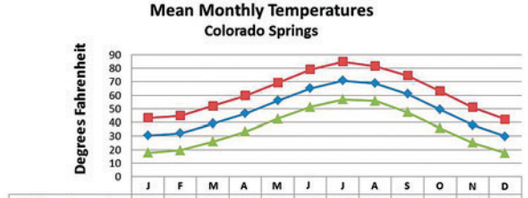
and flooding around Colorado Springs. The driest year recorded was 1939 when we got only 6.07 inches of precipitation. The year of the Waldo Canyon Fire, 2012, was also a year of very low precipitation – 8.11 inches.



The mean annual precipitation for Colorado Springs as reported by NOAA

Our temperatures reflect our mid-latitude position and give us our four relatively distinct seasons. Winters are usually cold at night but warm up nicely during the day. The average winter nighttime temperatures are in the teens and the daytime temperatures usually in the forties. Summer days can be hot while the nights cool off to very pleasant levels. Often the high summer daytime temperatures last only a few hours as thunderstorms develop in the afternoons and cool the air rapidly. Temperatures moderate quickly as we approach fall. Cool nights and pleasant, relatively warm days accompany the clear and deeply cyan skies we see nearly every day. One might imagine that our record high temperatures would be very high. Surprisingly, the record is only 101° reached in July 2012. Many parts of eastern and far western Colorado reach and exceed that temperature regularly. Our lowest temperature ever was -32° in January 1883. We seldom get below zero, and it is a shock to our system when we do.

What we have discussed so far is called the macro-climate of Colorado Springs and UCCS. But there is another, finer scale climate called the micro-climate. Micro-climate can be as detailed as looking at the climatic differences between the bottom and the top of the same leaf on a Gambel oak shrub, or it can be on a bit larger scale. These larger scale micro-climates show themselves to any keen observer at UCCS. One of the most dramatic of these is the micro-climate, and resulting vegetation, on the south-facing slopes of the bluffs. These are sere landscapes with a lot of bare rock and exposed soil. These slopes can heat up quickly and intensely on a late summer's morning. This is in contrast to the north-facing slopes of the bluffs that are tree covered and generally much cooler, having a great deal more ambient humidity than their southern neighbors. The intensity of the Colorado sun makes a huge difference in these juxtaposed landscapes.



	J	F	M	A	M	J	J	A	S	O	N	D
Mean Temperature	30.5	32.1	39.1	46.5	55.9	65.1	70.9	68.7	60.9	49.4	38.1	29.8
Mean High Temp.	43.2	44.8	52.1	59.8	69.1	79	84.8	81.6	74.5	63	51	42.1
Mean Low Temp.	17.7	19.5	26	33.3	42.7	51.3	56.9	55.7	47.3	35.8	25.2	17.5

Mean monthly temperatures for Colorado Springs as reported by NOAA

Additional effects on these micro-climates are caused by the changes in elevation on campus. There is 440 feet of elevation change (relief) from the lowest to the highest point on UCCS. Because we are in a semi-arid class of climate, we are just on the edge for moisture availability for many plants. With just a little boost upward, the orographic effect of moving air lowers its temperature much closer to the dew point

and toward more precipitation. The higher sites of the bluffs may get just an inch or two more precipitation than the lower slopes in any given year, but that marginal increase can make all the difference to a drought weakened ponderosa pine or a healthy, vibrant Douglas fir.

The first decade of the 21st century in the Southwest has been a time of considerable drought. Massive wildfires in the region including the Black Forest, Waldo Canyon, and the Hayman fire near Lake George are indicative of the lack of snow and rainfall. This may just be a cycle of dryness like others that infrequently hit any given place, but there is also the wider topic of global (and therefore local) climate change insidiously becoming something of concern. Carbon dioxide, a proven greenhouse gas, has increased in our atmosphere from 280 ppm (parts per million) in the late 19th century to just over 400 ppm now. There is no scientific denying that with increases in carbon dioxide there will be increases in temperatures and dramatic hydrologic changes. The impacts will be widely variable depending on location; the consistent predictions for the Southwest and Colorado are for a dryer and warmer atmosphere than many other places. Over 90% of the climate models predict that the Southwest will have a fifth less water in the 21st century than it had in the 20th century. So far the models have under-predicted the warming that we are actually seeing today, meaning it is getting warmer more quickly than we thought might happen. UCCS will not be immune to these trends, and our position in the urban/wildland interface of the foothills means that keeping our beloved natural environment healthy will be a challenge for the future.

Water

Tom Huber | Geography and Environmental Studies

With the climate patterns in mind, the story of water at UCCS is really quite simple – usually there isn't any except when there's too much. There are no permanent or perennial streams, ponds, lakes, or marshes on campus. We do have what some call arroyos that are long-term, intermittent water courses and more recently created large gully systems that, if not wholly caused by human activity, are certainly exacerbated in the extreme by it.

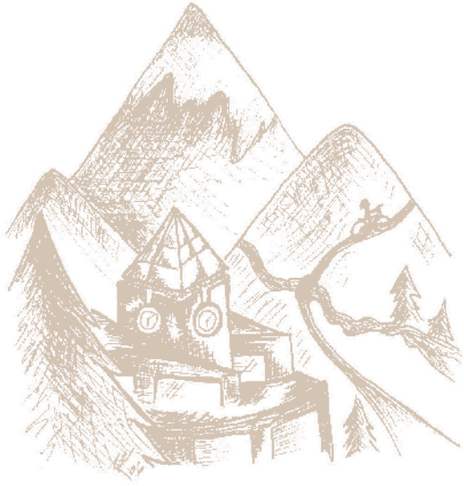
There have been various attempts to name the larger natural arroyos, but these names never really caught on with the campus community. Successful naming of landscape features usually occurs when the people committed to a place assign names to features that have meaning for them – seldom do names decreed from some higher authority remain beyond the term of office of the person doing the decreeing. The three most prominent natural arroyos on campus run from east to west on the North Campus parcel. The largest and most developed and stable of these, called the "southern outfall" in the latest Master Plan, closely parallels Austin Bluffs Parkway. It is a quintessentially riparian ecosystem where vegetation abounds as a result of the slightly higher water found in the alluvial sands of the stream channel and banks. The trees, shrubs, forbs, and grasses of this arroyo provide some of the best faunal habitat on the entire campus. In all of eastern Colorado, riparian corridors just like this one

provide food, shelter, and relatively safe travel for large numbers of animal species including mule deer, bobcats, black bear, and red fox to name a few.

A road at the bottom of the 'southern outfall' arroyo. Note the thick vegetation on either side

The second of these large, intermittent arroyos, the "middle outfall" in the Master Plan, runs just to the north of and parallel to the first. It naturally marks the rough boundary between the southern edge of the Eagle Rock neighborhood and the campus. Both of these watercourses drain the high bluffs that loom above the Alpine Village apartments. This second arroyo is still very natural and less eroded than either of the other two. Although it is not as large as the arroyo just to the south, it carries most of the runoff from the bluffs above Alpine Village, and it too is a well-developed riparian ecosystem that provides habitat for various fauna.

The third of these main arroyos, the "northern outfall" in the Master Plan, may be the most natural near its head and the least natural as it exits the campus to the west. It starts in the City of Colorado Springs Austin Bluffs Open Space that lies just east of the Heller Center property and flows along the northern edge of the Eagle Rock neighborhood and the southern edge of the Heller Center. In its upper reaches it is a small but very pleasant riparian respite from the more sere grasslands of the open space. As it enters the far southern tip of Heller from the city's open space, cottonwoods, Gambel oak, and other shrubs thrive alongside its sandy bottom. As the arroyo progresses west, the small valley opens up into a nearly native grassland on either side of the arroyo bed. But just west, as it approaches Nevada Avenue, it becomes a deeply entrenched and degraded gully where the steep walls are eroding rapidly.



Soil

Tom Huber
Geography and Environmental Studies

In his book *Dirt* William Bryant Logan called soil "the ecstatic skin of the Earth." He exuberantly and reverently chronicles the soul of the soil and how it provides one of the most critical assets needed for life on this planet. Soil along with water in all its phases and the particular and peculiar chemical mix of gases in our atmosphere are the three things most responsible for our ability to inhabit the unique planet Earth.

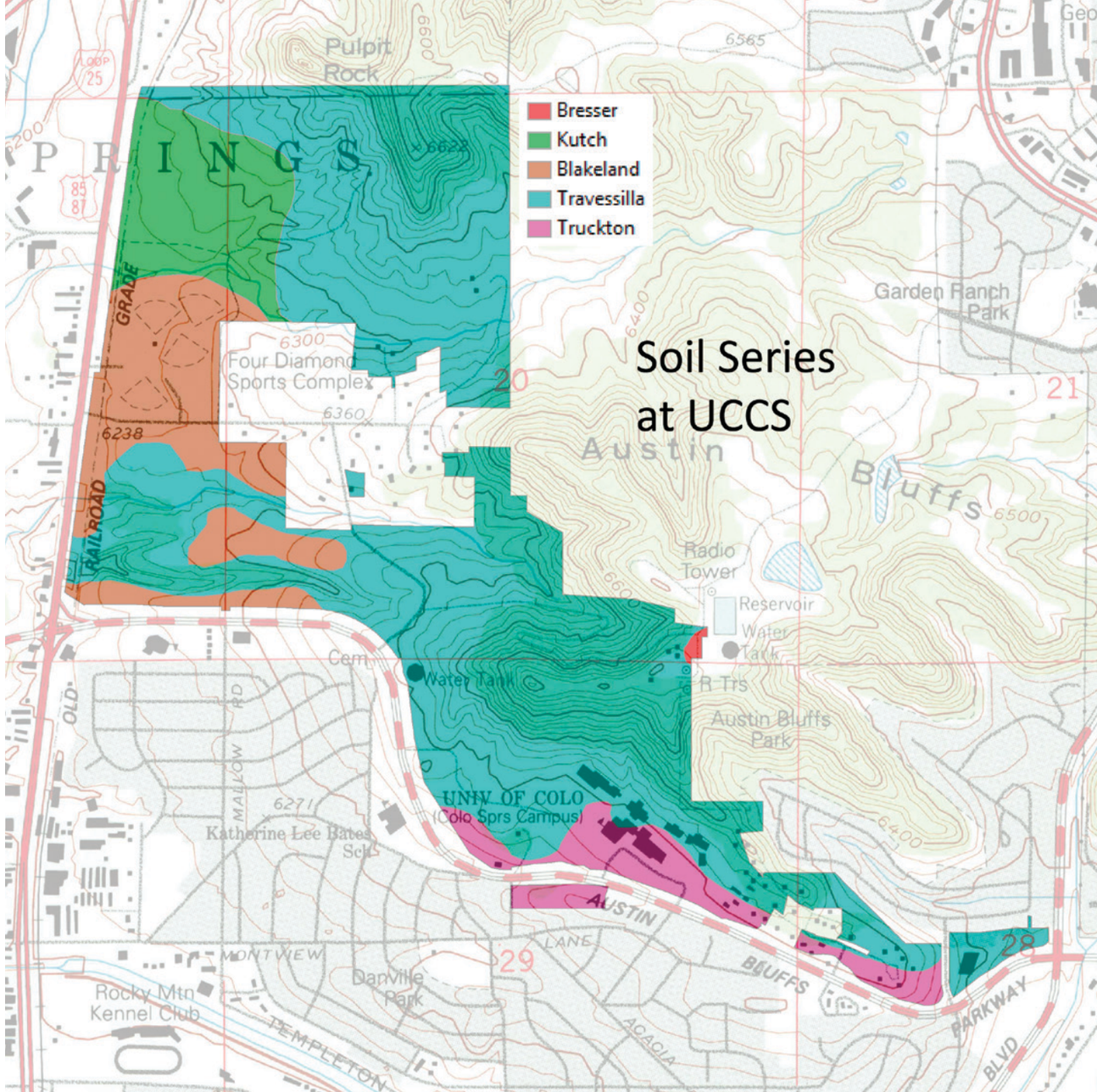
Soils come in nearly infinite varieties. Some are naturally fertile, others nearly sterile. Many almost magically filter and clean the water and wastewater that runs on, in, and through them. Others are good for buildings, reservoirs, and roads while a few soils are capable of destroying these same engineered works. Soils can give life but can also destroy lives if not treated with respect and a modicum of care. Soils are critical to nearly all terrestrial life and, as such, have been studied, tested, categorized, and classified. In the United States, soil classification is predominantly done by the Natural Resource Conservation Service (NRCS) (formerly called the Soil Conservation

Service). The NRCS has assiduously mapped most of the arable lands and their soils in the country. They have established more than 10,000 soil series throughout the United States. Five of these 10,000 occur here on our campus.

When the NRCS names a soil series, it uses the concept of "type location" similar to how geologic formations are named. The type location is the first place that a soil is thoroughly described and mapped, and the soil expert that does this describing determines that this series is significantly different than any other series. The five soil series found at UCCS include the Travessilla (named after a soil found in Union County, New Mexico), the Blakeland (named for a soil first described in Arapahoe County, Colorado), the Truckton (for a soil first named on the western side of Colorado Springs), the Kutch (named for a soil in Elbert County, Colorado), and the Bresser (again for a soil found in Arapahoe County).

One of the major factors determining how soils develop, especially in a semi-arid environment such as we have at UCCS, is the parent material from which the soil is made. For this reason it makes sense that the Travessilla soil

Travessilla soil sitting atop a sandstone outcrop on the bluffs



The five soil series that exist at UCCS

is the most prevalent (over 70%) of the five soil series found on campus. The Travessilla derives from the Pulpit Rock and Pikeview formations – a complex mix of sandstones, siltstones, and sandy claystones, all of which are obvious in the bluffs looming over the campus. The soil that comes from these formations is mostly sandy, contains many rock fragments, and is very shallow on the steeper hillsides. The NRCS rates the Travessilla as not very useful for anything other than forest or shrub growth and concludes that it erodes easily and often on the steep slopes of our campus bluffs. Even a cursory look at the hills above the Cragmor parcel shows multiple, deeply eroded gullies.

A singular and critical dimension of the Travessilla soil is the near-end product of its weathering. The decomposed claystone, in particular, has had major impacts on the campus infrastructure and the buildings of the preceding era of the Cragmor Sanatarium. The weathered clays from the claystone are what soil scientists call the smectite group of minerals. The critical characteristic of these clays is that they expand greatly when wet and contract an equal amount when they dry out. The pressures exerted by these expanding clay lenses has had severe effects on several buildings of the campus and the sanatarium that came before it. A great example can be seen behind Main Hall. Embedded in the hillside is the northern wall/foundation of what was once the nurses' quarters for the tuberculosis sanatarium. Barely a month after the building was finished in 1930, the expansive clays in the soil relentlessly destroyed most of the foundation, and the building was condemned and demolished. All future building at UCCS is sure to take into account this natural propensity for the clays to wreak their havoc.

The remaining foundation of the 1930 nurses' quarters destroyed by expansive soils

The Blakeland makes up the majority (16%) of the rest of the campus soil. Its parent material is one weathering and erosion step more developed than the Travessilla. Most of the main valley in the northern part of the campus, including the Eagle Rock neighborhood, is underlain by ancient alluvial and colluvial fans that came down from the bluffs during the Pleistocene epoch. These relatively flat lying sediments are more weathered and stable than the deposits just below the cliffs, thus providing these soils a longer period of undisturbed development. The Blakeland soils are easily distinguished from the less well developed Travessilla soils.

The Kutch (in the far northwestern corner of campus just under Pulpit Rock) and the Truckton (only along the very southern edge of the campus along Austin Bluffs Parkway) together comprise nearly all of the rest of the soil on campus. They have both developed from more recent alluvial

Blakeland soil is more well developed than the Travessilla that lies upslope

material, some of which is rich in calcium carbonate and some the result of ancient sand dunes that spot the area. The Bresser soil is a miniscule 1% of the campus soil. It lies at the very top of the bluff on relatively recent terrace gravels.

The land along the Front Range of Colorado including the campus is a unique environment in the country for the evolution of soils. The NRCS uses a hierarchical system to classify soils much like that used in biology. At the very top of the scheme are 12 soil orders (very similar to the six biological kingdoms) that cover every soil in the United States. At the bottom of this hierarchy are the 10,000+ soil

The Kutch soil is the most developed and deepest of all soils on campus

series. The rapid elevation changes and subsequent complexity of environments along the Front Range produce an equally complex set of soil orders in the region. Out of the 12 soil orders that can possibly occur throughout the U.S., eight of them can be found to a lesser or greater extent within a 30-mile radius of the UCCS campus. There are few places that can match this amazing environmental diversity and none that exceed it anywhere.

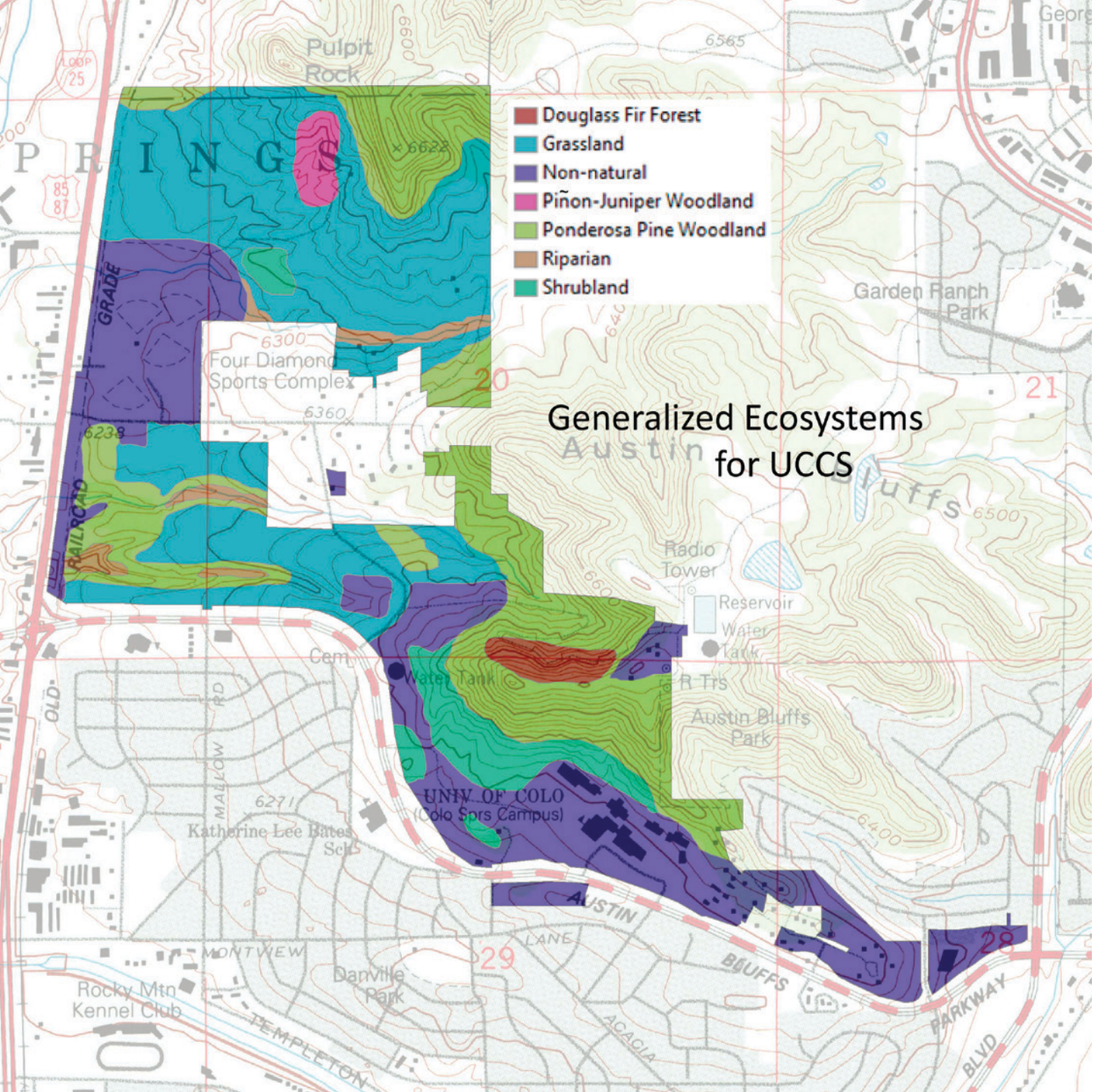
Soils are critical for many reasons: they provide the basis for all terrestrial ecosystems; they help us grow nearly all of our food; and they are part of the important natural systems that keep our world functioning. But, if you know how to "read" them, they can also be a text that tells us what the environment was like hundreds to thousands of years ago. Because soils need water and energy to develop, we can tell by looking if a soil has been evolving in a dry or wet, cold or hot site. Plants need soil, but good soil also needs plants and the live and decaying organic matter that is crucial to the health of the entire soil ecosystem. Even whether a soil sits on a slope that faces south (drier) or north (moister) can dramatically affect how the soil develops. Soils are complex entities, but with a little knowledge and some keen senses, the soil becomes our own ecological history book of a place. The soils of UCCS tell us a story, one that is grounded in our place and integral to our natural world.

UCCS Ecosystems

Tom Huber and Steve Jennings
Geography and Environmental Studies

Colorado, maybe more than any other state, is defined by elevation. Anything concerned with the natural world in Colorado is either on the eastern plains or in the mountains or in the high mountains or on the eastern slope or on the western slope – all elevation related. The biotic character of Colorado can be classed in a similar way. There are many systems that ecologists and biogeographers have devised to give some sense to the living natural landscapes in our elevated state. One simple and understandable scheme is the idea of *lifezones*.

Lifezones in Colorado progress upward from the lowest elevation to the highest: the plains; the foothills; the montane; the subalpine; and, the alpine. UCCS sits firmly in the foothills lifezone that generally spans approximate elevations from 5,500 feet to 8,000 feet. There is always some overlap with the plains lifezone on the low side and with the montane on the high side. The campus elevation ranges from a low of 6,184 feet near the corner of Austin Bluffs Parkway and Nevada Avenue to a high of 6,624



The seven generalized locations of the UCCS ecosystems

feet in the northeastern corner of the northern parcel. In any given lifezone, there exists a collection of ecosystems that are defined by vegetation type, water availability, soil character, bedrock formation, aspect, and elevation. An ecosystem is basically a community of living organisms (plants especially) that exist in association with certain of the non-biotic characteristics of the site. On the UCCS campus we have six distinctive, natural ecosystems and some non-natural variations caused by humans.

Ecosystems

Shrubland

The shrublands is the most obvious foothills ecosystem on campus. It is probably also the one most associated with the somewhat dryer parts of the foothills lifezone in all of Colorado. The plants that dominate the shrublands here are the Gambel oak, skunkbrush (also known as three-leaved sumac), mountain mahogany, and to a lesser degree the wax currant. The Gambel oak is the star, growing in expansive stands that are dense and easily recognizable from a distance and producing vivid reds and oranges in the autumn as its leaves change. All of these shrubs grow in sere locations, but the Gambel oak and mountain mahogany grow in particularly desiccated places, especially on south facing slopes that dry out rapidly after a rain or snowfall and on rock outcrops where little soil is available.

The Gambel oak acorns are a staple for local mule deer and some of the other fauna here. Of course the acorns are the seeds used for sexual reproduction of the oaks, but the plant has evolved to be adaptable if, for example, wildfire

affects a stand and precludes sexual reproduction. The oaks can vegetatively reproduce from swellings, called lignotubers, on the roots that send out rhizomes immediately after the fire. This is an extremely important adaptation in the foothills – especially when we think of the devastating fires the area has seen recently. The berries of the currants and skunkbrush, dispersed by the birds as they move about the land, are an important food source for several species of bird on campus. The feather-tailed seeds of the mountain mahogany are a wonder of evolution. When the seeds fall, the feather-like corkscrew tail allows the wind to move them hundreds of feet, and it will almost always land seed side down. As the tail dries out, the seed may actually be screwed into the very top soil surface.

Shrub species at UCCS love the rocky outcroppings like this one just south of Columbine Hall

The understory of the shrublands depends almost totally on the particular shrubs that are present. Many grasses, cacti, and yucca are interspersed with the shrubs. Under the Gambel oak and mountain mahogany stands, there is often little to no understory growth; these two shrubs usually grow in dense thickets that do not allow much sunlight to penetrate down to the soil surface. Without the sun the grasses and other herbaceous plants have a difficult time thriving.

Grassland

The grasslands on the UCCS property, especially on the northern parcel, are extensive and cover much of the flatter ground on the campus. An intensive study done for the city's Austin Bluffs Open Space just east of the Heller Center found the grasslands there to be a vibrant and nearly native tall-grass prairie. Many of the grasses in the Open Space and westward into the campus are considered tall-grass species including big bluestem and prairie sandreed. These two dominant grasses are increasingly joined by a list of short-grass species as you move more and more westward toward Nevada Avenue. Native grasses and their associated forbs dominate the eastern side of the northern parcel and degrade progressively as you move west onto the more level lands of the campus. These flatter places are largely designated to become the "built" parts of the northern parcel. Much of the eastern side of the northern parcel is too steep or already protected (the Heller Center) to allow easy construction, so the more native stands of grassland should continue to be dominant in these areas.

We have great examples of thriving grassland on areas of campus

As with any healthy grassland ecosystem, there is a diversity of plants on the UCCS lands. In addition to the two tall-grass species above, buckwheat, milkweed, needle-and-thread grass, blue grama, three-awn, western wheatgrass, and the invasive smooth brome are the main species. Forbs that intersperse throughout the grasslands on campus give a burst of color to the land when they bloom. Examples of these include the sunflower, sage, yucca, and several cactus species. Ecologists from around the region look at the city's Open Space and the Heller Center in particular as some of the best preserved and healthiest natural grassland ecosystem in the area.

Natural grasslands are both a very tough and very fragile ecosystem. The grasses of the prairie not only can survive fire but their growth is actually stimulated by it. Most of the biomass of the native grasses is in the root systems. As fire consumes the above ground foliage, it kills invading trees and shrubs. Once the fire is over, the deeply rooted grasses immediately start to send up new and vibrant growth. Grasslands are so good at taking advantage of wildfire that they are often called "pyrogenetic" landscapes. Grasslands also evolved to be able to withstand tens of thousands of bison as they roamed through large swaths of prairie. The bison kept moving and the grazed grasses revived quickly. But if these same grasses are grazed constantly, such as in an enclosed pasture, they will quickly become degraded and often invaded by weeds. Grasslands are very vulnerable to disturbance by heavy farm machinery or construction equipment moving over and plowing or grading the soil, for example. Invasive plants move in quickly to the newly vulnerable areas and, once established, have few natural pathogens. Without any natural enemies, they often out-compete the natives.

Piñon-Juniper Woodland

The piñon-juniper (PJ) woodland is the quintessential Southwestern plateau ecosystem. Colorado Springs and the UCCS campus mark its northern/eastern limit, although inexplicably there is a small stand north of Ft. Collins. Because

The Rocky Mountain junipers are typical of those on campus

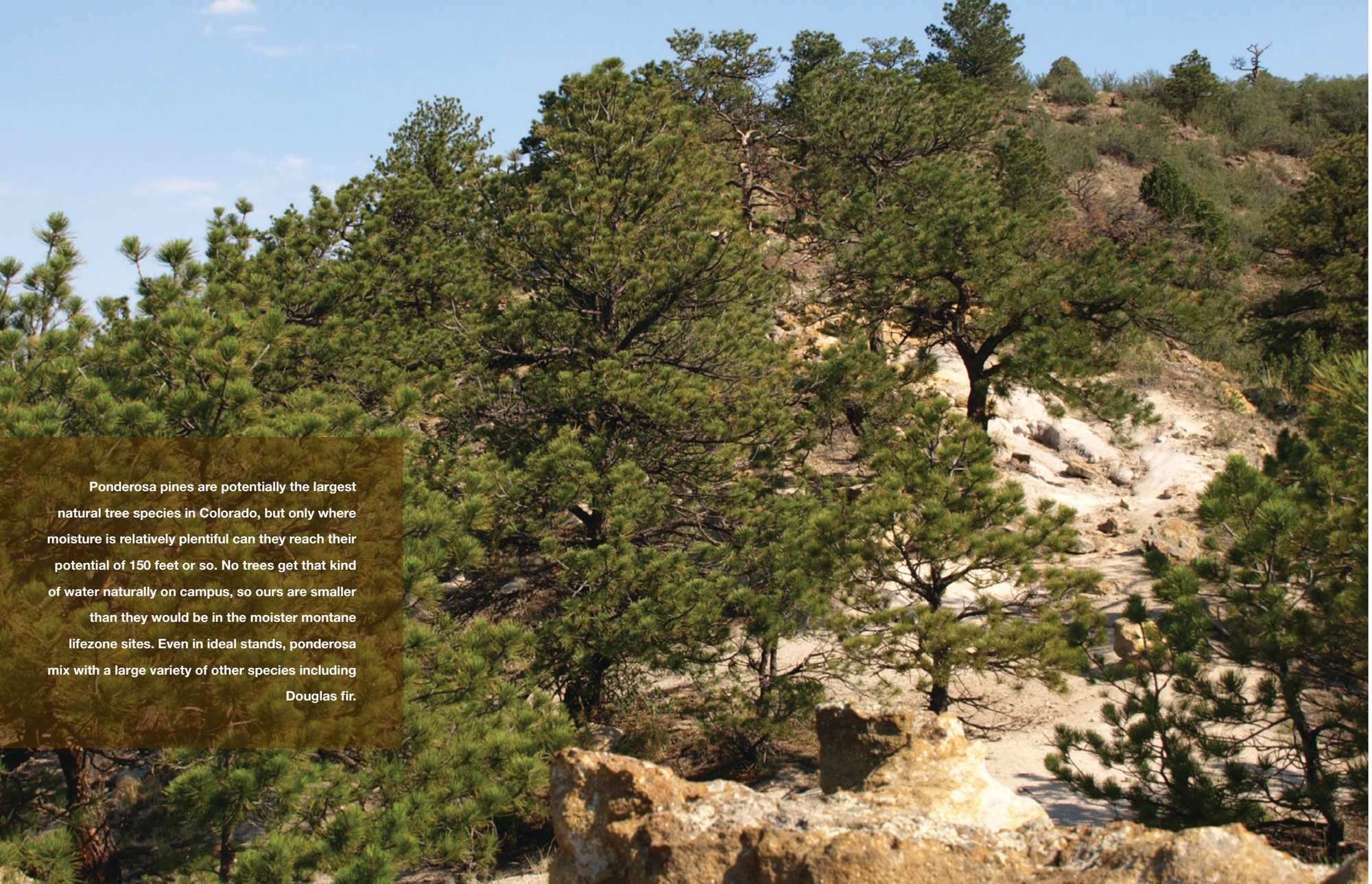
the local foothills are similar in elevation and climate to the plateaus of western Colorado and New Mexico, the PJ is a significant component of the natural environment in the northern parcel and on the south-facing bluffs above campus. The dominant species that make up the woodland here are the Colorado piñon pine, the Rocky Mountain juniper (also called the western red cedar), and the one-seed juniper. In western Colorado, the juniper species changes to the Utah juniper. These moderately sized trees often grow near each other, but if the area is drier, the juniper will dominate, and if the area is wetter or slightly higher, the piñons will be the primary tree species in the woodland. In most of the PJ woodland on the UCCS campus, the trees are widely spaced and inter-finger with other ecosystems. This is especially true at the Heller Center property.

Many people know the piñons for their culinary offerings; a number of foods of the Southwest use the piñon nuts as a staple. The production of nuts varies greatly from year to year. Large seed crops occur on average only about every five years, but this depends greatly on the precipitation patterns and amounts over those years. Many piñon stands of the Southwest are now suffering big declines because of the combination of drying from overall climate change and the trees' increased susceptibility to the *ips* beetle that kills many of the climate weakened trees. The *ips* has not reached the Colorado Springs area in force yet, but it may only be a matter of time.

The seeds of the one-seed juniper are used by animals and, to a certain extent, by humans. Most people would not eat a juniper seed – they are bitter and intensely resinous. But the familiarity of the smell of the seed comes from its use for flavoring gin. Both junipers are tough trees that can withstand long drought periods better than their piñon partner. The one-seed juniper has the look of chaos – its branches spreading in seemingly random directions, producing a gnarly appearance. In contrast the Rocky Mountain juniper often looks manicured with a perfect cone shape and dense foliage and is often used as an ornamental plant. The Rocky Mountain juniper tends to be the dominant juniper in slightly higher and moister sites than its cousin. The Rocky Mountain and one-seed junipers will probably become the primary species in the PJ woodland as the *ips* beetle continues to deplete the piñon stands of the Southwest.

Ponderosa Pine Woodland

The ponderosa pine stands on campus are living at their lower elevation limit and thus need to grow in places with slightly higher moisture levels. These tree stands are mostly restricted to the north-facing slopes of the bluffs and near ground water sources like the arroyos or other small, intermittent drainages. Ponderosa pines are potentially the largest natural tree species in Colorado, but only where moisture is relatively plentiful can they reach their potential of 150 feet or so. No trees get that kind of water naturally on campus, so ours are smaller than they would be in the moister montane lifezone sites. Even in ideal stands, ponderosa mix with a large variety of other species including Douglas fir. Most of the other plants are ground cover that grows between well-spaced trees. On campus these species include



Ponderosa pines are potentially the largest natural tree species in Colorado, but only where moisture is relatively plentiful can they reach their potential of 150 feet or so. No trees get that kind of water naturally on campus, so ours are smaller than they would be in the moister montane lifezone sites. Even in ideal stands, ponderosa mix with a large variety of other species including Douglas fir.

blue grama, needle-and-thread grass, and small wax currant bushes.

Ponderosa pines are very common in the montane where they can develop into very large stands. In healthy ponderosa stands, small fires frequently burn along the ground and consume low lying vegetation including many ponderosa saplings. The thick, tough bark of the mature ponderosas keeps the trees safe from these frequent fires and keeps the trees well-spaced. But if the small fires are not allowed to burn, as is the case in most of our western forests, the ponderosas grow very close together, and the potential for severe crown fires increases exponentially. We have seen the results of this scenario recently in the foothills on the west side of Colorado Springs and especially in the Black Forest.

Typical ponderosa pine stand on top of Eagle Rock

Ponderosas, like piñons, are also suffering the long term effects of drought. This obviously weakens the trees over time, and they become vulnerable to attack by pests that normally are bothersome but not lethal. Dwarf mistletoe is a parasitic plant that can stress a healthy tree but can kill a weakened one. The main pathogen that threatens almost all pines in Colorado including the ponderosa is the mountain pine beetle. This insect bores into pines to lay its eggs. It carries with it a deadly fungus that stains the wood blue, clogs the cells that transport nutrients and water, and kills a weakened tree very quickly. Vast swaths of mostly lodgepole pine have been destroyed by these beetles in northern Colorado and other areas of the West. The beetle has always been here, but it is now becoming a major infestation in all of the state. The beetles are thriving because the low temperatures needed during the winter to kill them off are not occurring or at least not occurring for long enough periods of time. The beetles are now even hatching multiple batches of eggs in a single summer – something unheard of before now. There is very little evidence of either the mistletoe or the pine beetle on campus yet, but the question is "when," not "if," in the long term.

Typical Douglas fir stand on the north facing slopes of the bluffs

Douglas Fir Forest

The Douglas fir forest stands on the UCCS campus are small collections of densely spaced trees often mixed with the ponderosa pines in the moistest, shadiest parts of the northern exposures on the bluffs. Most stands may consist of a few hundred trees at most. The Douglas fir needs more moisture than the ponderosas, so it finds niches in the shadows of other trees, large rocks, or cool ravines. Genetically different than its coniferous neighbors, the Douglas "fir" is not a true fir (or pine or spruce or hemlock either). Its genus name is *Pseudotsuga*, meaning false hemlock. It is a beautifully shaped plant much in demand for Christmas trees. The trees in the stands that we have at UCCS and throughout Colorado are moderate in size, especially compared to the giant subspecies of Douglas firs found in the Pacific Northwest. These mammoth trees are only outdone in size by the coastal redwoods of California.

Because the Douglas fir forest floor is so devoid of sunlight, there is often little understory vegetation. However, the stands of Douglas fir are seldom monocultures and readily mix with ponderosa pines, limber pines, and bristlecone pines in the montane but only with the ponderosas in this foothills location. Pine beetles may attack the pines in the stand, but they do not affect the firs. Douglas firs are less vulnerable to pathogens than the pines, but they do have their own diseases and insects. The most prevalent of these is the spruce bud worm that can defoliate a tree. Intermittent and recurring infestations of the bud worm cause some losses of the firs, but often there are trees left in the stand that serve as seed sources for re-vegetation after the worm attack abates.

Douglas firs are often able to survive drought periods because of a distinctive symbiotic relationship with certain fungi species. Fungi put out long, filamentous tendrils called hyphae. Many of these hyphae mass around the roots of the fir trees in what is called a mycorrhizal mycelium. The mycelium interweaves with and even penetrates the roots, thus increasing the root contact area with the soil and soil water by one hundred times or more. The fungus receives sugars produced by the photosynthesis of the tree in return. If you ever see an uprooted Douglas fir tree, look closely at the root/mycelium network that has been exposed. This mass is the manifestation of the complex and richly rewarding relationship between two very different organisms.

The Riparian

The last natural ecosystem at UCCS is the riparian. The riparian is generally understood to mean that landscape that lies between the aquatic zone and the terrestrial ecosystems. Hypothetically, it sits along the banks of lakes, marshes, and streams. Of course at UCCS we do not have lakes, marshes, or perennially flowing streams; nonetheless, there is incrementally more moisture along the banks of the arroyos because when it does rain or snowmelt, water in these water courses soaks into the soil and is stored for extended periods. This marginally larger moisture reservoir allows for relatively luxuriant growth of a wide variety of flora that is usually not found in any other ecosystem on campus specifically or in Colorado generally. With the exception of the shrublands on campus, the riparian is the only dominantly deciduous ecosystem at UCCS. The most extensive, continuous, and intact riparian zones on campus are in the upper reaches of the arroyos in the northern parcel. As these watercourses descend westward toward Nevada Avenue, they become less cohesive and, in some cases, are non-functioning riparian systems.

Most riparian sites at UCCS are dry much of the time. They only carry running surface water during significant storm events

The diversity of plants that grow in the riparian is large, but the ecosystem is dominated by the plains cottonwoods and sandbar willows. Both of these

species thrive in soil that may be saturated for extended periods – most terrestrial plants' root systems would shut down with this much water in the root zone. Other plants that can tolerate these moisture conditions and are in our riparian zone include cattails, horsetail, sedges, and rushes. In many places near the arroyos, there may be prolific growth of non-riparian plants such as ponderosa pine. The incremental gradient of soil moisture availability even a hundred feet away from the streambed gives these non-riparian species a significant advantage. You will see dense stands of pines parallel to some of the arroyos. The riparian in Colorado and the West produces the most vibrant vegetation of any ecosystem in the region. Fauna use the riparian in the plains, foothills, and mountains disproportionally more than any other ecosystem for food, shelter, and travel. Mule deer and other larger fauna on campus use our arroyos extensively.

Non-Natural Zones

There are significant areas of the campus that are not covered by natural ecosystems. One obvious example of this is the disturbed land that exists. Most disturbed land on campus is ephemeral – it will eventually be covered by buildings or intentionally landscaped, but if left alone (small areas of disturbed land always exist) it will likely be invaded by plants we call weeds. Many of these weedy species will be aliens to our environment and, because they have no local controls, will be able to spread rapidly and out-compete local species. Some of the more aggressive invasive plants we already find on campus include cheat grass, Canada thistle, tamarisk, and tumbleweed (Russian thistle).

Most of the remainder of the campus in the non-natural state is covered with buildings, walkways, parking lots, or landscaping. Only in this last category are plants a major feature. The campus is making some progress toward water conservation and the use of plants that are suitable for our climate and soils. To this end UCCS belongs to the nonprofit Plant Select® program administered by the Denver Botanical Garden and Colorado State University. Plant Select "seeks out, identifies, and distributes the best plants for landscaping in the intermountain West and the high plains." In conjunction with this program, the campus has created a "plant palette" that helps to select flora that are then used with the UCCS Landscape Design Guidelines for designing and creating landscaping. As the campus building infrastructure grows, this entire process of selecting and building rational landscaped spaces is going to become ever more critical. If we are to maintain and enhance our particular place nestled in the foothills of the Front Range, we need to stay focused on what vegetation we use at UCCS.

Much of the campus non-native vegetation can be described as manicured

The UCCS campus is endowed with an ecosystem diversity to be envied. To have this many kinds of vegetation naturally occurring in such a small area is a gift from our land and its dramatic elevation changes, our variations in climate, and our geology and soils. The UCCS community has our own natural laboratory, one to be cherished and encouraged.

UCCS Selected Plant List

Steve Jennings and Tom Huber
Geography and Environmental Studies

Shrublands

Gambel oak *Quercus gambelii* — The dense clusters of branches generally form impenetrable thickets. Unlike other species of oaks, the leaves of this shrub turn brown in the fall rather than bright colors. The dead leaves can persist on the plant through the winter until they are pushed off by the new leaves.

Gambel oak with newly formed acorn

Skunkbrush *Rhus trilobata* — This relative of poison ivy has three-lobed leaves which are actually leaflets that together form the leaf. Small yellow flowers develop into red berries which are a valuable source of food for birds and small animals.

Skunkbrush, also called three-leaved sumac

Mountain mahogany *Cercocarpus montanus* — This somewhat leggy shrub is not a true mahogany. The leaves are triangular and have several rounded teeth on the leaf edge. The distinctive seed with its hairy tail remains on the plant after the leaves have fallen in the fall.

Mountain mahogany with its corkscrew-like seed

Wax currant *Ribes cereum* — This is a small shrub having lobed leaves with serrated edges. In the spring the plant produces clusters of pale white to pink flowers which develop into small, relatively tasteless red berries.

Rubber rabbit brush *Ericameria nauseosa* — This shrub has many stems that originate from a base and are covered with fine white hairs giving the plant a whitish tint. The leaves are long and slender. Flowers are produced in the fall in showy clusters of yellow flowers.

Grasslands

Big bluestem *Andropogon gerardii* — This grass is a perennial that can reach a height of three feet. The bases of mature stems have a purple hue. The seeds are found on three spikes at the top of the plant. These three spikes look like a turkey's foot; hence another common name for this grass is turkey foot.

Little bluestem *Schizachyrium scoparium* — Purplish at their bases, these perennial grasses look similar to big bluestem. The plants are usually smaller than big bluestem. The seeds are hairy and are borne on a seed head that can be several inches tall.

Prairie sandreed *Calamovilfa longifolia* — This perennial grass produces numerous leaves that roll up in response to dry conditions. The seeds are produced on tight clusters on the stem and have long hairs at their base.

Needle-and-thread grass *Hesperostipa comata* — The common name describes the seeds of these perennial grasses. The seeds have a hairy extension called an awn which can be as much as eight inches long.

Blue grama *Bouteloua gracilis* — A perennial grass reaching a height of less than a foot, this is an easy plant to identify since the seeds are all on one side of the stem. As the seeds mature the stem becomes curved, looking a little like long eyelashes. The foliage has somewhat of a blue tint.

Blue grama grass with its distinctive “eyelash” seed pod

Sideoats grama *Bouteloua curtipendula* — This grass is related to blue grama but has larger seeds which are more widely spaced on one side of the stem. A few seeds may also be on the opposite side of the stem.

Sunflower *Helianthus annuus* — This is a tall annual with large leaves and flowers that are characteristic of sunflowers. This flower is actually an assemblage of numerous small flowers. The disk flowers in the center produce seeds and the ray flowers are the showy petals around the edge.

Pasture sage

Pasture sage *Artemisia frigida* — Related to the larger sagebrush, this is a small perennial with a woody base. This plant is in the sunflower family, but does not produce showy flowers. The flowers are small, wooly, gray-green, and bunched on stems that rise above the rest of the plant.

Yucca

Yucca *Yucca glauca* — Forming a rosette of long stiff leaves with sharply pointed tips, this plant has been important for Native Americans. The leaves were used to make sandals and the roots for shampoo. In the spring large white flowers are produced on long stalks that grow from the center of the plant.

Spinystar *Escobaria vivipara* — This is a small mound-shaped cactus with long spines. The areoles are arranged in diagonal patterns on the cactus. The spines look like a star radiating out light from their centers.

Spinystar or starvation cactus

Plains pricklypear *Opuntia polyacantha* — This cactus is composed of clusters of flat pads with numerous spines. The flowers are large, multi-petaled, and yellow.

Pricklypear cactus

Piñon-Juniper Woodlands

One-seed juniper *Juniperus monosperma* — This conifer is characterized by needles that are small triangular scales that cover the surface of the twigs. The fruits are purple and berry-like. These trees are very aromatic and have stringy shredding bark while the wood is not very durable compared to other junipers.

Colorado piñon pine *Pinus edulis* — As with all pines the needles of this tree are clustered together by a papery sheath at their base called a fascicle. Each fascicle has two short needles. The cones are compact with stout scales. The seeds are large, and are enjoyed by humans and many animals alike.

Rocky Mountain juniper *Juniperus scopulorum* — This species of juniper is similar to one-seed juniper with its reduced scales, purple fruits, and stringy bark. The tear-drop shape of the tree is the best way to identify this species. Both species of juniper have plants that have individuals that produce only pollen-producing flowers and others that produce only seeds.

Ponderosa Pine Woodland

Ponderosa pine *Pinus ponderosa* — This pine has two or three long needles per fascicle. The bark of mature trees forms plates that have yellowish areas between them and often smells like vanilla or butterscotch. The crown is usually rounded.

Douglas Fir Woodland

Douglas fir *Pseudotsuga menziesii* — This large conifer has flat, blunt, needles that are attached directly to the twigs. The easiest way to positively identify this tree is to look at its cones

Douglas fir

which have distinctive three-pronged bracts protruding from between the cone scales.

The Riparian

Plains cottonwood *Populus deltoides* These deciduous trees have large triangular leaves. The common name comes from the tree's prolific production of seeds which are surrounded by cotton-like hairs. The flower clusters are green and hang from the branches before the leaves emerge.

Plains cottonwood

Willow *Salix* spp. — A relative of cottonwood, these shrubs are hard to identify to the species level because the flower parts are small. The flowers are produced in fuzzy clusters before the leaves open in the spring. Typically the leaves are linear.

Willow spp.

Broad-leaved cattail *Typha latifolia* — An easily recognizable plant of wetlands with long strap-like leaves and dense, cylindrical, dark brown flowering heads. This plant can reach a height of as much as six to eight feet if water is plentiful.

Sedge *Carex* spp. — These grass-like plants have triangular stems and spikes formed of several flowers. Usually an individual plant will have separate male and female flowers. Below the flowers there is a bract which encloses the flowers.

Rushes *Juncus* spp. — A grass-like plant that is similar to sedge although the stems are round. Numerous flowers are crowded at the tops of the stems.

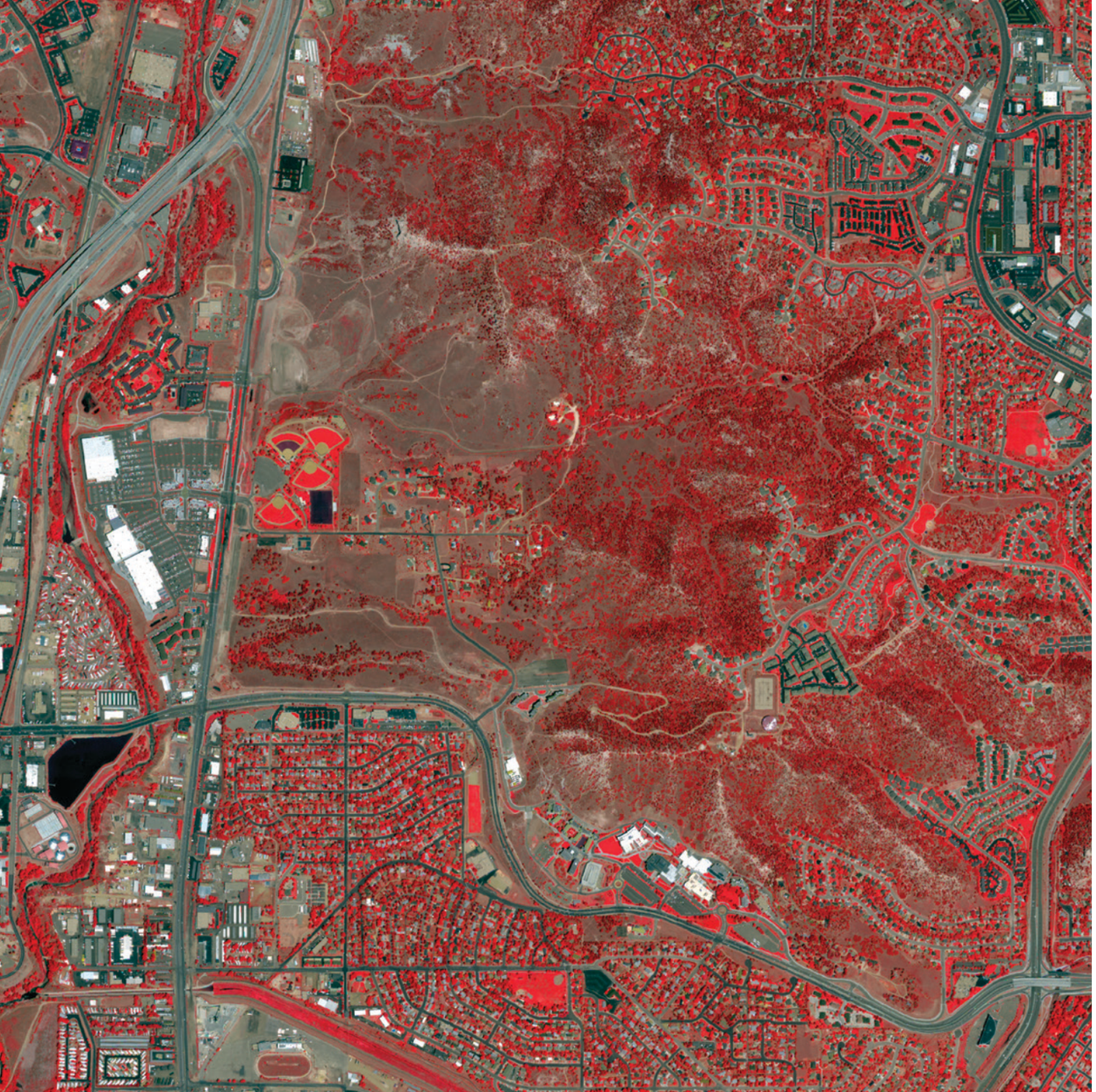
Non-Natural Zones

Cheatgrass *Bromus tectorum* — This is a cool season annual grass that by early summer has already produced seeds and died. These grasses have sharp pointed seeds that are borne on drooping stems.

Canada thistle *Cirsium arvense* — This member of the sunflower family is an introduced plant from Europe and Asia (not Canada). This plant is a prolific seed producer and spreads from its root system, making it hard to eradicate. The distinctive thistle flowers are purple.

Slender Russian thistle *Salsola collina* — An introduced plant from Asia, this is a small shrub with green, finely dissected leaves until it dries out at the end of its growing season. The plant breaks off at the ground level and tumbles around in the wind leaving seeds behind — thus the common name of tumbleweed.

Siberian elm *Ulmus pumila* — The leaves of these fast-growing trees are an elongated oval with serrated edges. These trees produce numerous seeds that are disks surrounded by a flat wing which helps the seed get distributed by the wind. Easy to establish and hard to eradicate, these trees can be found in many disturbed areas.

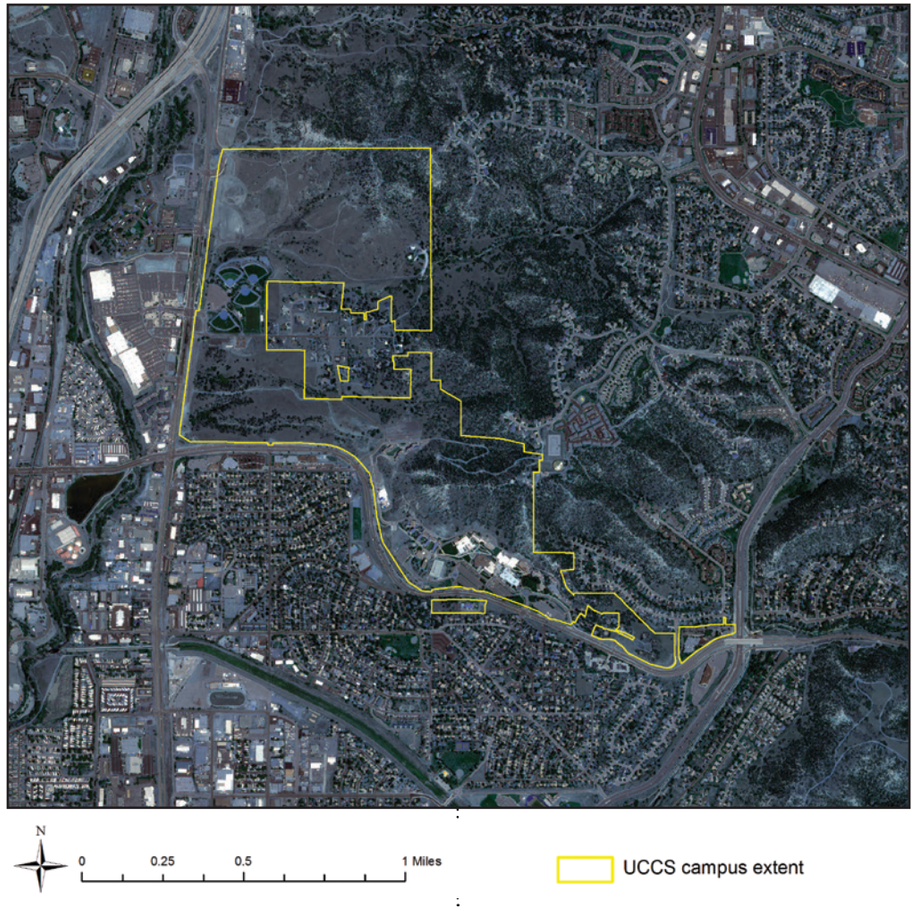


UCCS from Space

Cerian Gibbes
Geography and Environmental Studies

Increases in the number, availability, and diversity of air and space borne sensors have improved our ability to observe, monitor, and describe the landscape. Remotely sensed measures of the earth surface provide static representations of the landscape at discrete points in time, in a spatially continuous and repeatable fashion at multiple spatial and temporal scales. The most commonly used images are those collected by passive sensors, which rely on measuring solar energy reflected and emitted from the earth's surface.

The following figures of the UCCS campus are derived from a WorldView 2 image. This image was collected on June 17, 2012, and thus, the characterizations of the UCCS campus shown here depict the configuration of the UCCS campus at a single point in time during the summer of 2012. The imagery has a spatial resolution of 2.0 meters in the multispectral bands. Spectral resolution is somewhat limited in that it only provides measures of reflected blue, green, red, and near infrared



UCCS and the surrounding landscape displayed as a true color composite. Image date: June 17, 2012.
Image source: WorldView2 purchased by UCCS from Digital Globe

energy. However, these measures, when combined with the high spatial resolution, support detailed assessments of spatial differences in the dominant land surfaces present on the UCCS campus.

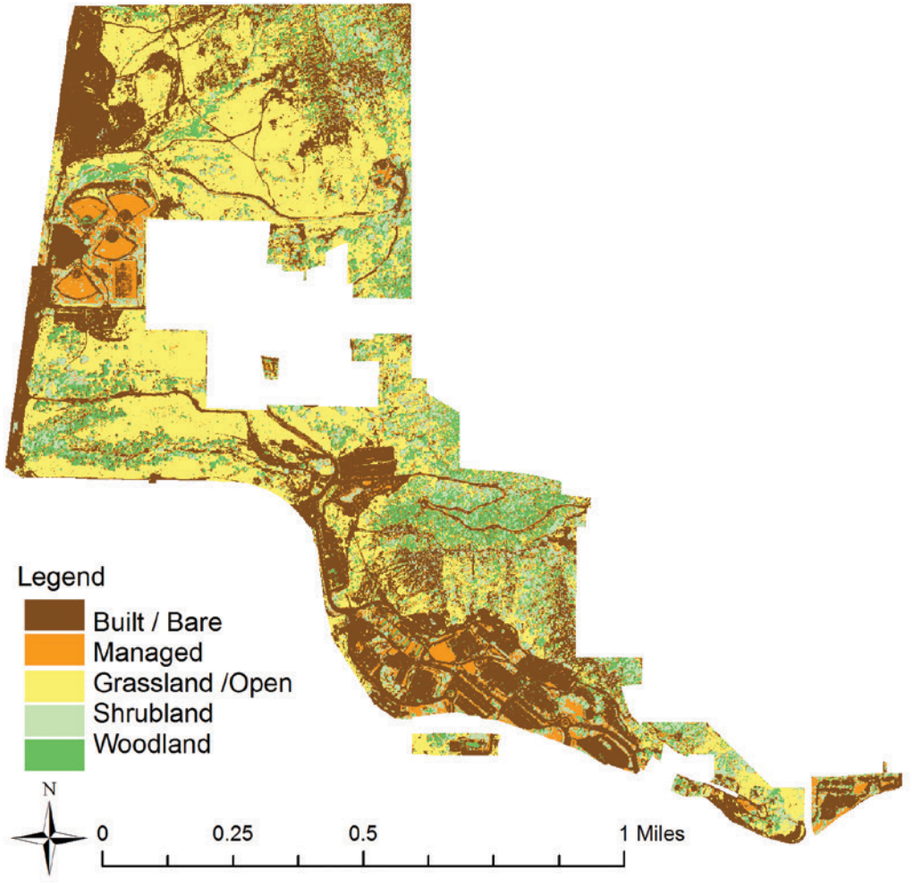
There are two dominant approaches for analyzing satellite imagery and characterizing the landscape: categorical and continuous. Categorical approaches have been heavily relied upon for assessments of environmental change and are frequently referred to as land use/land cover classifications. Spectral classifications group the landscape into classes based on similarity of the recorded measures of reflected and/or emitted energy. The resulting classification from these discrete approaches to analyzing imagery is easily interpreted, highlights distinct changes in land surfaces, and is useful for management and planning purposes.

The land use/land cover classification figure of the UCCS campus shows five classes. The classes integrated into this classification are those which are predominant on the UCCS campus and spectrally distinct. These classes include built/bare, managed, grassland/open, shrubland, and woodland. The class names are indicative of the land cover present and/or the human-environment interaction which occurs in a given space on campus. For example, the woodland class highlights parts of the UCCS campus in which active human management is limited and the dominant land cover consists of trees. The managed class identifies parts of the campus in which the land cover is predominantly vegetation; however, the vegetation is markedly different

from that in the grassland/open, shrubland, or woodland classes, as it is actively maintained and its composition is determined by campus design. As the classification shows, the core of the campus is evident in the south central part of landscape dominated by the built/bare and managed classes. The presence of grassland/open, shrubland, and woodland classes across the UCCS campus is a defining characteristic of the campus which is in part a function of the geography and yet contributes to a unique intertwinement of a campus with its natural surroundings.

Continuous approaches to analyzing satellite imagery most frequently employed include the use of vegetation or spectral indices. Using an index to characterize the landscape reduces the subjectivity of the analysis as these indices are designed to characterize particular environmental variables based solely on measures of reflected and emitted energy. The relationship between reflected and emitted energy and vegetation is commonly used to measure variations in vegetation presence and health. The Normalized Difference Vegetation Index or NDVI is the most widely used vegetation index and is based on the principal that vegetation is highly reflective in the near infrared and highly absorptive in the visible red. Through the use of NDVI, the distribution of vegetation across the UCCS campus can be clearly quantified.

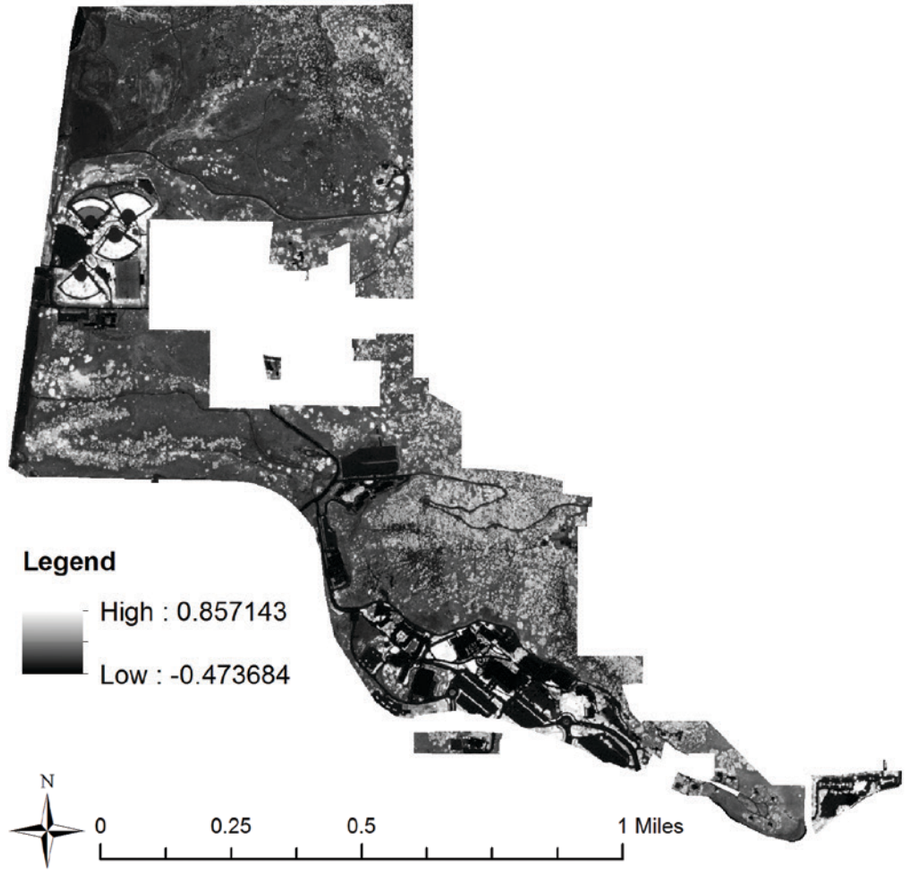
The NDVI figure shows biomass concentrations for the UCCS campus as measured during the summer of 2012. Higher NDVI values (0.2 and above) are shown in the lighter shades of gray and are associated with



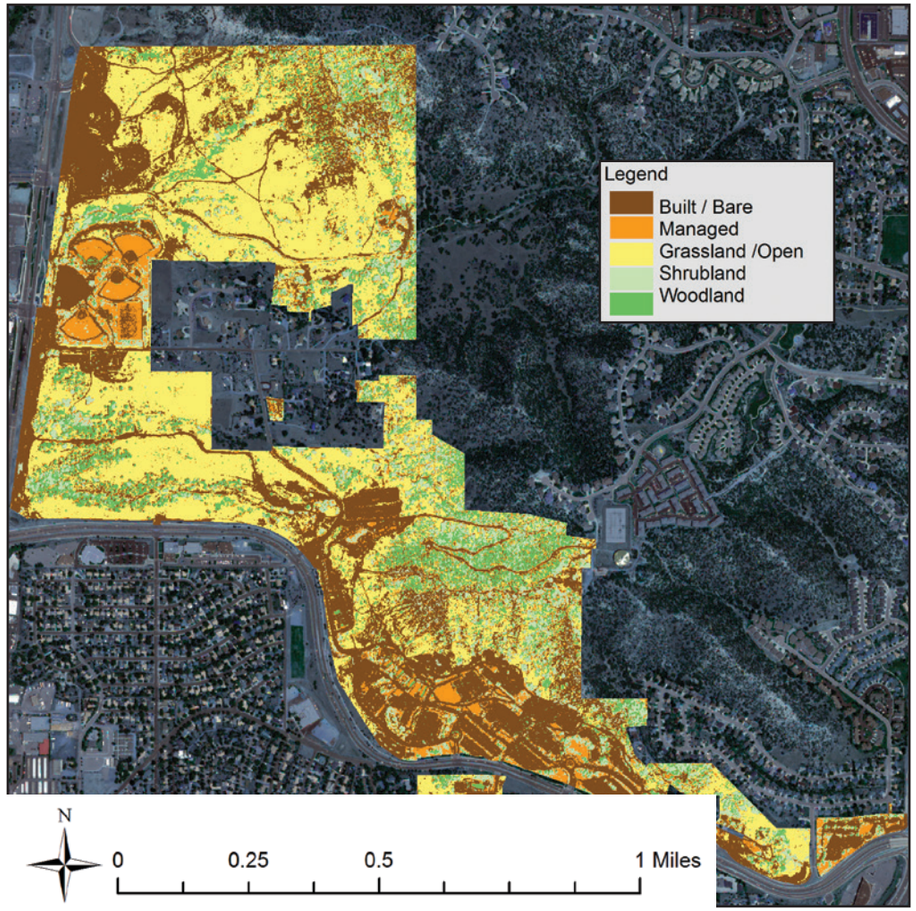
UCCS landscape characterized using land use-land cover classification. Image date: June 17, 2012.
Image source: WorldView2 purchased by UCCS from Digital Globe

vegetated portions of the landscape. Low NDVI values relate to the parts of the campus that in the land use/land cover classification are identified as built/bare and managed. NDVI is particularly useful for highlighting variation within what might be broadly classified as vegetation. For example, in the NDVI figure multiple shades of gray are present within the areas classified as woodland. This provides a more nuanced representation of this part of the UCCS campus and indicates that variations (possibly in composition and density) exist within these vegetated parts of campus. The difference between actively managed vegetation and grassland/open or shrubland/woodland is also readily apparent through the use of NDVI. The actively managed vegetation (most clearly seen in baseball fields in the northwest of the campus) is dominated by very high NDVI values resulting from management practices including watering and application of fertilizer used to maintain these predominantly grass covered areas.

Satellite imagery offers a unique perspective of the UCCS campus in that it provides a spatially contiguous snapshot of the entire campus at a given point in time. The land use/land cover and NDVI figures focus on the campus itself. The last figure shows the campus relative to the immediately surrounding Colorado Springs landscape and thus demonstrates an additional value of exploring the UCCS campus from space. Considering the composition and configuration of the broader Colorado Springs landscape within which the UCCS is nested facilitates an examination of the role that UCCS plays in the larger

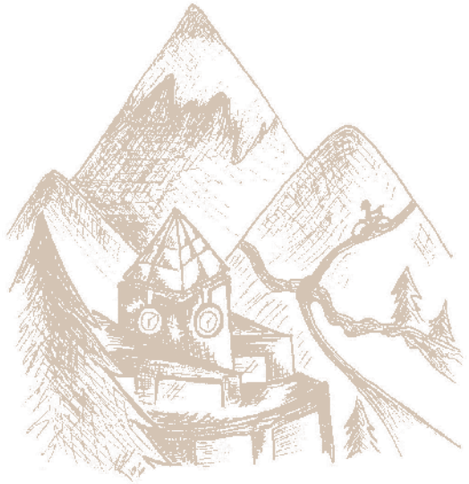


UCCS landscape characterized using the Normalized Difference Vegetation Index (NDVI). The theoretical range for NDVI is -1 to 1, where values approaching 1 indicate presence of active vegetation.
Image date: June 17, 2012. Image source: WorldView2 purchased by UCCS from Digital Globe



UCCS land use/land cover classification relative to surrounding landscape, image date June 17, 2012
(Source: WorldView2 purchased from Digital Globe by UCCS)

landscape. In this figure the dominant presence of the urban landscape surrounding the campus reinforces the value of the mixed composition of land use and land cover found on the UCCS campus. Remote sensing analyses, such as classification or use of a vegetation index, provide an understanding of the human-environment interactions occurring on the UCCS campus as measured by spatial differences in the physical landscape.



UCCS Birds

Suzanne MacAulay and Curtis Smith
Visual and Performing Arts

Knowing birds is a way of knowing place. Bird presence is the changeable aspect of landscape and vista, adding movement and sound to spaces between earth and sky. The University's location is ideal for hosting resident and visiting birds since it is poised on a rocky bluff with different ecosystems and an unimpeded view to the summit of 14,000 foot Pikes Peak. This combination of edge and peak demarcates a primary flight zone along the migratory route of birds flying north and south from lower to higher elevations during various seasons. The university campus separates into the built environment of classroom buildings, sidewalks and plazas, the rocky outcroppings and trail system above the main campus area, plus the very special riparian habitat and shrubland surrounding the Heller Center for Arts and Humanities, a former ranch gifted to the University located near its northern border.

During the school year while walking across campus, preoccupied and pressured by time, one can be pleasantly surprised by the appearance of treetop birds, which

prefer their own grand views such as **Clark's Nutcracker**, a transient from a higher elevation conifer habitat, and **Townsend's Solitaire**, a common foothills resident. Both birds can be seen at lower elevations during the winter. Neither of these birds is particularly colorful. The Clark's Nutcracker is gray with black wings, tail and a distinctively long sharp bill. The Nutcracker is close to a foot from head to tail. The Solitaire is about eight-and-a-half inches, mostly gray with pale underbelly and buff-colored wing patches especially evident in flight. Both are solitary and prefer to perch on the very tops of trees.

The Nutcracker has a hoarse, grating call while the Solitaire's single, high-pitched repetitive one-note call carries over long distances and is often heard before this bird is spotted.

Down around the tree roots and in open spaces, family groups of handsome **Black-billed Magpies** hop around screaming their heads off and engaging in a lot of internecine arguments. Certain lighting makes their tuxedo outfits shine in iridescent shades of green, blue, and purple. No matter the distance, the flashing white wing patches are unmistakable signs of magpies in flight. Magpies are a glorious sight throughout the year measuring nineteen inches with most of the length attributed to their very long tail. Their proximity to urban and suburban areas as well their large numbers earn them the birdwatchers' epithet of "trash birds" (i.e., common and numerous).

Black-billed Magpies have large song repertoires, usually with harsh tone colors. When a magpie is in trouble, flocks of them will assemble and make as much noise as possible—it is scary! Magpies can be observed teaching juveniles their songs, which is a not-too-long rote process. Typically all magpie vocalizations are raucous sounding.

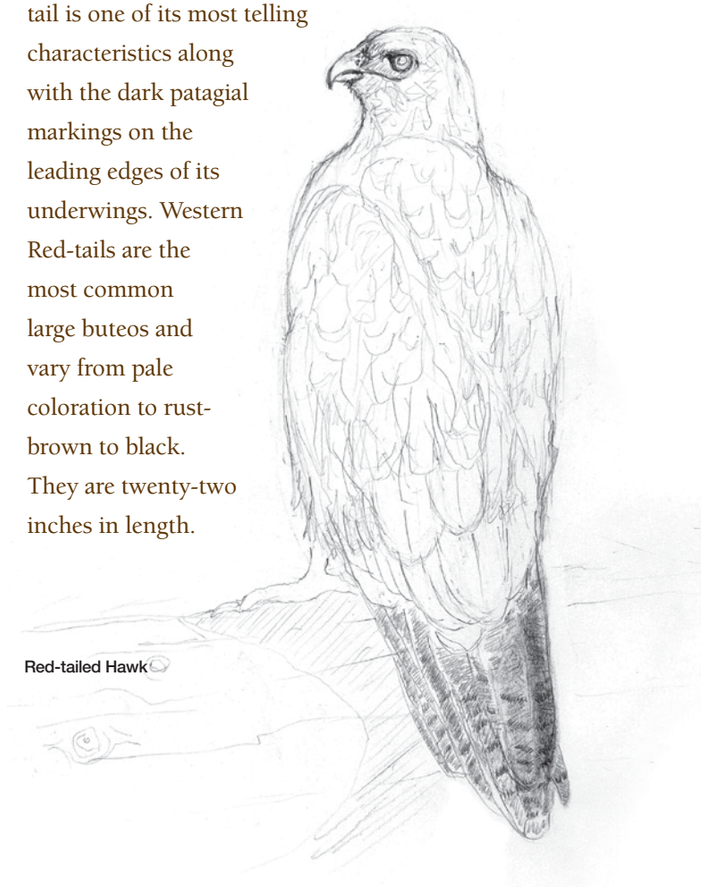
Black-billed Magpie

To add to the cacophony of the sonic environment of open spaces and noisy tree copses, **Steller's Jays**, **Blue Jays**, and **Western Scrub-Jays** are also a constant campus presence in all seasons. Silence seems to offend these birds. All are clad in shades of blue, either washed in varying bluish hues or emphatically marked with distinctive bold patterns of black and white against blue backgrounds. The Steller's Jay and the Blue Jay (associated with the East) have crests. The Steller's is a rather unkempt black topknot, which merges with its brilliant cape of blue-black feathers. This jay is about eleven-and-a-half inches long similar to its cousin, the eastern Blue Jay. The *classic* Blue Jay's crest is quite tidy and is accentuated by a black necklace encircling its neck thus emphasizing its crest in the back. The Blue Jay's call is the harbinger of rain. The Western Scrub-Jay is a pale version of the coastal variant with gray-streaked undersides. It is very noticeable for its shrieking mob calls while bounding from branch to branch in scrub oaks. The Scrub-

Jay is also in the same eleven-inch size range as the other Jays.

Blue Jays make a loud, harsh shriek that fills the air with their noise. In the spring, the males make a slightly metallic call with descending pitch pattern and a very pleasant tone. Steller's Jays can sound similar in call to the Blue Jay. In spring the song is a woody repeated pattern that sounds like a very slowly played large musical guiro (gourd). The song is entertaining and effective for mate attraction.

Along with the mountains as a framing device and locator, the sky dominates life on the Front Range. It is the feature of living in the Rockies that, when away, one misses its presence the most. The movement of soaring raptors – **Red-tailed Hawks**, **Northern Harriers**, and **Turkey Vultures** — frequently animates the sky above the campus. All year long Red-tailed Hawks can be seen circling on the breath of thermal breezes achieving great heights and flying over long distances. In flight their visible red tail is one of its most telling characteristics along with the dark patagial markings on the leading edges of its underwings. Western Red-tails are the most common large buteos and vary from pale coloration to rust-brown to black. They are twenty-two inches in length.



Red-tailed Hawk

Throughout summer days, the Turkey Vulture soars with wings in a slight dihedral or small V-shape. These raptors measure twenty-seven inches with a dramatic six-foot wingspan. At twilight the Turkey Vulture returns to roost and sleep surrounded by many of its kin perched in the upper branches of tall trees. The large cottonwoods lining a dry streambed on the Heller grounds make ideal roosting spots for these big black birds, which resemble a gathering of medieval priests clustered together, hunched over in theological debate to ponder the number of feathers "that could fit on the head of a pin."

The Northern Harrier has a slender body with long tapered wings and a distinguishing white spot on its rump above the long tail. The male is blue-gray with black wingtips and measures seventeen inches while the female is longer, about twenty-three inches, and more brown than the male. At any time of the year the harrier is usually spotted flying over fields watching and listening for prey (e.g., rodents and small birds). Its appearance hovering above the Heller meadows is always startling as it suddenly appears over a hill, and

Northern Harrier

equally impressive as it flies slowly and stealthily with its wings in a strong dihedral forming a V-shape.

One of the smallest resident raptors is the **American Kestrel**, which is intent on hunting or alternately perching on a wire or post with its piercing eyes fixated on the ground watching for any movement. These small hawks measuring about twelve inches (in most raptor species, the female is larger than the male) are seen on the defunct telephone poles and lines at Heller. Their faces are singularly marked with black vertical stripes on either side. Their bodies are a lovely russet and blue-gray with streaks and spots. Once trained by falconers to hunt sparrows, their food source is actually grasshoppers and small mammals. These fierce wee Kestrels can often be seen hovering in midflight over one spot with wings beating furiously.

While walking in daylight through strands of cottonwoods and oaks on the Heller property, if one is very observant and watchful, occasionally a **Great Horned Owl** can be sighted asleep on a branch blending in with the gray bark and dry brown foliage at any time during the year. It sits so still the owl looks like an appendage of the tree. These very large owls just short of two feet prefer riparian habitats, old streambeds, and small bodies of water bordering on open country. They are powerful predators and are identified by two feathery "horns" on their head from which they take their name.

The Great Horned Owl is the stereotypical "hoot owl." Its vocal pattern of whoo, whoo-whoo…whoo… whoooh is both eerie and beautiful. It is not unusual for less experienced "birders-by-ear" to mistake the Mourning Dove song for the Great Horned. The dove song has a similar tone, but the inflection is the interval of a 4th or 5th up and back followed by two or three slowly repeated notes.

If the Great Horned Owl can so successfully blend into a tree, crows and ravens are just the opposite by attracting attention through their clownish antics in the sky. They are an integral part of the fly space above the university and can be viewed throughout the day as they twist and roll and dive and soar either as sparring pairs or companionable duos. The **American Crow** is an all black bird that is about seventeen-and-a-half inches long, which makes it close to seven inches smaller than the **Common Raven**. Ravens are more likely to be solitary and are usually observed at higher elevations while crows live closer to human settlement. Both species can be seen flying around the Heller property and particularly above the campus where the rocky ponderosa forest overlooks the university buildings. Not only are their differences distinguished by size but also by tail shape. In flight notice that the raven's tail is a wedge shape and the crow's is squared-off at the bottom ("square tail is a crow, rounded tail is raven, square crow, round raven").

One of the best ways to differentiate the* crow *from the* Common Raven *is through the voice. The raven makes a low, croaking sound while the crow is the higher "caw, caw, caw." Both birds have large vocabularies or repertoires and can sound similar or hugely different.

During summer, clusters of small vocal birds gather in bushes and shrubs on the Heller property collectively chasing insects in a helter-skelter manner. When these small birds disturb the air with their movements, they also flush tiny flying bugs into flight. **Blue-gray Gnatcatchers** are probably some of the most frenetic feeders of insects as they flash around through branches moving quickly from one bush to another. Their swarming also includes a bit of expert tail choreography where gnatcatchers flick tails to the side, cock them upwards, and fan them open and closed. Males are blue-gray with pale under parts, white-eye ring, proportionately long tails and bills. Females are a paler version of the male. They are only four-and-a-half inches.

Pine Siskins are slightly larger than Gnatcatchers – about half an inch difference in size. Siskins are small birds streaked with brown and can be observed throughout the seasons. Yellow patches on wings and tail are visible in flight. Thistles and sunflowers offer fine feeding opportunities along the road and fields surrounding the Heller property. In late summer one encounters groups of siskins flitting around these plants eating seeds and grabbing the fluffy down from flowers long past their prime.

The Pine Siskin has a rising trill with a slightly harsh tone. The song is often delightful to hear when many Siskins are together and singing. The same can be said for other year-round residents like the European Starlings, which have a harsh tone call that almost sounds like more than one note at a time. But the starlings also sing half a "wolf whistle" (up only). Since they like to flock, the combination of many starlings is quite a delightful chorus of birds. Go to Youtube and search for starlings flocking—it is amazing (http://www.youtube.com/watch?v=eakKfY5aHmY)!

Another flock in this mix of seed eaters is the **Lesser Goldfinch**, which shares the culinary delights of plants gone to seed with its slightly larger associates, the Pine Siskins. Lesser Goldfinches are four-and-a-half inches long and are identified by their greenish yellow feathers and black wings with white patches. The males have bright yellow throats and under parts. Again, the female is paler by comparison. Flocks of these pretty little finches are found in riparian areas, shrubland, and ponderosa pine forests. Lesser Goldfinches visit the Heller property in late summer and fall and can also be spotted in the woods above campus.

The Finches, House, Goldfinch, and Lesser Goldfinches are great singers. The song of the ubiquitous House Finch is a fairly long complex melody that ends with a trill. A summer resident, the American Goldfinch sings another long complex melody with a less full tone than the House Finch and with no trill at the end of the song. The Lesser Goldfinch, another summer visitor, sings complex phrases that can last for ten seconds. It contains pure tones, wheezes and trills. Since the Lesser mimics other bird songs, it tends to have local accents.

Pygmy Nuthatches, small blue-gray birds just over four inches long, also travel in animated groups foraging among ponderosa pine trees in search

of insects. They stay around throughout the year and their polyphonic high piping notes are often heard before they are seen clambering up tree trunks and over outer branches. The **White-breasted Nuthatch** is frequently sighted in the same area as the little nuthatches but not as a traveling companion. It is bigger than the Pygmies by over an inch-and-a-half. This bird moves up and down tree trunks (headfirst in its descent). It has a very sharp appearance of bluish-gray with distinct white undersides. Its head is topped by a black cap, which extends down the back of its neck. Both nuthatches winter over in the foothills and riparian woodlands. They are found on the forested rim above campus as well as throughout Heller's shrubland.

The Heller property and main campus are also the home to both species of Chickadee, the **Black-capped** and the **Mountain**. Although associated with different ecological zones, their territory often overlaps. They are the same size measuring five-and-a-quarter inches from head to tail. Both can be observed on campus energetically hopping through tree branches and repeatedly calling their name "*chick-a-dee-dee*." The Black-capped Chickadee is usually sighted at lower elevations while the Mountain Chickadee lives higher up in the mountains constantly filling the montane forests with a chirping upbeat song until winter arrives at which point it descends to the foothills and lowlands at the foot of the mountains. The two species are difficult to tell apart because of similar markings and their perpetual flitting motion. The Black-capped Chickadee is gray with buff-colored sides and a white face framed by a black throat and cap extended so low that it masks the eyes. The Mountain Chickadee is mostly gray and white with a small black cap, black goatee, and eye stripe.

Chickadees, Black-capped and Mountain, have similar spring songs. The male's tone is pure and features a descending major 2nd or almost minor 3rd. They repeat the song over and over. When they have mated they take on the familiar "chick-a-dee-dee-dee." The Black-capped Chickadee's sound is "zick (Z as in Mozart)-a-dee" and the Mountain sounds like a windup toy "chick-a-dee." Their "gargle" sound is a complex collection of short high notes.

While walking near trees on the trail on top of the bluffs or at Heller, one can hear the noisy **Spotted Towhee** digging and shuffling around, making

Spotted Towhee

a lot of racket in the underbrush as it rummages through a covering of decaying leaves in search of tasty insects. This is a showy bird with black head, breast and back accentuated by deep rust-colored plumage and marked by lively white spots dotting its wings. These vivacious Towhees measure about eight-and-a-half inches in length and have a range of songs.

Spotted Towhees have a song with from two to six repeated notes followed by a trill. Juveniles have to practice the trill for a long time. It begins with a plaintive, high sound with a slight pitch descent (a bit similar to one of the Lesser Goldfinch's vocalizations). As it practices, the repeated notes are learned while the trill is still in the works until it is mastered. The Towhee call is a shriek similar to a fox bray, but higher in pitch.

The birds with rhythm, which musically beat their beaks against trees and poles looking for insects in the bark or performing staccato rapping sounds in order to attract mates, are the **Downy** and **Hairy Woodpeckers** and the **Northern Flicker**. Some people cringe at the mention of Flickers because these birds are known to rap out loud rhythmic percussive beats on any surface that resounds (often just before daybreak) during mating season. Evidently, females are attracted to performances of resonant virtuoso drum rolls on various metallic objects from gutters to chimneystacks. The Flicker is graphically colorful with a speckled gray body, black crescent necklace on its chest, and white rump. Males have red mustache stripes on either side of their beaks. The variety haunting campus properties is the "Red-shafted" or northern form with salmon colored feathers under wings and tail. Flashes of red are mainly discernible in flight. The Northern Flicker is a big bird thirteen inches long.

Downy and Hairy Woodpeckers are practically identical except for their size. The smaller of the two is the Downy, which is six-and-a-half inches, while the Hairy is nine. Both woodpeckers carry on the drumming tradition of their species. They can be heard and seen on the UCCS bluffs trail, clambering up and down and circling the trunks of ponderosa pines as well as working in-and-out of tree clusters on the Heller property. The Downy has a white back framed in black and striped face with a red spot on the back of its head. The Hairy has a pronounced long bill (almost the length of its head), black back interrupted by a central white stripe, and a red spot also on its nape. Downy Woodpeckers are commonly seen in urban and suburban areas. Hairy Woodpeckers prefer a wilder habitat.

Downy Woodpeckers have a four, five, or six note song with descending pitch but steady rhythm. When they land in a tree they make an irregular tapping sound while foraging for food. As mentioned, woodpeckers use a non-verbal communication called drumming. The males find the loudest most reverberating surface and beat their beaks against it to let female woodpeckers know that they are available for mating.

The smallest jewel-like bird buzzing in the summer air is the **Broad-tailed Hummingbird**. Males are the only

Broad-tailed Hummingbird

hummingbirds to make the special deep buzzing sound created when air passes through uniquely tapered feathers at the wingtips. They usually arrive in early spring, often during snowstorms, and can be seen around the Heller buildings before some birds head up to higher elevations. If the light is right, the male hummingbird appears an iridescent green with a flashy magenta throat. Females are also iridescent green and their throats are streaked with magenta-red stripes. One can identify these wee birds by their acrobatics in the air. Males rise straight up overhead to around fifteen feet and then steeply dive straight down. Despite their small size of four inches, their dramatic flying stunts cause them to be quite visible when they are near by.

The **Mountain Bluebird** has been sighted stopping off at the Heller Center on its way to the high mountains where it will spend the summer. These birds are so deeply azure blue that caught off-guard, one thinks that a piece of sky is suspended just above the grass. This effect is due to the way the Mountain Bluebird feathers are structured to reflect and scatter light. The female's resplendence is not as startling as the male's and is covered in a more subdued wash of gray-blue. Mountain Bluebirds are delicate-looking medium-sized birds measuring about seven-and-a-quarter inches long. They have a distinctive way of hunting for food known as ground-sallying which entails swiftly swooping to the ground from a perch and then briefly executing a series of little hops as they bear down on their insect prey and then pop right back to their perch.

A glimpse of the colorful male **Western Tanager** lifts spirits as he is seen moving through the trees like a patch of brilliance emerging from shadow. Seen at Heller in late spring and early summer, Western Tanagers pass through this region on their way to the cooler mountain forests. One can usually spot them in the upper branches of trees where they prefer to feed on larvae and insects. The male is radiant with a red face and a yellow and black body. By contrast females are a dull greenish yellow with light-colored wingbars. Both are slightly over seven inches in length.

Their song is similar to the American Robin, but with a long rest between "warbles."

An inventory of local bird sightings would not be complete without mention

Western Tanager

of the **American Robin**. This familiar bird is often seen running across lawns in a series of distinctive hops. During mating season it has a deep red chest yet pales toward the end of summer. The Robin is a large bird measuring ten inches. Some Robins flock in the winter to different destinations while others stay year-around.

Early in the morning and at dusk robins have a lovely warbling sound. In midday they have a rather nasal call. In the evening they warm up their voices with quite a few calls of two or three harsh repeated notes before beginning their nightly warble. Quite a few birds have a similar song to the* Robin*, the Black-headed Grosbeak for one, the Northern Oriole, and Western Tanager as well.

A particularly beautiful bird to see in spring and summer is the **Northern Oriole** with its fiery orange and black plumage.

Orioles have a chattering call that is easy to recognize, and the chatter can lead you to the sighting of an oriole bouncing in-and-out of branches and emerging from treetops to chatter some more. The spring song is a bit similar to the American Robin, with a good pure tone and varying lengths of song. Orioles are particularly fond of singing in blooming fruit trees and lindens.

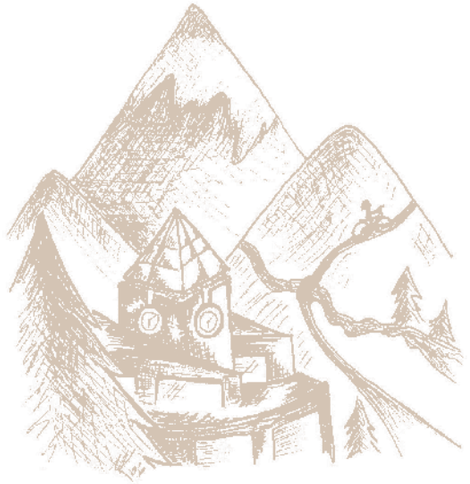
Another distinctive song of shrublands and prairie in spring and summer, which cuts through the sound of car engines, is that of the **Western Meadowlark**. Outfitted in a smart yellow vest with a striking black "V" around its neck, the meadowlark at a respectable nine-and-a-half inches culminating in a short tail, gives the impression of being stocky but a gifted singer.

According to bird polls, the Western Meadowlark is the second most popular state bird in the United States (the Northern Cardinal is most popular). That status is probably due to its song, which has a truly magnificent deep tone that carries a long way and is made up of a complex, but easily recognized melody. The Western Meadowlark is really the grand opera diva of western birds!

Slightly to the east of the Heller property boundary along the city's open space trail there is an active colony of eternally restless **Bank Swallows**. These are fascinating birds to observe as they are never still, and appear to relish rapidly flying, fluttering, careening, and swirling through the air with beaks open simply breathing in clouds of tiny insects. Their extensive apartment complex consists of numerous closely packed nest holes excavated in a clay bank along an intermittent streambed. Bank Swallows are slightly over five inches, brown with white throat, and chest demarcated by a well-defined dark chest band.

The most memorable sighting at Heller occurred very early one morning during a birding field trip with geography students. As we trooped onto the Heller grounds, we saw an avian apparition perched high on Eagle Rock across the valley to the north. It turned out to be a solitary **Great Blue Heron** standing absolutely motionless on the tallest promontory around. This was such unusual behavior for a water bird,

which normally likes to be camouflaged by leaves and branches while hunting frogs and fish along a muddy shoreline. Although out of context, the afterimage of this grand bird poised on its high rocky roost far above an arid valley in the foothills elicits surprise and wonder but also evokes something unpredictable and transitory.



LOS OJOS

Mary Jane Sullivan
Philosophy

Dead center north by northwest
A white ball radiates into sandstone
Penetrates window splattered
With updrafts of red earth

Rock formations hold back tricksters
Of wind who gather stories
In rising scrub oaks
As the animals eat morning meal
Piñon coffee brews, clementines dazzle the tongue
It is then that I see you
Perched on the crown of pine branches
Looking through windows of protection

At first camouflaged in stillness
I bring you forward with binoculars,
Adjust focus to your eyes
Awake with the slope of canyons and mesas
You great harrier fly down into the wild

Am I worthy of your stare under Ta-Wa-Ah-Gath–
Sun mountain sitting big—
Is time different for you from high country to flood plain
To the bluffs of sacred healing trees
Where bark is stripped for sustenance
You move not
The sheath of permafrost settles
Into a morning rise of crystals
As the sun pulses toward the feeding fields

Since then I look everyday only to see
The play of winter finches and nuthatches
Perhaps you pass time into me so I shall not forget
That what teaches me is older than dirt
And vibrates in the hundreds of thousands
Of atoms within us
What soundless sound holds you in the night
What escapes, yet does not revenge landscapes
You and the mountain birth original nature
Become animal, bird, human

You fly high above the stone faced fire
The serpent of water streams through canyons
Toward the hungry destination of the sea
The finger of creation crosses the diurnal sky
Down into the quarries of human commerce
The remains of scarred red rocks where
We mine down to bring up minerals and liquid tender
As you fly high and absorb our delusions
I learn from you via your absence
And if I could imagine a conversation, it is this:
You first said to me we would sleep under these
Stars and give night to our tongues

In that bone chill our dreams would become permanent
Dance on a string
Touch the wild hair of shadows
Become mountain eyes.

UCCS Animals

Jeremy Bono
Biology

Situated on a bluff bordering open space, UCCS sits in an ideal urban location for viewing wildlife. Whether just passing through or setting up permanent residence, diverse animals large and small can be observed on campus. In this guide I have focused on some familiar animals that are frequently seen on campus along with others that may be less familiar or conspicuous. All of the chosen species are notable for their interesting evolutionary adaptations which I have highlighted in the descriptions. The animal diversity on campus is truly amazing, so grab your guide, take a stroll, and see what you can find!

Mammals

Prairie voles *(Microtus ochrogaster)* are not like most mammals. Rather than reproducing with multiple partners, as is typical of mammals, male prairie voles are often monogamous, breeding with a single female for an entire reproductive cycle, or even a lifetime. Eager to understand the molecular underpinnings of social

bonding, scientists have identified specific aspects of prairie vole brain chemistry that influence mate fidelity. Remarkably, research suggests that similar mechanisms may be involved in human social bonding. Prairie voles spend much of their time below ground so you will be lucky to see one, but you may spot their burrows—look for

Prairie vole

a series of holes connected by well-traveled runways.

The **deer mouse** *(Peromyscus maniculatus)* is found virtually everywhere, and the UCCS campus is no exception. Research on deer mice has yielded important insights into the genetic basis of evolutionary adaptation. If you see a deer mouse on campus, notice how its fur closely

Deer mouse

matches the color of the soil, making it difficult for predators to spot. In some

populations, scientists have discovered specific genetic mutations that contribute to differences in fur color. Deer mice also have the unfortunate distinction of carrying Hanta virus, which is non-pathogenic in mice but potentially fatal to humans.

Mule deer *(Odocoileus hemionus)* are social animals and are typically found in groups. If you see a group of females on campus they are likely to be related, as females tend to remain close to their mother and sisters throughout their lifetime. Unrelated males join female groups at the onset of breeding season in the fall and remain with them throughout the winter. Colorado mule deer populations are threatened by Chronic Wasting Disease (CWD), a fatal prion disease that has become increasingly common, especially in southern El Paso County. You may encounter mule deer anywhere on campus, though they are most frequently observed on the bluffs and around the Heller Center.

Mule deer

Our university mascot, the **mountain lion** *(Puma concolor)*, is occasionally observed on campus. A solitary predator, mountain lions roam territories ranging in size from 10 to 370 square miles. They are adept hunters capable of sprinting up to 50 mph to catch a variety of prey including mule deer, foxes, and coyotes. After

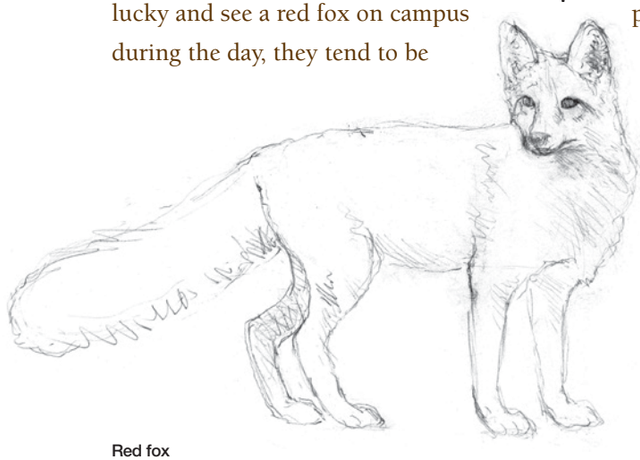
killing a large prey item, mountain lions will often drag the carcass to another area where they cover it with debris and continue to feed on it for several days.

Mountain lion

Black bears *(Ursus americanus)* are the largest mammals you are likely to see on campus. Surprisingly, despite their large size (males can weigh up to 600 pounds), their diet consists of mainly berries, grasses, and nuts. However, they are not picky eaters, and chances are if you find one on campus it will be digging through the garbage looking for an easy meal. With a nose a hundred times more sensitive than ours, a bear can smell food up to five miles away. In Colorado, black bears are typically active from March to November, retreating to winter dens when the weather gets cold. They spend the winter in hibernation, reducing their metabolism to such a low level that they do not need to eat, drink, urinate, or defecate for months.

Black bear

The **red fox** *(Vulpes vulpes)* thrives in urban areas and is observed relatively frequently on campus. Red foxes are family oriented, with both parents participating in care of the young, and yearling females even chipping in on child-care duties from time to time. Red foxes usually hunt alone, relying on their extraordinary hearing to locate prey. In fact, their ears are so sensitive they can even hear rodents digging underground. While you might get lucky and see a red fox on campus during the day, they tend to be nocturnal so your best chance to find one is at night.



Red fox

Bats are the only mammals capable of flight. The **little brown bat** *(Myotis lucifugus)* is one of the most common bats in North America, and has been observed on campus occasionally. The little brown bat is an insect specialist, using echolocation to pinpoint the location of fast moving prey with amazing accuracy. When hunting, bats produce high-pitched sound waves that are inaudible to humans. When the sound wave strikes a potential prey item, the bat can judge the distance, direction, and size of the insect by listening to the returning echo. In some areas of the country little brown bat populations have been devastated by White Nose Syndrome, a poorly understood fungal

disease (visible as white areas in the accompanying photo). Thankfully, the disease is not a problem in Colorado—at least for now.

Little brown bat

Reptiles

Although we Coloradoans consider ourselves westerners, the **Eastern Fence Lizard** *(Sceloporus undulatus)* is right at home on our campus. Fence lizards are territorial, particularly during mating season.

During this time you may observe males performing all kinds of interesting displays in an attempt to ward off other males and attract females. Males frequently flash their bright blue throats to gain the attention of females, while "push-ups" and "head-bobs" signal their superiority to other males and also impress on-looking females. On campus, look for fence lizards on rocky slopes where they may bask during the day.

Eastern fence lizard

Perhaps the one reptile you would prefer not to stumble upon in your travels across campus is the **Western Prairie Rattlesnake** *(Crotalus viridis)*. Despite lacking legs, claws, and other typical attributes of a fearsome predator, rattlesnakes have evolved a different weapon: venom. Rattlesnake venom is a complex cocktail of many proteins, including hemotoxins, neurotoxins, and anticoagulants. In a complex evolutionary story, these toxic proteins were generated when copies of pre-existing genes originally expressed in other snake organs (e.g., the heart) became expressed in saliva. Subsequent evolutionary refinement over millions of years has resulted in the potent proteins that make up snake venoms. While snake venoms can be deadly, scientists have been able to harness their toxicity to benefit humans. In fact, snake venoms are the source of many pharmaceuticals, including, for example, anti-blood clotting medications that have saved countless human lives.

Western prairie rattlesnake

Insects

Native to tropical regions of Africa, the **fruit fly** *(Drosophila melanogaster)* has spread worldwide thanks to

human travel and commerce. Despite its common name, the fruit fly does not feed on fresh fruit, but rather on microorganisms associated with the decomposition process. *Drosophila melanogaster* have been the focus of biological research for more than a century, in part because they are easy to rear in the laboratory and have a short life cycle. Much of our scientific knowledge in the fields of genetics and development come from studies on fruit flies, which share approximately 60%

Fruit fly

of their genes with humans. Around campus you are likely to see fruit flies near trash and compost receptacles.

The many yucca plants on campus would not exist if not for the work of their faithful pollinating partner, the **yucca moth** *(genus Tegiticula)*. Female yucca moths collect pollen in specialized tentacles extending from their mouthparts before laying eggs inside yucca flowers. Once eggs are laid, the female walks up the floral stigma and actively pollinates the flower. Successful pollination is critical for the survival of her young, which feed on developing seeds inside the fruit. Although the plant inevitably loses some seeds to developing moth larvae, many more are left to mature, making the interaction between the plant and the moth beneficial for both parties. Adult yucca moths can

be observed during periods of yucca flowering (typically June in Colorado Springs) when the tiny (~1 cm long) adult insects spend most of their time nestled inside the flowers, living for a maximum of a few days.

Yucca moth

The parasitic lifestyle of **ants** in the genus *Polyergus* has long fascinated biologists, including Charles Darwin, who discussed their amazing habits in *On the Origin of Species*. Unlike most ants, *Polyergus* queens cannot establish a new colony independently. Instead they enter a colony of their host species (genus *Formica*), kill the resident queen, and dupe the host workers into carrying on as if nothing happened. The offspring of the invading queen are incapable of performing normal worker tasks, and the colony will not survive in the absence of additional host workers. *Polyergus* workers therefore routinely steal developing young from neighboring host colonies, which are brought back to the nest where they work for the colony. *Polyergus* colonies

Polyergus ants

are rare and hard to find, but look for them on summer evenings when they conduct conspicuous raids against host colonies (*Polyergus* are the red ants in the accompanying photo; the host is black).

The **Western or European honeybee** *(Apis mellifera)* has been introduced to North America where it serves as a key pollinator and source of the delectable treat we call honey. Honey is derived from nectar, which bees collect while pollinating flowers. Although the process of making honey is amazing, even more amazing is how bees collect nectar in the first place. When a honeybee forager locates a flower patch, she will fly back to the hive to recruit nest mates. But she does not physically guide them to the flowers. Instead, she communicates a set of instructions using a "waggle dance," which encodes information about the distance, direction, and quality of the food source. Honeybees orient using a sun compass, and dancers even make mathematical corrections for the sun's movement across the horizon when communicating information to nest mates. Look in almost any flowerbed on campus and you are likely to find a honeybee—they especially like *Salvia*. Unfortunately, a mysterious phenomenon called Colony Collapse Disorder, for which a definitive cause has not been established, is decimating honeybee colonies worldwide.

Honeybee

"One for the Books" A Snake Story

Cathy Mundy
Librarian (retired)

One quiet, sunny fall Saturday in October (probably of 1980), I was working at the reference desk in the UCCS library. A woman and her little daughter had been picnicking in the rocks up behind campus and happened to see a snake out sunning itself on the rocks. At first, I didn't see the sack, and never dreamed anyway that she would have picked it up. She merely described it and wanted to know what I thought it was. I offered to get a reference book to look it up. However, before I could stop her, she said, "Well, I picked it up and brought it here for a positive identification."

So saying, she dumped the snake on the reference desk! I could see immediately that it was a rattlesnake, and what with being warmed up, it was considerably livelier than when she'd first snatched it up and stuffed it in her empty picnic bag. It was about 4 feet long, slithering all over the desk. I really like snakes, but have a healthy respect for a poisonous one. I called security; Bonnie Frick rushed over, and together we managed to put a trash can over the snake. So much for a quiet Saturday in the library!

Archaeology along Austin Bluffs

Minette C. Church, William Arbogast, and Roche Lindsey
Anthropology

History on this campus does not begin with the history of this campus, written documents, or tuberculosis patients. It begins with the oral traditions and detritus left by Jicarilla Apache, Kiowa Apache, Pueblo groups, Ute, Pawnee, Comanche, Lakota, and Arapaho, and their ancestors. The UCCS past also comprises sheep herders, railroad workers, employees for General Palmer's water system, depression-era laborers from the Civilian Conservation Corps, sanatarium doctors, nurses, and patients. Not all of them documented their presence here in writing, but all of them left behind objects or modifications to the landscape. One person's garbage is future archaeologists' data, as it turns out.

Viewed from an archaeological standpoint, Austin Bluffs and its surroundings offer a host of resources that have supported human occupation of this landscape for at least 11,500 years. For countless generations various groups of people have quarried outcrops on the bluff for raw material to make stone implements which they used

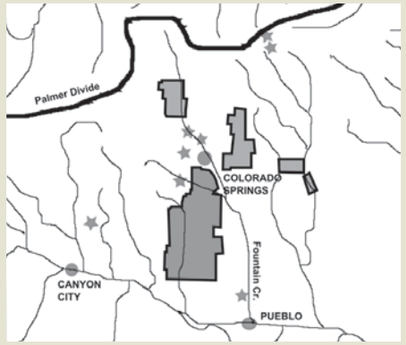
Ute coming down Ute Pass west of Colorado Springs, photo by Horace Poley, August 1912

to hunt, scrape hides, process edible and medicinal plants, work wood and bone, and for other applications. UCCS Anthropology students wandering to central campus from student housing occasionally find stone tools washed onto our parking lots by rainstorms. Students taking courses in experimental archaeology – recreating ancient technologies – find themselves gathering the abundant yucca on campus to make soap from the roots or twine from the leaves just as their prehistoric predecessors would have. The valley around the Heller Center for the Arts and Humanities hosts native plant species not readily found other places, some of which are edible or medicinal. At the base of Eagle Rock, student archaeologists-in-training found a natural source of pottery-quality clay and explored whether this source might have been the fabric of locally fired pottery found on nearby archaeological sites. Results are inconclusive so far.

These paragraphs may make the campus terrain sound like something of an ancient grocery/hardware store. However, the human mark on the landscape – the archaeological landscape – is much deeper and more meaningful than simply a place to come to gather yucca, clay, or stone. We have tentative evidence of hunting blinds in the arroyos on the east end of campus and possibly three or four vision-quest sites, one of which was positively identified by a Ute Elder. When one stands and looks either up at, or out from, formations such as Pulpit Rock or Eagle Rock, it is not hard to see what a good place these spots are to watch the movements of deer or elk, to sit and make stone tools, to tell stories to children, or to seek

spiritual guidance. The artifacts that survive through time – generally stone and sometimes ceramics or campsites with fire hearths — give evidence of this rich, untold history.

A variety of laws including the National Environmental Protection Act, the American Antiquities Act, the Historic Preservation Act, and additional ones covering the State of Colorado and its "governmental subdivisions" mandate archaeological research and evaluation when construction or renovation threatens sites. Therefore, the best archaeological coverage of large territories occurs in areas where federal, state, or local governments fund directly or otherwise permit construction. Developers who are building roads, running gas pipelines, or constructing dorms and classroom buildings usually hire Cultural Resource Management firms to make sure that significant archaeological sites are not affected by the construction, in accordance with state and federal laws.



Colorado Springs area showing locations of major archaeological projects and excavated sites between 1978 and 1999. Shaded areas are military reserves with archaeological surveys; stars are individual archaeological sites.

As a result of these laws, a map of the area around UCCS shows large scale archaeological research surveys at the Air Force Academy, Peterson and Falcon Air Force Bases, Fort Carson Army Post, Cheyenne Mountain Air Force Base, and a few isolated burials in the general vicinity of campus.

These surveys have given us a glimpse as to what life was like in the area prehistorically; however, much more archaeological research must be completed if we are to truly understand the prehistoric cultural landscape. The campus sits on the southern slopes of the Palmer Divide which runs east-west between the Platte and Arkansas River watersheds. This divide marks an important geographic and environmental transition. Since there are few large swaths of state or federal land (excepting the Air Force Academy) up toward the divide, we know little about the archaeology of this unique area, other than that people have lived on and moved across this landscape for a very long time.

Archaeological work on campus has been sporadic, often supervised by faculty on a volunteer basis, and is still incomplete. William Arbogast wrote successful grants to the Colorado State Historic Fund to work with UCCS students during the summers of 1997 and 2003. They completed one large-scale survey of campus as its boundaries existed in 1997 and began to identify surface evidence of sites that provide some insight on how past peoples occupied the land. In 2003, Arbogast and a student team also surveyed the city's Pulpit Rock Park, adjacent to campus along North Nevada Avenue. These

projects, along with field schools conducted on campus, provide the Anthropology Department with some insights into the complex prehistoric and historic archaeological record.

Archaeological Surveys: Life along the Bluffs Through the Millennia

Because archaeologists deal with tangible objects, we tend to talk about how ancient cultures were situated in time by referencing the kinds of artifacts that survive in the archaeological record. We seldom find clothing, wooden tools or toys, textiles, basketry, or leather items, not because people did not make or use them but because they usually disintegrate in time. So the chronologies and cultural categories archaeologists use all reference stone or ceramic object styles that changed through time, much like neckties or hemlines today.

For a long time archaeologists widely accepted the theory that the earliest humans in the New World were big game hunters or "Clovis people," named after a particular style of spear point, who would have been in this part of Colorado around 11,500 years ago. However, over the last twenty years the consensus opinion has changed. Evidence from sites all over North and South America seem to point to two conclusions. First, there were inhabitants long before Clovis for whom hunting mammoths or *Bison Antiquus* was not the primary means of getting dinner. Second, even at Clovis period sites, archaeologists have studied patterns of wear on the edges of these big "spear points" and have found that they were multipurpose tools; some edges were worn from cutting plants rather than meat, or were lacking any signs of use at all. This evidence suggests people were more semi-sedentary than nomadic and their diet was much more bound to territories geographically and diverse in content than we had believed. There is one stone artifact from the bluff on campus that may be from this period.

UCCS students excavating and mapping one of the sites on campus that is eligible for listing on the National Register

For the most part, archaeological sites discovered through campus surveys are very hard to date based solely on surface evidence. Many surface sites may have more artifacts or features buried in the soils below, but we have excavated few of them. The 1997 student survey team led by Arbogast recorded 67 archaeological resources, and the 2003 survey recorded 17 more. A volunteer survey by UCCS students and Roche M. Lindsey, also faculty in Anthropology, documented sites on the road from North Nevada to the Heller Center.

These surveys have produced some interesting findings. As it stands, we

can only tentatively associate some sites on campus with specific Indian peoples in the past. For example we know that Apache, Comanche, and Kiowa were here in the seventeenth and eighteenth centuries. Carbon dating of an excavated hearth revealed a date of 320 AD, and may have been part of a Pawnee camp. A hearth eroding out of an arroyo on the west end of campus, containing both fire-cracked rock and carbon, dates to 170 AD. Another buried hearth remains undated, and there are other campsites that remain unexplored. The first English-speaking settlers in the area describe encounters with Arapahoe, Cheyenne, and Ute, and the Ute may have built the stone enclosures on campus tentatively interpreted as vision quest sites.

In their report, Arbogast's team noted that "most surprising is the large number of prehistoric resources: the density of prehistoric resources…per acre is much higher than expected" based on research done before the 1997 survey. He goes on to note that in the field he and the student crew defined separate archaeological sites arbitrarily when there was a 30 meter or more "artifact free" zone between them. However, where visibility through the vegetation was difficult, particularly on the "gentle slopes below high bluffs and in the meadows on the west side of campus," Arbogast argues that several of the sites his team recorded might in fact be a single very large "cultural manifestation." The entire western portion of Austin Bluffs on campus, both outcrops and downslope, could actually be described as one huge "lithic procurement" site where people quarried stone, tested it, and made tools.

Archaeological Excavation: site 5EP3012

There is one archaeological site on campus where the Anthropology Department and students are conducting long-term research. Not far along Stanton Road from Austin Bluffs Parkway, near student housing, city road work activities threatened one of the sites on campus recorded by Arbogast's team in 1998. Roche M. Lindsey began excavating that site with students in 2008, and continued in 2010 and 2012. Arbogast and his student team recorded some pottery sherds and stone flakes occurring on the surface. Based on the analysis of these artifacts, Arbogast dated it to the "Late Prehistoric" or "Plains Woodland" period, between 100 and 1000 AD. This period is frequently correlated with Pawnee occupations. With further excavation, Lindsey's team of students found evidence of a notched projectile point (arrow point, in this case) which extends the occupation dates to around 1550 AD.

The first season of Lindsey's investigation focused on the stone tool materials and their sources. Some of the flaked stone came from sources far away, but local chert and welded tuff were both quarried from the Pikeview Formation outcrops on the bluffs of the UCCS campus. UCCS turns out to be one of two known sources for the welded tuff, and tools of this material are found all over eastern Colorado and beyond, on sites dating to the Paleoindian period (beginning c. 12,000 years ago). For decades archaeologists were confusing the tools and flakes made from Pikeview Formation welded tuff from Austin Bluffs with those made from better-known and much more

widely available Morrison Quartzite. Distinguishing this new source type is an extremely important piece of new information that will tie the sites on UCCS campus to sites all over the Central Plains and possibly beyond, greatly refining our picture of where and how people navigated the region.

The sand that holds these artifacts continues downward for over seven meters, constituting a gigantic ancient dune. At the base of this dune is a contact between sand and clay that marks a paleo pond, and there is potential for Archaic Period (c. 7900 - 2000 years ago) or even earlier Paleoindian Period occupations. Concentrations of fire-altered rock from human activity indicate a feature such as a hearth may be nearby. Students and faculty will continue to explore this possibility in archaeological field classes to come.

Excavation showing the sand dune at the construction site of the parking garage

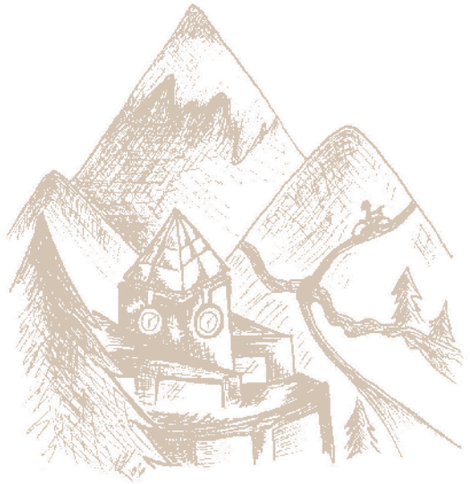
An important factor that confounds archaeological research is the fact that people have made a habit of collecting artifacts along the bluff. At one end of the bluffs, Arbogast's team found a "collector's pile" of 140 artifacts. Collecting seems to be "human nature" in action; it has been going on for years and spurred Arbogast to include a research question in his 1999 report: "How has avocational artifact collection in the project area skewed the data concerning prehistoric utilization of the project area? Is the relative scarcity of groundstone, ceramics and diagnostic lithic artifacts at least partially a result of avocational collection?" Campus archaeologists ask that you contact the Anthropology Department should you find interesting artifacts around campus, so that the items can be added to the growing body of data housed in our climate controlled artifact curation facility.

Summary

Archaeologists have tapped only a tiny portion of the campus' archaeological potential so far. From surveys, we begin to know something about how native peoples lived upon this landscape, and the resources they prized. We can infer that the views that draw us here also drew them. Think for just a moment about what the landscape between Austin Bluffs and the foot of Pikes Peak must have looked like before settlers from points east planted hundreds of thousands of non-native trees in the newly platted town of Colorado Springs and its suburbs. From the bluff, one might have seen herds of buffalo as well as elk, deer, or even other groups, friends or foes, traveling miles away across the plains and foothills. The vegetation would have been almost entirely different, though glimpses of what it might have been like occur in the area surrounding the Heller Center. Animals that we think of now as primarily mountain-dwelling, such as mountain lions and black bear, roamed the plains along with packs of wolves and other currently endangered species.

We are left with a number of archaeological research questions. We are privileged to have had a taste of the wisdom that Ute and other native

elders might choose to share with us in order to protect sacred sites on or near campus. As campus building activities expand, we need to talk more to such people. Excavation in other places can answer archaeological questions of the everyday: what were people eating, how were they hunting, what kinds of tools were they making and how were they using them? How did living on the southern slopes of the Palmer Divide differ from living at the divide or to the north? Further analysis of artifacts and features in context can tell us where people traveled from, where they camped, and even how different regional groups may have related to one another through trade, warfare, or intermarriage. We all stand to gain an even deeper appreciation of the heritage that sits in this ancient landscape.



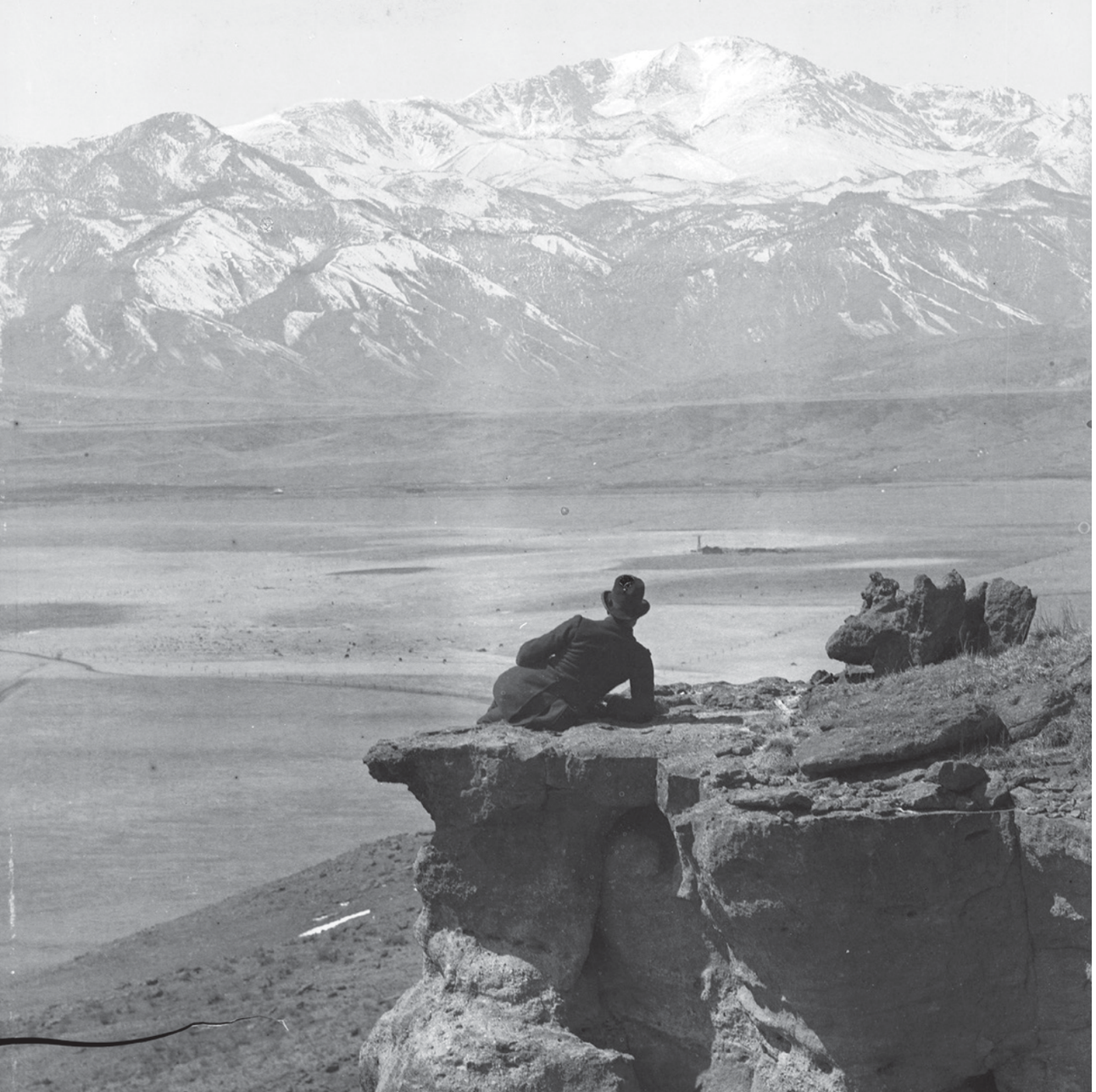
Life along the Bluffs since the Coming of the Railroad

Minette C. Church, William Arbogast, and Roche Lindsey
Anthropology

Many people assume that archaeology "ends" with Columbus or the occurrence of written histories. However, the federal government's Department of the Interior has defined anything over fifty years of age as potentially archaeologically significant, and possibly eligible for listing on the National Register of Historic Places, depending on the potential quality and quantity of historical and archaeological data available. As historians will tell you, written narratives are anything but complete; analyzing written histories in conjunction with other documents, oral traditions, landscape features, architecture, and artifacts provides a far better picture of the multiple pasts of this campus.

1860s through the 1880s

Around the same time General Palmer was platting out the proposed settlement of Colorado Springs as a health destination, several men homesteaded north of the soon-to-be-city, near some craggy outcrops. In 1873, Henry W. Austin made official



View of Pikes Peak and Monument Creek Valley from Austin Bluffs: William Henry Jackson, late 1800s. Courtesy of the Denver Public Library, Western History Collection

his homestead patent on several parcels of the bluffs east of UCCS which bear his name. Other homestead patents on or near the current campus were made by Hiram P. Bennett and William P. Mellen as early as 1870 and 1872. Since homesteads were "proved up" after a legal requirement of five years' occupation, an 1870 date means occupation began in 1865. James H. Kerr patented his parcel in the early 1880s. Austin, and perhaps these other owners as well, hired Spanish-speaking New Mexican men to herd sheep on and just below the bluffs in the 1880s.

An archaeological feature on campus that survives from the 1870s is a segment of the historic Santa Fe Railroad and includes a dressed stone overpass surrounded by a light scatter of artifacts including ceramics and bottle glass dating to the end of the nineteenth century. This railroad ran north-south along North Nevada Avenue In 1888, General Palmer and the Austin Bluffs Land and Water Company acquired a right-of-way across what is now North Campus for their Northfield Water Line. William Arbogast's team of student archaeologists recorded remnants of this water system in a few places; it served Colorado Springs until 1969, through the sanatarium period and for four years after the founding of UCCS campus.

Fragments of General Palmer's Northfield water system still exist on campus

Another site dating to late nineteenth century, and possibly before, is a notably fine pottery-quality clay source just north of campus near Pulpit Rock; it has masonry walls and artifacts scattered about it that date between the late 19th and early 20th centuries. This site is eligible to the National Register of Historic Places because there is a possibility it may be associated with Artus Van Briggle and his famous pottery works in the early 20th century. There is evidence of significant clay digging activity dating to that period.

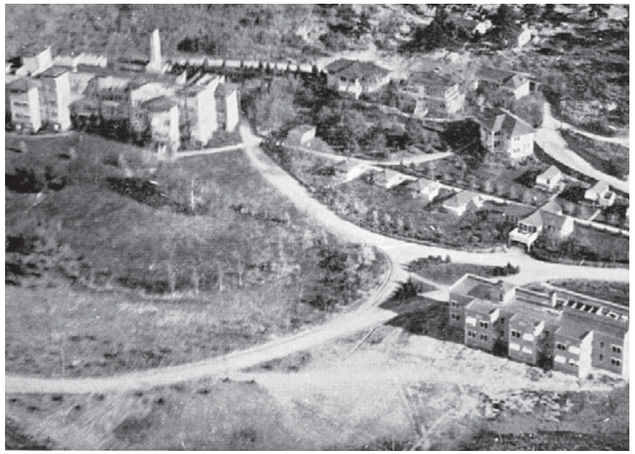
1890s through the 1920s
Cragmor Sanatarium and the "Colorado Cure"

The history of Cragmor Sanatarium correlates to regional histories of health-seekers and "health tourism." In the late nineteenth century Colorado Springs established a reputation as a place to cure tuberculosis. The thin, cool air alleviated (though rarely cured) symptoms of the disease and extended lives in many cases. Whereas indigent sufferers worked as they could on ranches throughout the state, the wealthy were lured to the sanatarium designed by General Palmer's personal physician, Dr. Edward Solly, himself a sufferer from the disease. The Cragmor Sanatarium was established in fits and starts, with construction occurring sporadically between 1904 and the early 1960s.

Dr. Solly's vision for the sanatarium emphasized exposure to the outdoors and fresh air as important to patients' recovery. The siting of the facility on the bluffs, facing southwest with a compelling view of Pikes Peak and Garden of the Gods, was integral to Solly's medical philosophy. General Palmer was convinced by his physician to donate 100 acres and $50,000 to make Solly's vision happen at this particular locale. Though the sanatarium opened its doors in 1905 with only a series of small cabins, Solly's vision was truly embedded in noted architect Thomas MacLaren's design for a Spanish Mission Revival style main building (now Main Hall), which included open air sleeping porches, towers, and spacious rooms. Unfortunately, Solly did not live to see the building take shape. After Solly's death the cabins went through a brief period of decay and group management, only to be revived with the hiring of Dr. Alexius M. Forster. An admirer of Dr. Solly's, Forster not only promoted treatment plans involving open-air convalescence, but he was also ahead of his time in believing that the comfort and positive mental state of patients improved medical outcomes.

Construction of the main building finally began in 1914, and in 1920 the facility was so popular that Forster added a fourth floor with a roof garden. Indeed, the roofline in profile was arguably the most distinctive piece of this important architectural design. Three other sanatariums in Colorado Springs dating to the city's period as a national destination for TB patients have all been demolished, so this was the one remaining example. Sadly, this building also stands as the only state-owned building ever to be de-listed from the State Register of Historic Buildings. Unstable soils and foundation problems required the gutting of the building, and the reconstructed version, among other things, corrupted the unique

architecture of the roofline with external air circulation and utilities boxes. This design decision proved one compromise too many for the State Historic Preservation Officer. The building does retain Solly's, MacLaren's, and Forster's commitment to the building's specific location and orientation, and also to local materials; all the stone for the base of the building was quarried from the bluffs above.



Aerial view of Cragmor Sanatarium c.1930

Through the "Roaring 20s" the sanatarium served well-healed invalids until their bank accounts were gutted by the stock market crash of 1929. By 1935, Cragmor Sanatarium was in foreclosure, only to be bailed out and reopened by the Federal Emergency Relief Administration in 1936. In contrast to the wealthy patients of the 1910s and 20s, the patients of the 1930s were generally poor. By that time the sanatarium had become a haven for illegal abortions and later housed WWII veterans sent from Fitzsimons Army Hospital in Denver.

In 1952 a new director, Dr. George Dwire, came to lead Cragmor Sanatarium. Under contract with the United States Indian Service, Navajo Indians, primarily women, were sent, often involuntarily, to find a cure at Cragmor. While there, they were encouraged to learn economically viable "handicrafts," and art collectors and aficionados frequented the facility. Local legend has it that the bluffs were denuded of yucca plants in this period as patients used Native American technologies to make soap and shampoo from the roots.

In 1958 Dwire hired the architectural firm of Bunts and Kelsey to build an International Style addition to the main building, Cragmor Manor (now Cragmor Hall); in 1961 it received an Award of Merit from the Colorado Chapter of the American Institute of Architects. The new wing was never occupied by sanatarium personnel, however, as the United States Indian Service did not renew its contract with the facility. Instead Dwire entered into negotiations with Colorado Governor John Lowe, and in 1965 UCCS was born.

Cragmor Sanatarium's Archaeological Sites

There are many sanatarium era landscape features as well as some remaining examples of architecture with archaeological potential. For example, archaeologists love to find refuse dumps filled with discarded items of day-to-day life, rich with data about how people lived, worked, and thought about their surroundings. Sadly, the main, early refuse dump associated with the late nineteenth and early twentieth century phases of

the sanatarium, including the period with mostly Navajo patients, was obliterated early on in UCCS history by the construction of Dwire Hall and the Engineering Building. However, on the slopes above and behind these buildings are archaeological sites and dumps from periods beginning in the 1920s that are still intact, although they have been subject to erosion from rain and wind through the decades.

Between 1905 and 1910 the sanatarium constructed a caretaker's cottage up on the bluff; it has since been torn down, but foundations remain. Close by was a large metal water tank which had served as a reservoir for Palmer's old water delivery system. The water tank site is officially eligible for nomination to the National Register of Historic places, not because of its importance as a water tank in the 1900s, but instead as a locus

"Campbell's Elephant Soup" decorated water tank before the arrival of the acetylene torches

of unsanctioned student creativity in the 1960s. Students painted it to look like an enormous "Campbell's Elephant Soup" can, echoing the work of Pop Art icon Andy Warhol. According to the UCCS website, a "humorless" university administrator had it torn down, but the slab and metal base remain.

Sanatarium period patient cottages (recently used as ROTC offices), the caretaker's cottage, and a scatter of associated artifacts dot the bluffs above

Dwire Hall and the Campus Services Building. In 1923, patient Marion Sells' mother built Marion Cottage (now occupied by Theatreworks) while her daughter was a patient, the first of several cottages meant to house less affluent patients. After 1947 Dr. Otto Einstein, Chief Physician, moved into the cottage. However, in the interim between Marion Sells' and Dr. Einstein's occupancy, the structure apparently served as a speakeasy and possibly a gambling hall during the Prohibition era. The structure still stands and there are associated artifacts. To date there are few if any archaeological studies of prohibition era speakeasies, and this presents an interesting site for future investigation.

Between 1910 and 1947, during the peak of the sanatarium's reputation, a residence was built for Dr. Forster, Chief Physician of Cragmor at the time, and his wife. In 2003 the University tore down this building, without undertaking any archaeological assessment, in order to build the parking garage near Columbine Hall. Dr. and Mrs. Forster's residence was called the Bennett House. The Forster House, which still stands in Cragmor

Artifacts from the sanatarium era found on the bluffs

Village, was built around the same time to house Dr. Forster's mistress. It now serves as offices for the Veteran Resource Center on campus. In his archaeological survey report, Arbogast notes that the University tore down another building of the same period, located behind Forster House, also without archaeological assessment. Clearly archaeologists are interested in the quarrying of tool stone that has occurred along the bluff for thousands of years, but the use of the entire bluff landscape during the sanatarium period is significant as well. Patients climbed steps up the bluff near the cottages which fed into a trail system, named by patients "The Happy Walk," or more notoriously "The High Trail to Passion," where Cragmor Sanatarium residents who felt well enough could walk, socialize, and generally escape the close scrutiny they must have endured in the facility itself. As noted in Doug McKay's 1983 history of the Cragmor Sanatarium, Dr. Frank M. Houck "conceived the plan [for the trail system] then single-handedly surveyed the terrain, leveled mounds of dirt, planted stones, and laid out a delightsome countryside walk" circumnavigating the bluffs. He had the trails marked at 50 foot intervals so invalids could note their progress. Along these trails and others that run the length of the bluff itself, bottles, broken ceramics, cans, even discarded medical equipment and other archaeological materials continue to appear after every good rainstorm, alongside chipped stone and flakes. These are archaeologically important data, and as with the stone materials, we ask the reader please not to pick them up, but to let the Anthropology Department know about them.

Stairway up the bluffs from behind Cragmor Hall to the "Happy Trail" or "High Trail to Passion"

1930s

If one walks east along Mountain Lion Way behind Main Hall, the concrete foundations of the deluxe four-story nurses' quarters that the sanatarium built in 1929 sit collapsed on the left, at the base of the bluff. Built at great expense on unstable soils, the quarters began collapsing almost as soon as they were built. The nurses who had moved in were unceremoniously evacuated and by 1930 it was boarded up. Expansive clay soils continue to plague University construction and renovation projects on campus to this day.

Over on the west end of campus near North Nevada Avenue, in the mid-1930s, the Civilian Conservation Corps (CCC) excavated contour ditches to limit erosion on the west end of campus as part of President Roosevelt's New Deal. They are also probably responsible for a concrete and earthen dam, the remains of which are in the northwest part of campus.

Arbogast's student team recording the ruins of the sanatarium nurses' quarters behind Dwire Hall

The Yawn Valley Yacht Club
(also known as the Heller Center)
At around the same time the CCC was digging ditches, Larry Heller, an artist from Pennsylvania began building an adobe Pueblo Revival house below Eagle Rock. Soon after, he met his future wife Dorothy, who was to become the first woman police officer in the city. She worked with at-risk youth long before the needs (or even existence) of that category of youth were generally recognized. The couple lived, ranched, and (rather notoriously) entertained at this place until Dorothy died in 1999. Their parties included horse and car racing, as well as golf. This is the only recent period archaeological site on campus to be excavated. The university tore down two of the original outbuildings, a garage, and Larry Heller's studio before there was any archaeological assessment, but then put in place plans to rehabilitate the house and guest house in a historically sensitive manner with the help of an assessment grant from the Colorado State Historic Fund. The archaeologists on campus realized that a historical/archaeological assessment of the grounds was also an imminent, and legally mandated, need.

UCCS students excavating the Hellers' cistern in 2009

In 2009, UCCS anthropology students and this author spent four weeks excavating around the house, greenhouse, guest house, foundry (for Larry's sculptures), and barn, as well as up the hill in a cistern the Hellers built in the years before city water was piped into the property. People frequently fill old features such as cisterns and privies with interesting trash (archaeologists prefer to call this data) from other areas of the site. True to form, the Hellers had disposed of an entire 1960s era washing machine in this cistern, as fill. The students excavated an old sock and a golf ball from within the mechanism, which probably accounted for its demise. The student archaeologists thus answered an unforeseen and age-old research question: where do odd socks disappear to in the laundry? We had hypothesized about the dryer, yet clearly it was the fault of the washer. The golf ball was no doubt a stray into the rough at what the Hellers called the "Yawn Valley Yacht Club."

Virginia Trembly, the first woman dentist in Colorado Springs, was one of the Hellers' neighbors. One of the sadder decisions on campus was to neglect and then tear down her whimsical 1930s home; only a stone fireplace stands there now. Along with her home, Trembly donated over 200 acres of land to our campus. The house

Dot and Larry Heller's defunct washing machine, c.1962 manufacture, emerging through excavation of their cistern

Virginia Trembly's house, post demolition

is gone, but the archaeological potential of the property remains to be assessed.

Conclusions and Future Directions for UCCS Archaeology

The reader may have noticed that in general, the post-1800 archaeological and historical features of campus have been more at-risk from campus expansion than the features of Native American origin, which are more widely recognized as archaeologically important. This chapter provides merely a taste of the stories about the past, often unavailable in documents, archaeology can provide us, even from recent periods. There is rich potential for data still residing beneath the surface of the ground. Recently, administrators and Facilities Services personnel have partnered with members of the Anthropology Department to make sure UCCS complies with state and federal laws as it grows, to avoid any more tearing down or construction of structures without archaeological assessment. Within the last year, UCCS administrators have orchestrated the development of a long term strategic plan. Many stakeholders were included in the process of its development, including an archaeologist. The physical campus is growing fast, and it made sense to all concerned to make sure that growth happens within a framework of projected needs and requirements.

The next logical step in this process is to create a comprehensive historic preservation and cultural resource management plan that parallels the campus strategic plan, in compliance with Colorado state statutes. As the campus celebrates its 50th anniversary and grows to be an educational hub for all of southern Colorado, the Colorado State Archaeologist plans to partner with UCCS along with all other state campuses to facilitate a continued accounting of the campus' past through careful resource management, including archaeology. Many UCCS undergraduates who cut their teeth on campus archaeology have gone on to professional archaeology and historic preservation careers in Colorado and beyond. These students have been absolutely crucial contributors to the archaeological knowledge we have of the campus so far, and much of the initial work described here complemented the Department of Anthropology curriculum. UCCS students will continue to be involved in the campus cultural resource management process at every stage.

UCCS History

Margaret "Peg" Bacon
Provost emerita

"Stories have to be told or they die, and when they die, we can't remember who we are or why we're here."
Sue Monk Kidd

Beginnings (1952-1965)

In June of 1965, three staff members drove up to the site of the Cragmor Sanatarium to see the new campus for the Colorado Springs Center. The land was neglected, the buildings deteriorated, and as one of them said, "My god, did patients die of TB or staph infection? How could this ever be a university?" When classes at the Colorado Springs Center started in the fall of 1965, there were still hospital beds and equipment on the upper two floors of the main building, and the center had to borrow 100 desks from School District #11. On the first evening of classes, Don King, the

Center Administrator, found that while they had secured chalkboards for the building, they had neglected erasers, so he rushed up and grabbed bed pads to use for that purpose. There were 1,282 students that first semester, paying $13 per credit hour. Ten full-time and 70 part-time faculty taught them.

But let's go back a bit–how did we get to this point? University of Colorado classes had been offered in Colorado Springs as part of an extension service as early as 1925 (although documents are foggy on this), but it was not until 1952 that the Extension Center was established with a part-time administrator. Adult education was at the forefront of the national consciousness after WWII; the GI Bill provided the resources for many former military men and women to take university courses. The 1955 enrollment at the Center was 583 and by 1963 it had doubled to 1,120 students, two-thirds of whom were military personnel. Library privileges were secured through Colorado College, and space for classes was provided by District #11 in Palmer High School and later by Colorado College. But a growing movement in the community began pushing for the ability to offer four-year degrees. In 1961, the *Colorado Free Press* published three editorials endorsing the authority of the Colorado Springs Center to offer degrees. And Hewlett Packard (in the person of David Packard) was sold on Colorado's educational plan after a letter from Governor Steve McNichols. The business and military communities formed a Colorado Springs Committee, whose work culminated with a resolution signed by business and civic leaders and presented to the legislature. After the Colorado House of Representatives formed the Little Study to examine the issue, a recommendation that the Colorado Springs Extension Center should become the Colorado Springs Center ensued. In June of 1964, the Regents officially established The Colorado Springs Center of the University of Colorado–UCCS was on its way!

The University of Colorado Extension Center

But where should it be? The Center was rapidly running out of space, and administrator Don King suggested that a campus should be built on donated land. As fortune would have it, George Dwire, the Managing Director, was seeking to dispose of the Cragmor Sanatarium, which was situated some distance north of downtown Colorado Springs at the foot of Austin Bluffs. The sanatarium was founded in 1906 by Edwin Solly and had a storied past as an enclave to serve wealthy tuberculosis patients. By 1936, it had been reorganized as a nonprofit under the aegis of the Cragmor Foundation. After Dwire took over as Director of Cragmor in 1952, he contracted with the newly formed Department of Health, Education, and Welfare to house Navajos from New Mexico with tuberculosis. By 1964 only a small number of patients remained.

Governor John Love worked with George Dwire to secure the property for the University of Colorado. Negotiations were successful for 82.5 acres with all structures and equipment, initially with a rental fee of $1.00 per year until CU gained title in 1965 when it paid $1.00 for the property. Sanatarium operations were phased out, and CU took possession in time for the fall 1965 semester. The property consisted of the four-story sanatarium, a three-story nursing home, a two-story dormitory, and several cottages and workshops; it was appraised at $475,000. However, the sanatarium was in a very run-down condition; staff had just walked away from the facility, leaving all of the medical equipment and supplies. There was a $50,000 allocation to renovate the facility but no funds at all for equipment, so the fall semester began with materials donated from the Boulder campus and the Denver Center. An inauspicious beginning, to be sure!

Accommodations for the library naturally had to be made. At the beginning it was housed in the second-floor dining hall of the main building with contributions primarily from faculty members. In the fall of 1965 there were 4,000 books which doubled to 8,000 and 225 periodicals by the fall of 1966, prompting one faculty member to characterize Cragmor's library as "the worst academic repository on planet Earth." When the library outgrew the Main Hall location, it was moved to the old nurses' dormitory (which became South Hall), with books stored in bathtubs and along stairwells.

But as one of the early faculty members, Dave Nichols of psychology, put it: "Poverty, shared poverty, brings people together. You've got to cooperate." One could say that has been the theme for UCCS ever since. Faculty, staff, and students all pulled together to make the fledgling Center successful. Staff often worked ten, twelve, and fourteen hour days (sometimes with coats on because the rooms were so cold or, in the case of one secretary, wore rubber gloves and a face mask for protection from the resident germs). It took a special kind of faculty member to make the decision to come to such a place, and some of them chose not to stay. But those who did often shared Professor James Busey's (UCCS' first full professor who had been on loan from Boulder for a year but then wanted to stay) view of that era: "Somehow we had something different, something unique in university life . . . a great mix of idealistic young people and experienced older ones, almost a family devoted to the objectives of learning and understanding." A student in James Busey's political science class that first semester remembered that he "exhorted the students to recognize the fact that this was a very momentous occasion they were a part of and they might never have such a glorious opportunity again–that is, to be in on the opening of a new school."

Achieving Legitimacy (1965-1974)

Now that we had a campus and had begun business, some vexing questions arose: Who were we? What did we hope to become? We had some difficulty even deciding on a name–people continued to call us "Cragmor" and some students referred to us as "TBU" in reference to its history with tuberculosis. The most troubling questions throughout

the late 60s and early 70s related to our legitimacy. The Colorado Springs Center had always planned to be a four-year university, and the community certainly had that expectation. But it was not clear whether the state constitution, which established the University of Colorado at Boulder, allowed for the possibility of campuses in other locations. In addition, the Colorado Commission on Higher Education (CCHE), which oversaw higher education in the state, claimed in a 1966 report that CU "had developed the extension centers into 'de-facto' universities without analysis of a need or relation to the total program of higher education for the state." The state, they said, did not need any four-year public universities other than CU and CSU (Colorado State University). Perhaps Colorado Springs could establish a state college rather than a university. To counteract this push, the Citizens Advisory Council of business and community leaders that had earlier successfully pushed for a CU Center in Colorado Springs reorganized itself in 1970 as the Community Council of UCCS; its main task now was to generate support for the Center. They recommended continued affiliation with CU; the center needed autonomy, not severance, from Boulder.

A fervid letter-writing campaign

A very early view of the campus when it began at Cragmor

ensued, organized by the Colorado Springs Chamber of Commerce, to the Regents, the Governor, and Legislature. As a result, at a public hearing in March of 1971, the CCHE received 15,000 statements collected from the community. CCHE passed a resolution stating, "the institution located at Cragmor be established as a first class undergraduate institution with such selected master's degree programs as the CCHE may approve from time to time."

But the CCHE made no decision about governance of the Colorado Springs campus, passing that on to the Legislature. A House proposal to create "Cragmor State College" was defeated; the House then passed HR Resolution 1003 which provided for a constitutional amendment authorizing the Colorado Springs and Denver campuses. By May of 1972 there was agreement on a bill to appear on the November ballot, which would "designate in the constitution that centers of the University of Colorado at Colorado Springs and Denver . . . are parts of the University of Colorado." The Regents gave unanimous approval, and Amendment IV to the Colorado constitution passed in the state by a margin of 52% to 48%. In El Paso County, a community campaign for the amendment resulted in 67% voting in favor and 33% opposed.

Now that we were legitimate in the eyes of the state, we needed to achieve legitimacy with our accrediting agency, the North Central Association (NCA). In a 1970 visit to the campus, the NCA criticized the University for not having a separate Vice President for the Colorado Springs Center and characterized the faculty as an

"uncoordinated array of individuals with little sense of community." The most damning critique was reserved for the facilities, including the library which they said had inadequate space and a small collection. The NCA recommended probationary status and planned a return visit in two years.

Anxious to prove the legitimacy of the campus, faculty and staff were energized. A Faculty Curriculum and Goals Committee authored an ambitious proposal on mission and goals and spent time focusing on and reviewing the curriculum. After the return visit of the North Central Association in 1972, its report stated that it was "much impressed with the considerable progress that has been made in the past two years" and said that curricular offerings had been "renewed, condensed, and revitalized." It removed probation and granted full and unconditional accreditation to the campus.

Establishing an Identity (1974-1982)

The campus was now fully authorized, but still had not established its own identity. We still did not have a Chancellor, the curriculum still had to be aligned with Boulder's, and faculty needed to be approved by Boulder not only for hiring but also for tenure and promotion. For the next ten years, the campus would feel like a "poor stepchild" and have an "us vs. them" mentality. The primary issue was funding, but the campus also needed to upgrade the facilities and add new buildings to accommodate the growing enrollment, which was increasing at the rate of 9% per year. By 1982, UCCS had over 5,000 students. The ties to the community that had been established so strongly during the fight for existence had not been nurtured and enhanced.

The campus gained a strong advocate in the person of Larry Silverman, who was named the first Chancellor in 1974. He immediately became a strong champion for UCCS in the community, partly by settling the issue of its name–we were no longer the Colorado Springs Center, but the University of Colorado, Colorado Springs (UCCS). Chancellor Silverman quickly took the UCCS message to the community and became the darling of the local press and businesses. His motto became "Education for the Community" and he sought to make that a reality by extolling UCCS' virtues and exhorting the community to put pressure on the Regents and the Legislature to provide more funding. The Joint Budget Committee overrode Governor Lamm's recommendation not to fund a new building and appropriated $2.5 million to construct a new laboratory-classroom building–the Science Building (now called Centennial Hall).

Registration lines outside of Cragmor Hall in the 1970s

While Dwire Hall had been constructed in 1972 to take some pressure off Main Hall for classes and labs, Main Hall continued to be a facilities nightmare; mice, bats, bees, wasps, and scorpions bedeviled it such that Professor Doug McKay referred to it as a "veritable vermin hotel." Students also complained about the parking lots, which were

dirt with inadequate and inconsistent lighting. Of course, student complaints about parking have continued to be voiced (sometimes loudly) over the years.

But one of the most exasperating issues continued to be the library, which still did not have its own location. The first building to be authorized by the new 1973 Master Plan, the library, opened in 1976. The library director at the time, Michael Herbison, devised a unique conveyor belt system to transport boxes of books down a rocky hill from Dwire Hall and into the third floor of the library. The University Center, finally a place for students to gather and even quaff a few in the pub, opened in 1977 much to the delight of the student body as well as the faculty and staff.

Silverman also oversaw a surge of cultural happenings on the campus in the 1970s. A University Chamber Choir performed regularly, the Cragmor Players (later called Theatreworks) put on plays, including the first "Shakespeare in the Park" in 1977, a production of *Romeo and Juliet*. A literary magazine, *Writer's Forum*, was founded in 1974, and a portion of the old Main Hall lounge was remodeled into an art gallery. "The University," Silverman claimed, "ought to be the center of cultural activities. The campus should be ablaze with music, art, and drama."

When Silverman chose to go back to the faculty in Boulder in 1977 to teach Russian History, Chuck Hinkle, who had served the campus before as Vice Provost, became Interim Chancellor and immediately set about updating the Master Plan. During his one-year tenure he was successful in changing the mission statement of UCCS, gaining CCHE approval for UCCS to be a "comprehensive master's degree granting university." Despite a contentious next four years, which included a faculty vote of "no confidence" in May of 1979 and a "no growth" mindset at the Legislature, the campus and its programs continued to expand. New construction included the Engineering Building, the Four Diamonds Sports Complex on the Trembly property, the Science Building, and the Creative Arts Exhibit Center (later to be renamed the Gallery of Contemporary Art).

Growing and Developing (1982-1992)

The next ten years were a time of building the campus–new degrees, new programs, new buildings, new challenges with the system to overcome. The campus gained a new mission, that of a "limited doctoral-granting institution" which paved the way for the first doctoral program in Engineering, a coordinated degree within the system.

The early 1980s presented several challenges. While UCCS leadership was working to bridge the institution's twin mission "between technological areas of study and the liberal arts," the system president wanted to make UCCS "the MIT of the West." Tensions arose in the CU system around issues of resource allocation and program autonomy. In addition, there was a direct conflict between the Legislature's desire to limit higher education in the state and the plans of UCCS to expand its programs to meet increased demands for advanced education, particularly graduate education, in the Pikes Peak region. A seasoned administrator from the Boulder

and Denver campuses was appointed Chancellor in 1985 and remained as a stabilizing factor in the university's history until 1992. Facilities improvements continued to be a part of the 80's, with the Engineering Building finally opening in 1985 and the University Center expanding in 1988. The campus felt as though it had arrived in terms of graduate education when it granted its first doctoral degree (in Engineering) in 1986.

By the time 1990 rolled around, the campus was ready to celebrate its 25th anniversary in style. Professor Doug McKay wrote a history of the campus, *UCCS–The First 25 Years* (which I have relied on for this history), a poster was commissioned, and a Convocation was held with all of the former Chancellors present. The campus breathed a sigh of relief – we not only survived, we thrived!

Coming into Our Own (1993-2000)

In August 1998, the *Denver Post* ran a front-page article called "School on the Move." "No campus has seen a makeover like CU-Colorado Springs. It's the cover girl of Colorado campuses" was the opening statement. The article talked about the addition of residence halls but also addressed several other signature changes on the campus. "All this from a satellite campus that was known for free-wheeling treatment of tuberculosis patients in the 1920s." CU President John Buechner called UCCS "a transformative campus. No one envisioned what the campus would look like today."

What happened in the 90s that helped the campus earn all these accolades? UCCS became a little more sophisticated, adding to our fund-raising capacity, our student recruitment initiative, and certainly to the appearance of the campus. Indeed, we came into our own as the twentieth century closed.

Clearly there was an opportunity for growth in the student population. While the student population in 1990 was at nearly 6,000 students, it had grown only marginally in the 80s after the years of 9% increases in the 70s. Given the demographics of the high school population in Colorado, there was potential for gaining a greater share of graduates. Student recruiters were hired and sent all over the state. We had moved from a "if we build it, they will come" mentality to a "let's go out and find them and let them know about us." A goal of 10,000 students by 2000 was established, and although it took the campus until 2013 to reach that goal, the groundwork had been laid.

A huge boon to adding more eighteen-year-olds to the campus mix came with the addition of the Housing Village in 1997. The energy and idealism of the students added vigor to classrooms and created an environment where students no longer just drove to campus for classes, but stayed for campus life such as athletic events, lectures, and concerts.

The 90s also saw a number of developments on the academic side. Primary among these was the merger of the Beth-El School of Nursing with UCCS in 1997 after a voter referendum overwhelmingly approved the partnership. The school became the Beth-El College of Nursing and Health Sciences and added degrees in both nursing and health sciences to UCCS. The campus also continued its growth in graduate programs, adding master's degrees in Engineering and Psychology.

The new relationship with the community resulted in some important land donations, including that of the Bennett property in the central area of campus. A substantial gift from the El Pomar foundation allowed for an expansion and renovation of the Kraemer Family Library, now housed in the El Pomar Center. The library now boasted not only state-of-the-art technology but also spectacular views of the Front Range.

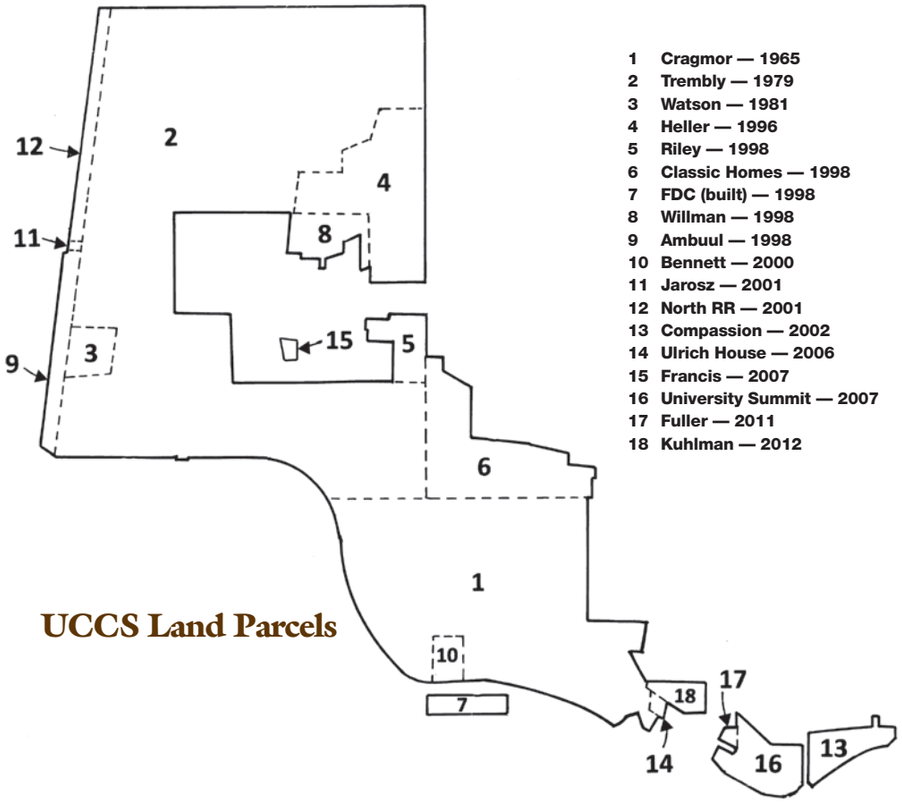
Exploding Growth–the 21st Century

In a May 2013 column in the *Colorado Springs Independent*, Ralph Routon stated, "UCCS is the best thing Colorado Springs has going for it now…. Almost anyone who hears about UCCS and its accelerating developments can't help but be impressed." "Why care about UCCS?" he asks. Because "the university has the ability to unite us all. It's practically immune from political battles, with all sides appreciating its value to the region." And he ends with saying that there is nothing wrong with Colorado Springs becoming known as a college town: "If that's a major portion of our city's 'next' identity, let's go for it."

This is a far cry from the early years of being "Cragmor" located on the outskirts of the city! The campus has moved from trying to establish an identity to being a major force in creating the identity of Colorado Springs. Many on campus and in the community attribute this 21st century boom to the leadership of Pam Shockley-Zalabak, who became Chancellor in 2001. Her long history on the campus as a faculty member, department chair, president of the Faculty Senate, and as Vice Chancellor for Student Success, as well as her vision for what UCCS *could* be, enabled the campus to reach new heights.

The first decade of the twenty-first century really *has* been one of exploding growth at UCCS, and one of the most dramatic ways of viewing this is to look at the current campus acreage–now at 535 acres compared to the original Cragmor gift of 82.5 acres. A map shows the addition of the various land parcels over the years.

New and renovated buildings have changed the campus landscape such that the community has taken notice. A Recreation Center opened in 2007 to add to campus life, and it has been so extensively used by students, faculty, staff, and alumni that an addition is in the works for 2014. Dwire Hall made its own call for renovation when a large chunk of concrete fell into a hallway (luckily during the Commencement ceremony in 2005 so that the building was relatively deserted). The expansive clay in the soil that had caused trouble since Dwire was first constructed finally took its toll. When the renovated Dwire, with its beautiful glass atrium, opened in 2007, it seemed like a new building. Main Hall and Cragmor Hall were also remodeled and created a much more centralized location for student services and administrative offices. And the Beth-El College of Nursing and Health Sciences finally achieved its own home with the acquisition of the former Compassion International building and land at the east end of campus; it was named University Hall and also housed Theatreworks. When a new Science and Engineering Building (later renamed the Osborne Center



for Science and Engineering) opened in 2009, state-of-the-art laboratories for biology, physics, exercise science, and mechanical engineering were created. The Foucault Pendulum, demonstrating the rotation of the earth, was installed as public art in the foyer of the building and has become an icon, exemplifying the blending of physics, biology, and engineering that the building represents. The west lawn, a green space created just below the building, allowed room for sunbathers, Frisbee throwers, and even movies to add to campus life. The El Pomar Plaza, created between the Osborne Center and the El Pomar Center/Kraemer Family Library, added a central focal point to the campus with amazing views. And when the Gallogly Events Center (attached to the University Center) opened in 2010, the UCCS basketball team could no longer "boast" of having the smallest gymnasium in the country in NCAA Division II. The campus now had 16 sports from basketball to track and cross-country and golf with athletes who excel on the field as well as in the classroom. Both the Gallogly Center and the renovated old gym, now named Berger Hall, gave the campus space to host not only athletic contests but also community events and large lectures.

Campus sustainability efforts, fueled primarily by faculty and students, increased dramatically as we entered the 21st century. An Office of Sustainability was added in 2006. The campus became a signatory of the American College and University Presidents Climate Commitment and stepped up its efforts to incorporate sustainability into all of its aspects. All buildings since 2007 have been

LEED gold-certified, which is the Green Building Council's rating system for designing and constructing energy efficient and high performing green buildings. Faculty created an interdisciplinary sustainability minor and added sustainability to the general education requirements.

The enrollment also jumped dramatically, growing from 6,600 students in 2000 to almost 10,000 in 2012. The student population included record numbers of new freshmen each year, so that by 2012 the campus had run out of housing and needed to lease an apartment complex on North Nevada Avenue to accommodate both out-of-state and Colorado residents. Record numbers of transfer students came from community colleges as well as four-year institutions. The campus also became increasingly diverse: by 2012, 24% of the students were minorities, 40% were first generation, and 24% were low income. As has happened across the nation, UCCS has experienced a growing number of online students (2,000 in 2012).

Academic programs also grew rapidly; by 2012 the university boasted 36 bachelor's, 19 master's, and five doctoral degrees. The long journey to a PhD in Psychology culminated in 2002, and that program with its emphasis on Gerontology has achieved national status. Centers and institutes began to play an increasingly more important role in research and community connections: the UCCS Center of the University of Colorado Biofrontiers Institute is devoted to collaborations between scientists across disciplines to advance biotechnology; the Center for Trauma, Health, and Hazards has created a location for research in emergency management as well trauma, particularly that affecting veterans; and the El Pomar Institute for Innovation and Commercialization and its three endowed chairs have been actively working with the community to inspire entrepreneurial and innovation activities.

UCCS Athletics also grew substantially during the 2000s. Athletic programs began in the late 80s with three sports. UCCS initially was a member of the National Association of Intercollegiate Athletics (NAIA), but joined NCAA Division II in 1990. The Mountain Lion became the new mascot, and the campus now boasts 14 teams. The teams have chalked up 17 consecutive semesters with a student-athlete GPA greater than 3.0 and have earned the Division II Presidents Award for Academic Excellence.

The new century was not without its challenges, however. Finances, which had always been problematic for the campus, reached a crisis level. The state of Colorado, which in 1971-72 had ranked sixth among all 50 states in terms of operating support for higher education, had moved to 48th by 2009-10. Several developments contributed to this decline, most noticeably the Taxpayer Bill of Rights (TABOR), a tax and expenditure limitation passed in 1992. The economic recession of 2008 also contributed, although along with other institutions in the state, UCCS used American Recovery and Investment Act (ARRA) funds to offset reductions in state support. These changes in funding have forced institutions to rely increasingly on tuition to support a greater proportion of the general costs of running the operations. In the

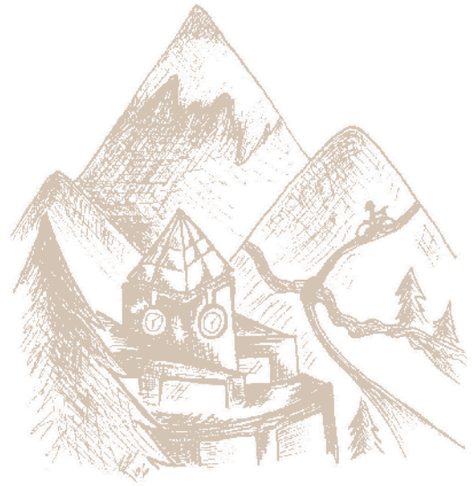
case of UCCS, the Chancellor worked tirelessly to secure new sources for scholarships and was successful in creating partnerships with several donors to fund the Reach Your Peak Scholars, the Kane Scholars, and the Karen Possehl Scholars, among others. As Brian Burnett, the Senior Executive Vice Chancellor for Administration and Finance stated, "higher education's survival has been dependent on its leaders to reinvent itself as more of a self-sustaining entity."

"When written in Chinese, the word 'crisis' is composed of two characters," President Kennedy said in several speeches: "One represents danger and the other opportunity." Chancellor Shockley felt that the campus certainly embraced the opportunities that the financial crisis presented: "it made us stronger to stay the course despite the difficulties." UCCS faculty and staff pulled together to help pass Referendum C in 2005, which gave a five-year TABOR timeout for the state, and the measure passed by 52%. UCCS has also gained a fairer share of the CU system allocations, and has increasingly fostered partnerships to provide funding for the next generation of buildings.

The next 50 years will continue to see UCCS grow – to a projected 25,000 students or more – and the northwest area of the campus will continue to be developed. The National Sport, Arts, and Wellness Village, on the land donated by Virginia Trembly, will place UCCS on a higher educational plane while fueling the region's economic engine. The Lane Center for Academic Health Sciences opened in 2014 and will provide a new home for the Beth El College of Nursing and Health Sciences, incorporating a new nutrition kitchen, gym, and managed nurse clinic. The Lane Family Senior Health Clinic operated by Peak Vista is also a part of the Center, along with the CU Aging Center and UCCS Gerontology Center, the Trauma Health and Hazards Center, and a CU School of Medicine branch. Plans are being drawn up for a Visual and Performing Arts Center that will house Theatreworks, the Gallery of Contemporary Art, a growing UCCS music and dance program, and possible teaching and performance space for area arts organizations. Rounding out the project will be an integrated Center for Sports Science and Sports Medicine, as well as sport facilities that will include a multipurpose arena and field house for Mountain Lion athletic events, lectures, concerts, and Olympic Training Center Activities; a fitness center and pool; and a high-altitude soccer field and track for sports medicine research, university teams, elite athletes, para-athletes, and the Wounded Warriors program.

The ambitious plans for the campus were captured in the Strategic Plan 2020, in which the vision states: "UCCS, a premier comprehensive undergraduate and specialized graduate research university, provides students with academically rigorous and life-enriching experiences in a vibrant university community. We advance knowledge, integrate student learning with the spirit of discovery, and broaden access to higher education for the benefit of southern Colorado, the state, nation and world." The campus once again in 2011 won a hard-fought battle to change the mission statement so that it includes research: "The Colorado Springs campus of the University of

Colorado shall be a comprehensive baccalaureate and specialized graduate research university with selective admission standards. The Colorado Springs campus shall offer liberal arts and sciences, business, engineering, health sciences, and teacher preparation undergraduate degree programs, and a selected number of master's and doctoral degree programs." The goals of the plan call for growing student enrollment and degree programs as well as research and community partnerships. As Shakespeare put it: "It is not in our stars to hold our destiny but in ourselves." If that is true, then UCCS should be well situated for the next fifty years.



Virginia Trembly and UCCS

Judith Rice-Jones
Librarian (retired)

The University of Colorado Colorado Springs has benefitted from the generosity of many individuals over the years. One of the most significant gifts came from a campus neighbor, Dr. Virginia Trembly. In the mid-1930s Dr. Trembly and her husband Dean purchased over 300 acres of land, a property forming a U-shape with the base of the U parallel to Nevada Avenue (the old highway to Denver) and the two sides, perpendicular to Nevada running east and west. The Tremblys planned to ranch in the area and to that end built a home, constructed by hand with rocks collected on site and from Sand Creek. Initially they had horses, Red Angus cattle, along with goats and the traditional ranch dogs and cats. In an oral history interview held at Dr. Trembly's home in 1990, she shared, "We didn't want to live in the city. We had loved living in the hills and we decided we'd rather look at the hills than live in them. And I enjoyed the sunsets over Pikes Peak for years."

Virginia Garth (her maiden name), Colorado Springs' first female dentist, graduated from DU College of Dentistry in 1923 and practiced briefly with her father, Dr. Samuel A. Garth. She then attended the International School of Orthodontia in Kansas City. Following graduation, she taught for a number of years at Kansas City Western Dental College. In 1924, Virginia was admitted to the Colorado Springs Dental Society and remained the only female dentist in that group until 1979.

Returning to Colorado Springs in 1931, she practiced dentistry in the old Mining Exchange Building (also called Exchange National Bank) for many years. In 1933, she married Dean Albert Trembly, a Colorado College graduate who had majored in psychology and music.

Over the next decade they built their home and adopted two sons, Cecil O. and James. In 1944, they had a daughter, Susan Jane. The Tremblys divorced in 1947, and thereafter Virginia and her daughter lived alone in the house at 1010 Eagle Rock Road.

Susan relates that she walked a mile to the bus stop on Nevada and rode the bus to Lincoln Elementary. After school, she took the bus to her mother's dental office and then drove home with her mother. As a single parent and practicing dentist, Virginia did not have time or resources to develop the ranch. The cows were sold off, but goats remained and supplied goats' milk to Virginia and her daughter up to the time of Virginia's death in 1990. According to those who knew her, Dr. Trembly was very much interested in nutrition and believed that goats' milk was healthier for teeth as well as for general health. She often advised patients on good nutrition as well as proper dental care.

By the early 1970s, Dr. Trembly had moved her office to the Burns Building on Pikes Peak Avenue. When plans were approved to tear down that historic building, Dr. Trembly decided to retire. She had practiced dentistry for 50 years.

Following her retirement she addressed the issue of her estate. By then her daughter had married and Dr. Trembly was living alone. Over the years, according to family and neighbors, she had often been approached to sell off parcels of her land to developers.

Between 1973 and 1978 Dr. Trembly spoke with representatives of the University of Colorado over terms for the disposition of her estate of 300 acres as a gift to the University. Dr. Trembly wanted to be certain that the land would be used for educational purposes and not for any commercial enterprises. In 1978 an agreement was reached which included a life estate for Dr. Trembly, allowing her the use of acres surrounding her home for her lifetime. Regent Sandy Kraemer called the donation "an exciting opportunity for the university and the entire community." A report in the campus newspaper in 1980 talked about the revisions to the campus twenty-year plan as a result of this monumental gift. According to Professor Douglas McKay, revisions included 100 acres to be preserved "for their beauty and aesthetic value." The exceptional beauty and distinctiveness of the acreage make this large gift even more

valuable. The site includes the rock structure which gives its name to the local neighborhood, Eagle Rock. To the east, the bluffs circle around a large natural amphitheater where one can send and receive echoes of one's voice. The diversity of vegetation is remarkable, including some small areas of tall-grass prairie, a rarity for the region. A long hike by the Colorado Native Plant Society in 2006 revealed the presence of a unique biotic community, amazing to find in the center of a major urban area.

In 1977 the University awarded Dr. Trembly an honorary doctorate, in 1981 the campus Alumni Award, and in 1982 the University Medal. Dr. Trembly passed away in 1990 at age 87 after a brief illness. Several years thereafter, the University allowed the Colorado Springs Fire Department to use her home as a training exercise and the house was burned down. Today, all that

The last vestige of the Trembly house. This chimney sits below Pulpit Rock

remains is a fireplace and its chimney as monuments.

Family members donated two paintings of Virginia done by her mother, artist Geneva C. Garth. Today one of these paintings hangs in the Brooks Room in the University Center.

Portrait of Dr. Virginia Trembly that hangs in the Brooks Room at UCCS

Dr. Trembly's love for and exploration of her land never ended. Many speak of her fondness for rocks. She called herself "Mrs. Got Rocks" and never tired of collecting them. In her later years, her dinner/reading table contained a circle of recent finds which she was always willing to share with visitors in the form of narratives about where they'd been collected and what they were. Her daughter remembers frequent forays in the spring to find the first anemones that bloomed, especially at a favorite site by the old Atchison, Topeka, and Santa Fe railroad culvert. Like her neighbor to the east, Dot Heller, Dr. Trembly loved the land, the views to the mountains, and her neighbors, and she saw her gift to the University as a way to protect the site she had come to know and love.

The Heller Center for Arts & Humanities

Perrin Cunningham
Heller Center

The Heller Center for Arts & Humanities is located one and a half miles north of the main UCCS campus, east of Nevada Avenue, on 36 beautifully secluded acres surrounded by 900 acres of dedicated open space. Backed by towering sandstone bluffs, the Heller Center opens to a panoramic view of Pikes Peak and the Garden of the Gods. Songbirds, eagles, deer, coyotes, bobcats, and other wildlife make their home in the valley. The Heller Center was founded in 2003 as an interdisciplinary center combining educational, research, and creative activities in the fields of arts and humanities.

The historic adobe Heller Center compound provides spaces for working artists, small meetings, classes, exhibitions, and performances, and functions as an open-air studio for creative endeavors and as an outdoor laboratory for environmental studies. The short-grass prairie surrounding the compound is one of the few areas within Colorado Springs that has never been disturbed or heavily grazed; it therefore has preserved

a rare combination of native grasses and plants. The hiking and biking trails provide outstanding recreational opportunities with unsurpassed views of Pikes Peak. Given the nature of the facility and its historical importance, the Heller Center offers a unique venue for programs that engage significant constituencies of the Pikes Peak region.

Philadelphia-area native Larry Heller (1905-1983) moved to Colorado Springs with his family in 1920. After graduating from Colorado Springs High School (re-named William J. Palmer High School in 1960), Heller headed back east to attend Williams College, Carnegie Mellon, and Yale. After travelling in Europe, he returned to Colorado Springs in 1933 to set up a fun, eclectic life as an artist. He was enchanted by the dramatic western landscape and burgeoning arts scene, accentuated by the Broadmoor Art Academy that thrived in the early part of the 20th century. He befriended another artist, Laurence Field. Together, they found a beautiful piece of land that was bordered to the east by Austin Bluffs and to the north by a large outcrop known as Eagle Rock. The young

The Heller main house and work buildings in 1948

men bought it and began building a "rammed earth" Pueblo Revival-style house. This small building, finished in 1935, still stands and is now known as the Herman Raymond Guest House in honor of a fellow artist. It is one of the few buildings of its type remaining in El Paso County.

Heller also quickly became enchanted with a young woman named Dorothy Kemp (1905-1999), herself an iconoclast, and the first policewoman in the Colorado Springs Police Department, who worked as a social investigator, with victims of domestic abuse as well as with alcoholics and drug-abusers. Dot and Larry married in 1936. Together with Laurence Field, they built the home the Hellers would occupy for the next fifty years. Field continued to live in what became the "Small House" while Larry and Dorothy lived in the "Big House."

The Hellers referred to their property as the 'Yawn Valley Yacht Club.' Membership, they loved to say, was limited to persons who were averse to steady employment. Horses, foxhounds, goats, turkeys, and even two cows roamed the property over the years. They took great pride in their greenhouse and terraced gardens, which are now historically restored.

The Heller main house was restored in 2010

Larry produced art with zest in media including painting, World War II posters, sculpture, ceramics, wrought iron, metal lathe work, film, and photography. His works matched his

love for the Western aesthetic with an appreciation for camp and romance. Most of his paintings are in the American Realism tradition, associated with the works of N.C. Wyeth and others. Heller, while talented and highly technically skilled, remained a true "amateur"; he did not like to sell his artwork and resisted becoming a commercial artist. He did set up plans to sell pottery, but in the end, decided against it. Heller did donate several pieces to the Sangre de Cristo Art Center and the Trinidad Museum, as well as to Carnegie Mellon. The Alexander Film Company of Colorado Springs used the location and Heller's various talents for many of its productions. Heller wrote scripts, acted, performed stunts, and designed sets and costumes.

The Hellers also welcomed a community of artists, including Tabor

Some of the iron art work Larry Heller created

Utley, Archie Musick, George Biddle, Frank Mechau, Randall Davey, Lew Tilley, and Starr Kempf, to their home, sparking countless connections and inspiring scores of peers to realize their own ideas and artistic visions. As a result, Yawn Valley became an active part of the flourishing mid-century arts scene in Colorado Springs.

When Dorothy Heller passed away in 1999, she bequeathed the home, property, and art collections to UCCS, with the hope that the legacy of the place as an intersection of nature, art, and passion would inspire educational experiences, creativity, and natural preservation. The Main House of the Heller property was rehabilitated in 2010, with assistance from the Colorado State Historical Fund and a generous gift from Mrs. Elizabeth (Betty) Taylor. Historic renovation of the Guest House was completed in 2012, with generous assistance from an anonymous donor,


Restored guest house at the Heller Center

in honor of Heller's fellow Colorado Springs artist, Herman Raymond. The Heller Center is now a learning community dedicated to the pursuit of knowledge through creative engagement with an emphasis on the arts and humanities. The Heller Center's goals are to provide collaborative programs that enrich the community, promote the creation of a vibrant and creative cultural life, and advance an understanding and practice of citizenship and civic responsibility. The Heller Center provides a working center for the arts and humanities, including exhibition and small performance spaces, studios, seminar areas, meeting spaces, a greenhouse and garden, and an artist/scholar-in-residence program. In addition the Heller Center program includes active collaboration with artists and scholars and organizations, emphasizing the arts and humanities.

"Walking-the-Farm" – the Campus Boundary

Katelyn Stover
Geography and Environmental Studies Student

I follow a dilapidated fence around the perimeter of the UCCS campus. Walking the farm (some call it "walking the perimeter") is an idea that dates back long ago. It is a tradition held by many. Walking the perimeter helps delineate problems between neighbors, like erosion and broken fences.

The UCCS property is so expansive and the line that outlines the boundary holds in so much and barricades out so much. Hidden places hold secrets, kept for decades. Old beer bottles and medicine containers are scattered across the property. Piles of collected rocks prove that someone is on the lookout for the hidden gems. The rusted barb wire fence that I follow is buried under the rubble of erosion, a forgotten artifact of the landscape. In some places, I feel like I am lost in the wilderness, embraced by the natural environment. In some places, I feel overwhelmed, invaded by the hustle of the city.

Old barb wire fencing

As I follow the perimeter, I consider these things — I consider how our campus affects our neighbors and our city; I also consider how the campus that is bound by a property line creates opportunities for our futures and guides us into the *real world.*

Our campus is unique. Our campus is evolving. We all contribute to what this place, within the property line, has become. It is more than property. It is more than land within a perimeter. New

construction like the efforts currently being put into the Lane Center, future home of a health sciences and medicine program, prove our evolution. Every day our campus is evolving into something new. With every extension that our campus makes, we not only extend our programs, we also extend ourselves into the community. Opportunities such as health services, potential employment, and potential events will continue to interweave our campus into the community. Changes on our campus create changes in our curriculum as we constantly strive to provide the best education so the students can join the community with impressive talents and useful skills. Our campus is evolving along with our community.

Standing on the property line amidst the unstable erosion of Pulpit Rock, I am struck by the division of the landscape on our campus. Reflective of the rest of Colorado, our campus is very much dictated by the geography of the land. The land allows spaces where we can erect our buildings, develop our cities, and create lasting infrastructure. Mountains create a barrier right down the middle of Colorado, just as the bluffs halt development on campus. These natural barriers create a different tone. The Front Range corridor and the core of campus are both beaming with hustle — automobiles, buildings, more automobiles, and more buildings where it is easy to get caught up in life and forget about the natural environment, the birds, animals and wildflowers.

Walking along the eastern perimeter I begin to get lost in the embrace of the quiet, natural environment of the bluffs. I cannot see any buildings and I begin to forget that I am on University property, in the middle of Colorado Springs. The quietness calms my busy mind and inspires me to look around and admire the landscape. Pulpit Rock towers next to me, shadowing the bluffs. I stumble upon pile after pile of mysterious rock collections. Some contain only quartz or chert; some contain one of several rock varieties reflecting the color variances of the landscape. Someone has spent considerable amounts of time gathering rocks and carefully creating piles all over campus. These piles are evidence that our campus is more than a place to explore the world of knowledge — it is also a place to explore the world of nature. We fill our brains with information, cramming every fact, every equation, every theory, hoping that it all sticks and all proves to be useful in the future. But on our campus, we can also fill our lungs with fresh air and embrace the quiet exploration of the outdoors.

UCCS strives to evolve. UCCS has succeeded in growing and developing into a respected institution within our community. As UCCS grows, so does the surrounding cityscape. The expansion of Austin Bluffs from a four-lane street to a six-lane highway modified the community at large, not just UCCS. University Village along North Nevada Avenue continues to add new businesses, providing jobs and services to students and the community. As UCCS and the surrounding environment evolve, neighborhoods such as the Cragmor development become absorbed into the campus, and neighborhoods surrounding campus become student and faculty homes. UCCS is changing and so is Colorado Springs, and it is through this evolution

that we develop a cohesion and community.

Maybe the things we see when looking out symbolize our futures — all the possibilities that we could pursue. All seems chaotic and out of control. But really, we are being guided along select paths, gently being merged into certain lanes on the road that will take us to our destinations. Our professors switch the light to green and push us onward, forward. The knowledge we learn on

Campus sign on Nevada Avenue

the inside helps us when we step over the property line, the property line that nurtures us until we are ready to explore the world beyond our campus.

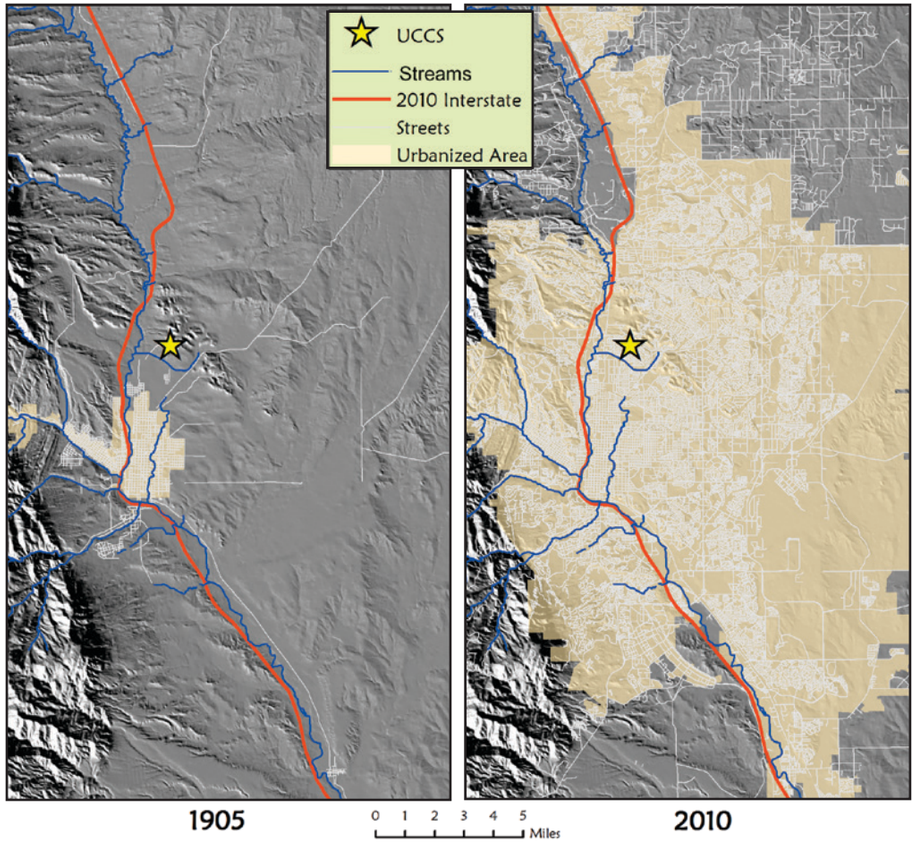
UCCS in Context of the Colorado Springs Metropolitan Area

John Harner
Geography and Environmental Studies

UCCS sits a little over four miles north of downtown Colorado Springs. At the time of its founding as the Cragmor Sanatarium in 1905, this site was an isolated enclave far removed from the urban hustle and bustle. The physical setting is quite remarkable, located on the south slope of Austin Bluffs, some 400 to 500 feet higher than the downtown, with commanding views of the older inner city and westside neighborhoods, Pikes Peak, and Cheyenne Mountain.


Looking south-southwest from UCCS to the Colorado Springs downtown, with Cheyenne Mountain behind

Today, this location that was once far removed from the city is centrally located when looking at the greater urban context, as Colorado Springs sprawled in recent decades to the north and east of



Location of what is now UCCS in relation to the urbanized area in 1905 and 2010

its original incorporated boundaries near the junction of Fountain and Monument Creeks.

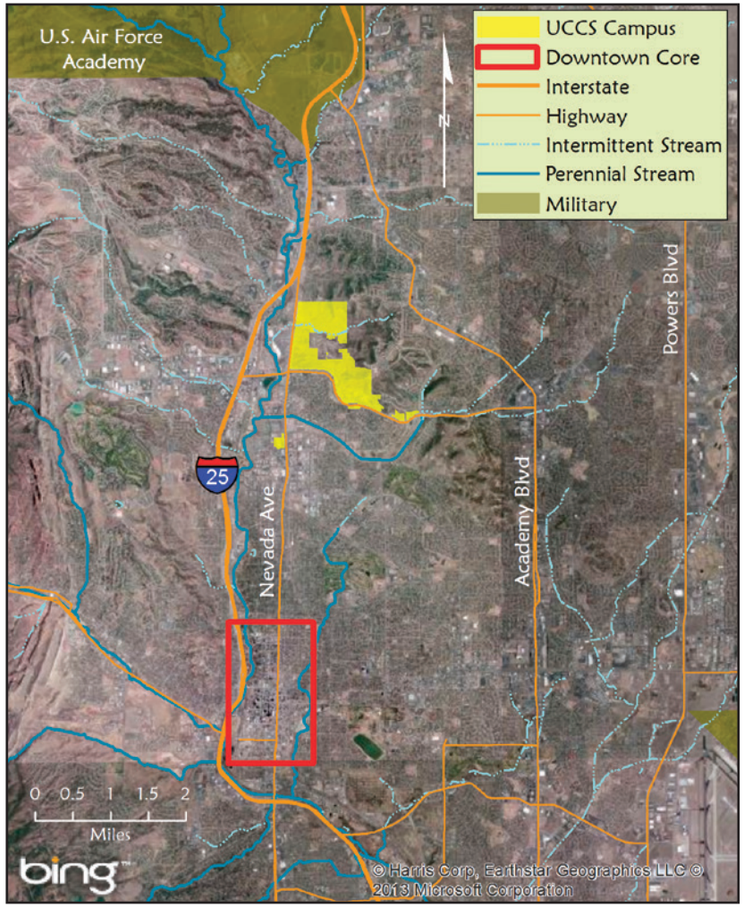
Colorado Springs remained fairly modest in size until the second half of the twentieth century, after which the city population and areal extent grew rapidly. This change from town to mid-sized metropolitan area drove increasing UCCS enrollments and fostered the desire by local agents and CU officials to transform UCCS from a commuter-based branch into a full-fledged university campus. By the mid-1990s, CU administration recognized that UCCS was undersized and underfunded given the metropolitan context, and thereafter designated UCCS to be the "growth campus" in the CU system. On site residential halls completed in 1997 were the first step towards this transformation, and investment in the physical infrastructure, lands, and academic programs have kept the process ongoing.

Year	City Population	County/Metro Population	Incorporated Area (sq. mi)	UCCS enrollment
1900	21,085	31,602	7.0	
1910	29,078	43,321	7.2	
1920	30,105	44,027	8.2	
1930	33,237	49,570	8.2	
1940	36,789	54,025	8.2	
1950	45,472	74,523	9.5	
1960	70,194	143,742	16.4	
1970	135,501	235,972	63.5	2,312
1980	215,150	309,424	109.3	4,827
1990	281,140	397,014	183.2	5,983
2000	344,076	491,750	186.0	6,632
2010	416,427	645,613	194.8	8,900

Colorado Springs historical data
Source: U.S. Census Bureau, City of Colorado Springs, McKay (1991), and UCCS Office of Institutional Research

Colorado Springs is characterized by low density residential tracts punctuated by car-oriented strip malls on the main arterial routes. This classic pattern of urban sprawl has diminished the growth of a dynamic central business and entertainment district—our downtown is certainly smaller than would be expected in a metropolitan area of over 600,000 people. Yet despite the siphoning of investment to ever-expanding suburban nodes, the downtown remains the key urban focus and place-making node for the city. The UCCS campus location and 535 acres of largely undeveloped land situates the university as a strategic player for infill growth and development that can complement and add to the downtown hub. UCCS is ideally located at what is considered a "gateway" to the downtown for travelers coming south from Denver or from the suburban areas in northern El Paso County.

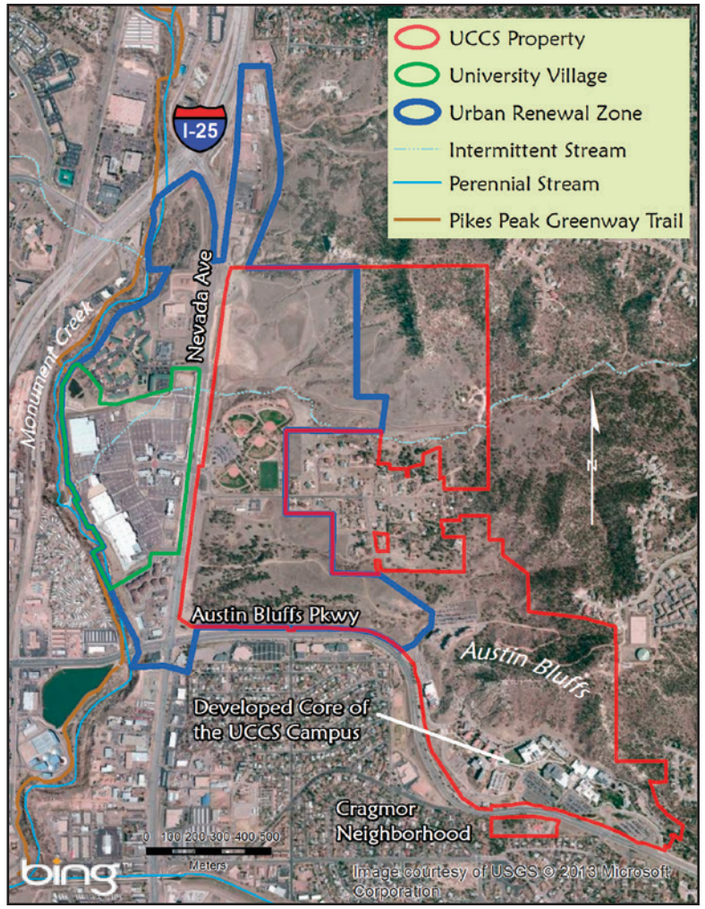
Austin Bluffs Parkway, the main thoroughfare and entrance to the campus, was once a dirt road that ended at the sanatarium. Now it is a principal east-west corridor through the city, recently straightened and expanded to six lanes in order to handle increased traffic flows. Our other bordering street on the west end of campus, Nevada Avenue, was once the main north-south highway connecting Colorado Springs to Denver. In its heyday, it was lined with small, family-owned motor courts, campgrounds, and motels. After Interstate 25 was completed in 1961, the old highway was bypassed by traffic, and a long gradual decline began. By 2004, the corridor was designated as "urban blight" by the Urban Renewal Authority, and major



UCCS is strategically located as a gateway to the downtown

redevelopment began. University Village, a large shopping complex, is now located across the street from campus. Despite a design catering to automobile parking and anchored by national "big box" stores, the hopes are that the retail space will work in synergy with the university to spark student housing and campus activities that turn the whole North Nevada corridor into a dynamic urban hub. UCCS has contributed to this goal by entering into agreements with an apartment complex adjacent to University Village to house students and planning more apartment housing at the campus Alpine Village just up the hill from Nevada Avenue. Given plans by UCCS to develop athletic, arts, and research facilities in the North Nevada areas of campus, one day this will be a main public entrance to the campus with a variety of events taking place.

The history of the campus as a relatively small and largely commuter-based school inhibited the founding of a college-town type of environment. There are no "student slums," cheap bars and clubs, or fast food hangouts adjacent to campus such as those found nearby most large public institutions. The majority of students still commute to UCCS from dispersed locations throughout the metropolitan area. But recent growth of the campus has begun to impact the immediate surroundings. Housing arrangements and future plans on Nevada Avenue will likely lead to an increased student concentration in that corridor. Housing in the most immediate neighborhood to the south (Cragmor) still remains largely single family homes, but change is occurring there as well. This 1960s-era neighborhood already has a concentration of UCCS faculty, and



UCCS boundary, North Nevada urban renewal zone, and University Village shopping center.

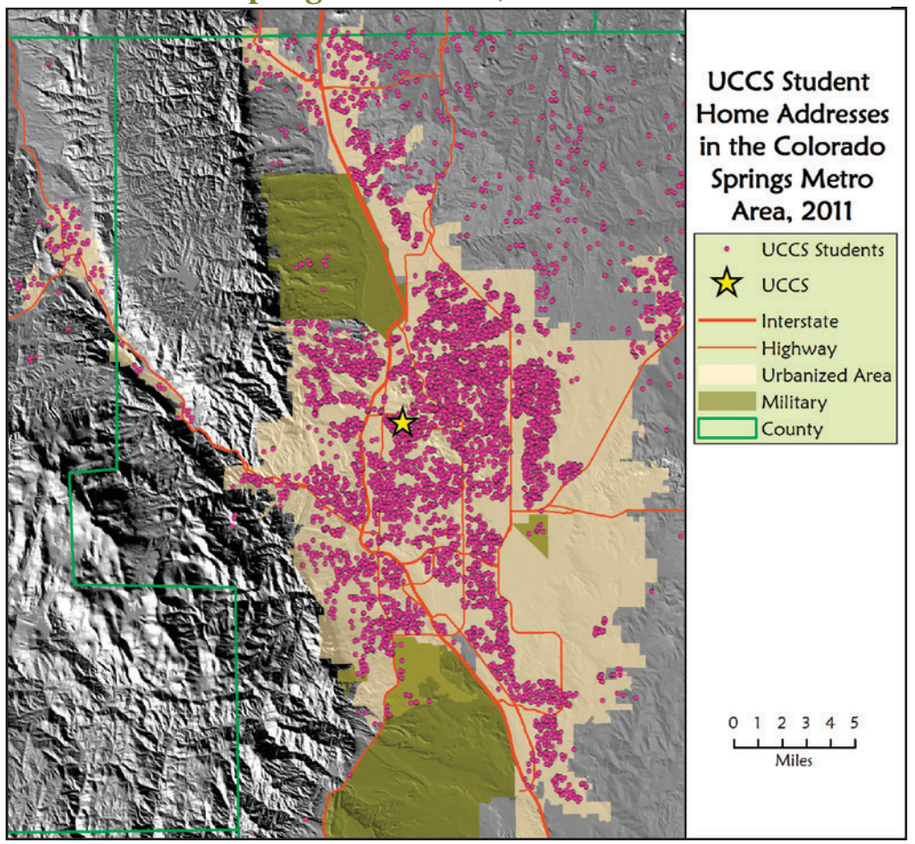
increasingly houses are renting to groups of students as the natural cycle of turnover occurs. Original owners have aged and moved out, and the housing stock is becoming attractive to landlords for rent to student clientele. Despite the dangerous neighborhood design that excludes much needed pedestrian sidewalks, foot traffic is heavy as students and faculty living in the neighborhood, combined with commuters who park there, walk from the neighborhood to the campus each day.

Given the campus' strategic central location, close proximity to the interstate and situated on two major arterials, visionaries hope that a true university district will arise that will be a growth engine for the city. Continued plans to expand student housing on campus will increasingly concentrate students on and nearby UCCS, which will drive commercial services. Students, faculty, research institutes, private industry, commercial services, and nonprofits may one day aggregate to form a localized economy with fertile cross connectivity and a synergy of creativity. The current mayor sees this district as one of three growth poles in the city, and regional leaders increasingly see the need for UCCS to grow and anchor dynamic quaternary sector industries.

UCCS in Context of the Region and State

The last sentence of the UCCS Vision Statement in the 2020 Strategic Plan says, "We advance knowledge, integrate student learning with the spirit of discovery, and broaden access to higher education for the benefit of *southern* Colorado, the state, nation and world."

UCCS Student Home Addresses in the Colorado Springs Metro Area, 2011

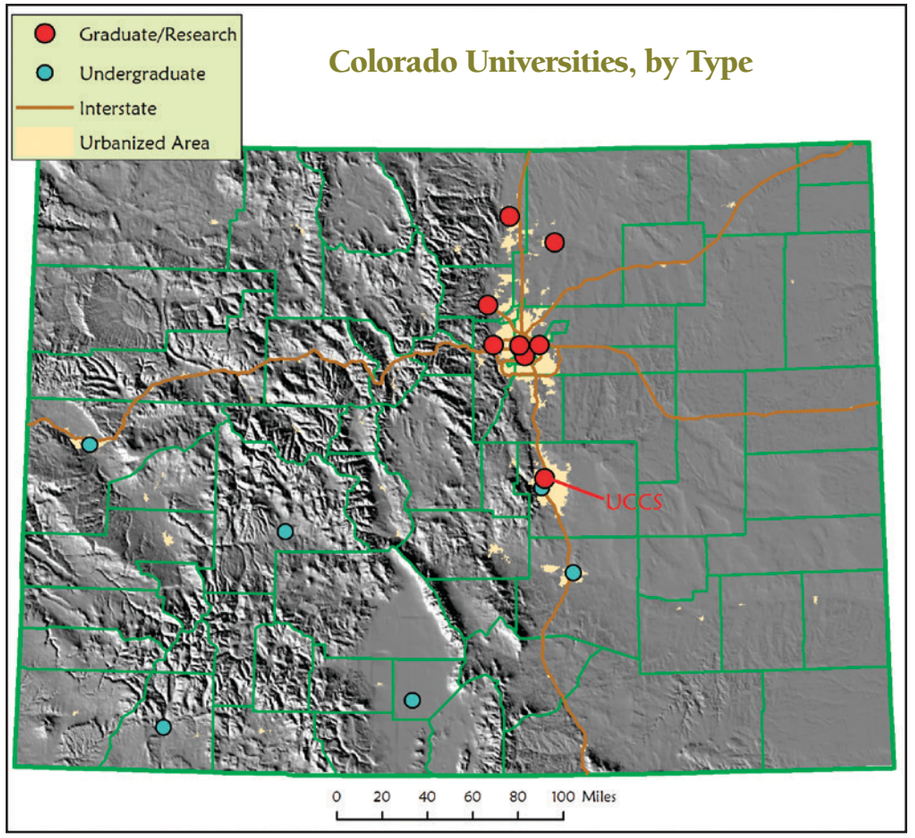


UCCS student homes

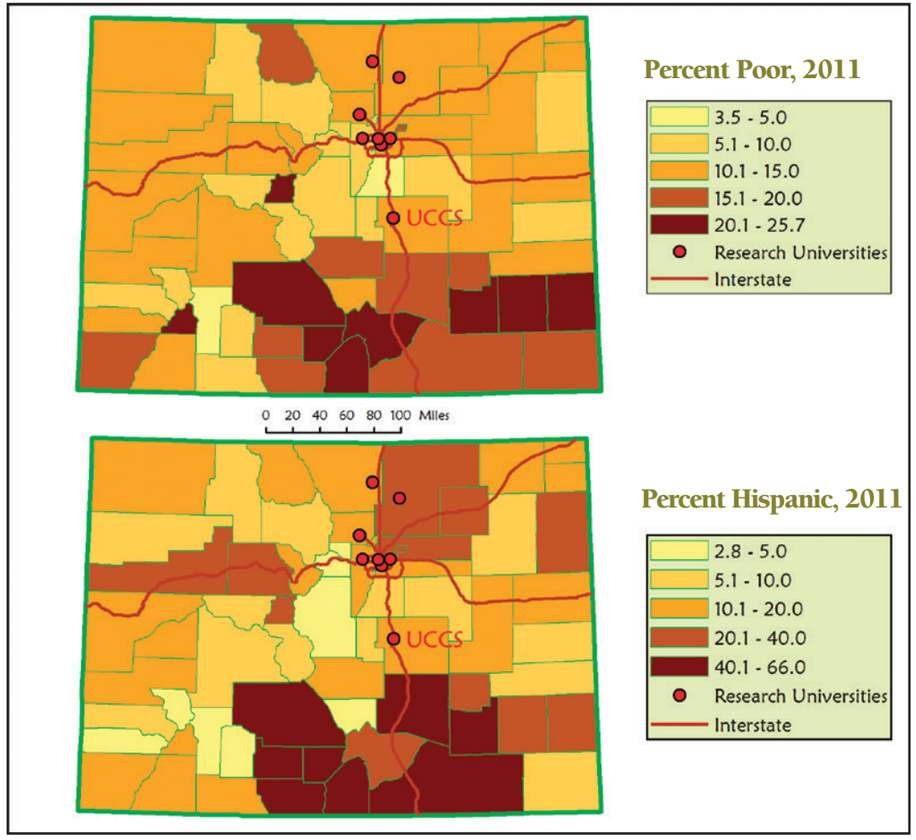
The specific mention of southern Colorado is intentional. When we look at universities in Colorado, we see a concentration of research-oriented institutions in Denver and north.

Southern Colorado is poorly served. Furthermore, counties in southern Colorado (including those in the San Luis Valley) are among the poorest and highest percentage Hispanic in the state. Couple these facts with a mission to be relevant and beneficial to the host society (explicitly stated in the 2020 Strategic Plan), then UCCS has a natural role to play in focusing on this underserved half of the state.

To make inroads into southern Colorado, the university will need to build trust throughout the region. The city of Colorado Springs has never been the dominant player in southern Colorado. It wasn't until about 1960 that the Colorado Springs population eclipsed that of Pueblo, and even then, Pueblo has long maintained stronger historic connections with southern Colorado and northern New Mexico. But Pueblo's apex was in the early twentieth century, when its strategic site on the Arkansas River commanded the entranceway into the mountains. Railroads naturally focused there as the site that connected the Great Plains and points east to the interior mountain mining communities. However, the river flooded in 1921, washing out the railyards, and Denver took advantage by building the Moffat Tunnel to connect railroads with Salt Lake City and routes west. Pueblo's centrality as a rail hub was never regained. Furthermore, its blue collar industrial base that once attracted



Location of universities in Colorado



UCCS in relation to underserved southern Colorado

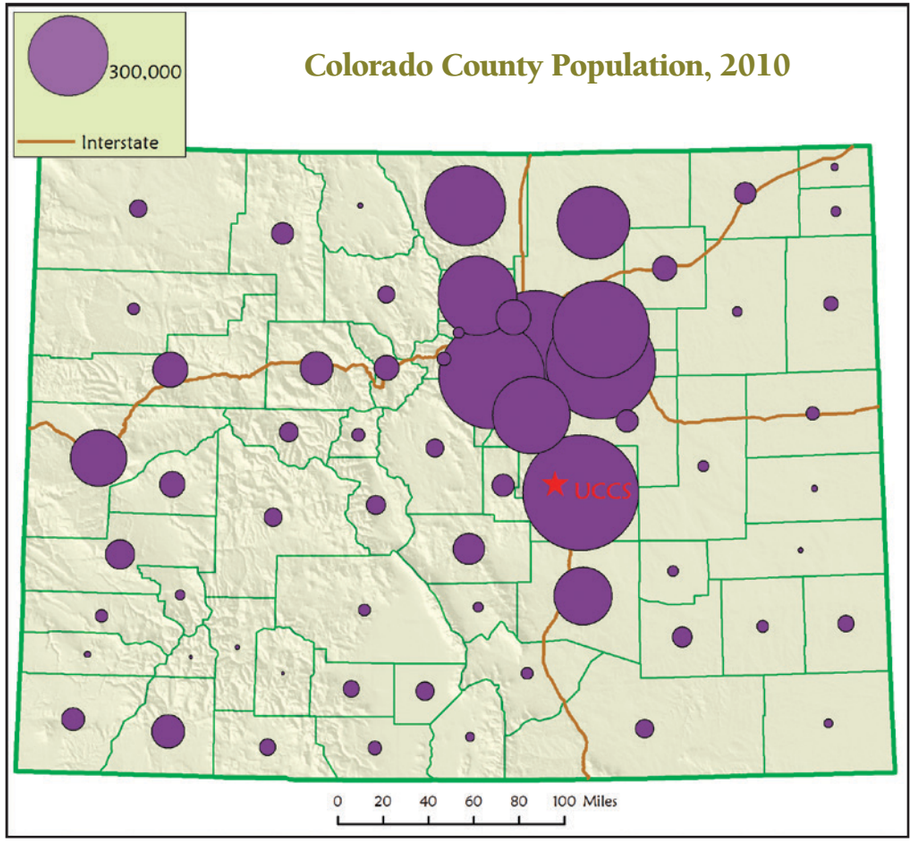
regional immigrants lost its stature with the growth of the postindustrial economy, culminating with industrial restructuring in the 1970s that saw the steel industry collapse. Pueblo has been relatively stagnant ever since (for comparison, Colorado Springs grew 10 times faster than Pueblo between 1950 and 2010—766% growth for the former versus 76% growth for the latter). Located in Pueblo, the University of Southern Colorado has served a regional undergraduate market since its founding in 1965. In 2003 this institution rebranded itself as CSU-Pueblo to benefit from their affiliation with Colorado State, but it has not transformed into a comprehensive research institution with surging enrollment growth as has UCCS.

As a result of these changes, UCCS sees a market niche in southern Colorado and the area where the greatest impact can be made. Recruitment campaigns target the region, outreach programs include a technologically sophisticated telepresence with Lamar Community College, and students increasingly come from southern Colorado communities. Opportunities abound to attract first-generation college students from disadvantaged areas and serve the region in a variety of outreach programs, from public health to educational collaboration to land management planning and more.

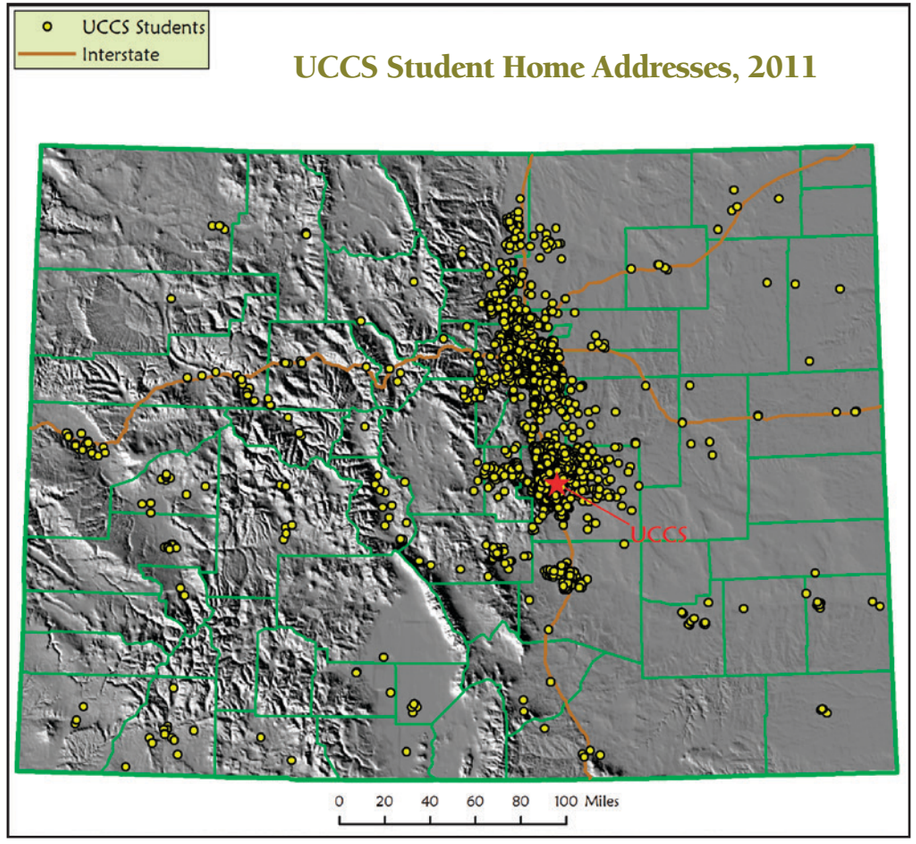
But the expanding focus to the south does not ignore the campus location in the greater Front Range, the urban conglomeration from Pueblo in the south to Fort Collins in the north. The counties in this region housed over 4 million people in 2010, fully 83.4% of the state population. Home addresses

of 2011 students reflect the location of most of the state's population. Increasingly UCCS is becoming known to urban and suburban families in the north, and UCCS has found itself in direct competition with major players such as Colorado State University to attract state high school students from this population core.

The southern Front Range regional context presents many research opportunities: known as a high-tech manufacturing center, local businesses have long worked in close connection with the UCCS colleges of engineering and business. As the population ages, the campus' geropsychology program has blossomed. The arrival of a medical school branch for intern physicians and health science research means hope for a public health program and expanding research into nursing, trauma recovery, and wellness programs. The large military presence creates many sociological and public administration opportunities, defense contractors collaborate with engineering and homeland security, and the vast holdings of federal public lands provide ample sites for environmental restoration and land management initiatives. Rapid urban growth over the past half century challenges the overall sustainability of our city, demanding creative answers to problems such as water infrastructure and storm runoff, transportation, economic development, and social justice. As home to the Olympic Training Center and the Olympic Committee Headquarters, there is a natural collaborative opportunity for health sciences and sports medicine research. Finally, Colorado Springs historically has long been home to a vibrant arts community



Colorado County Populations, 2010



UCCS students homes in the state

that was attracted to this spectacular location, and UCCS faculty and students continue to be a part of the resurgent art scene. The opportunities for community-based research and outreach are numerous.

UCCS is playing an increasingly vital role in both the Colorado Springs metropolitan area and in the state. Success is seen in student growth, increased number of academic programs, and expanding research projects and community engagement. If the physical site on and around campus develops a strong place identity, UCCS will become a destination increasingly sought out by students and community members partaking in university-sponsored activities. The entire image of the city of Colorado Springs would be forever changed if it were recognized as a dynamic hub of innovation and education and a home for the University of Colorado.

Art and the Outdoor Campus

Matt Barton
Visual and Performing Arts

"Grove" at the Heller Center for the Humanities

The sculpture "Grove" by UCCS Visual Art professor Matt Barton, nestled among the juniper trees at the Heller Ranch, is an example of experimentation with sculptural and architectural hybrids that the Heller Ranch's original adobe structures exemplify. Utilizing natural materials with the goal of finding a harmonious union between human design and the natural environment, "Grove" seeks to inaugurate such experimentation for future sculpture courses at the site.

The Heller Center provides a rich landscape for creative research and experimentation in site-specific creative works. Many Visual and Performing Arts courses have taken inspiration from the Heller site, ranging from stone carving classes to interdisciplinary courses in which students respond to the setting, creating installation works of performance, sound, video, and dance.

UCCS Student Public Sculpture Program

Each year two UCCS students are selected from a submission process to create large scale, permanent public sculptures to go along the west side of the North Nevada corridor, just west of UCCS campus. Through generous funding from the University Village Colorado, the students each receive a budget for materials and installation. UCCS students have shown exceptional creativity and ingenuity in the creation of pieces that consider the context and characteristics of the site, the durability and visual appeal of outdoor public works, as well as challenging conventions within the genre of public sculpture. The students get a first-hand experience at the demands of applying their artistic practice to the public sphere from the design phase, budgeting, presentations to the Urban Renewal Authority, and finally fabrication and installation. The experience gained is an invaluable education and has led to further successful public sculpture projects nationwide.

"Detail of Evolution," by Deb Zelenak

The participants to date include Deb Zelenak, Lisa Cross, Taylor Stamp, Brett Wilson, Elizabeth Raitz, and Patrick Bohnen.

"Molded Earth," by Lisa Cross

A Sonic Landscape of UCCS

Glen Whitehead
Visual and Performing Arts

UCCS is a uniquely interconnected community, both within the campus, across its geographic landscape, and reaching throughout the Colorado Springs region. At once urban, suburban, and rural, the campus sits on the edge of the wild: deer, small mammals, and birds are a constant presence; sightings of bear and mountain lion, although rare, can be expected almost annually; runners and walkers traverse trails that top the bluffs; students gather, meet, talk, laugh, and shout as they move from the University Center to classrooms and dorms. Sounds produced in the natural landscapes surrounding the campus' built environment change with the seasons, as they did in the first days of the Cragmor Sanatarium in 1905. These natural sounds include migratory birds of great variety, seasonal patterns of prairie and mountain insects, crashing thunder, and wind gusts sweeping across the hillsides and sandstone outcrops. Nearly silent water run-off trickles down the hills where desert and mountain plants volley with unpredictable seasonal shifts, hoping to bloom and prosper in the dry climate. Layered over these nature-songs are contrasting sounds

associated with the place's newer identity as a college campus, such as the cacophony rising from the cheers at the softball fields, buzz and blasts of gardening mowers and blowers, the rumble of construction bulldozers, the loud voices and laughs of students on the lawn. UCCS possesses a rich variety of sounds, rooted in the past, present, and speaking to the future.

"Sound" is a vital, yet subtle, almost subliminal, part of any landscape. Visual representations have an immediate impact, but sounds enable you to experience the uniqueness of a space by dipping your consciousness into a deeper place in time. Sounds create an acoustic experience of a place where you may have never been before while often conjuring up a nostalgic memory of something familiar. If you close your eyes and listen, you can hear different sonic layers. The collective soundscape at UCCS is that of a university, teeming with activities, working overtime, efficient, energetic, and spontaneous. The overlapping *soundscape* of the campus reflects the aural diversity of the community, generating porous sonic footprints woven through both acoustic designs and natural sonic landscapes.Throughout central campus, buildings designed for specific types of research and teaching produce distinct sounds, like the whir and churn of specialized ventilation systems and the pre-programmed factory-set chime of the Kraemer Library clock tower heard across the campus on the quarter hour. Interior spaces also have their own sonic personalities. Entering the El Pomar Center at the foot of the clock tower from the El Pomar Plaza, you pass through a high-ceiling rotunda before encountering the doors to the library. If you stop and listen, you become immersed in a unique spatial orchestration generated by sounds of passersby moving, talking, and breathing. Sound travels upward, then resonates back from the transparent vaulted ceiling chamber, producing natural reverberations like those of a small canyon. The rotunda is one of several intentionally designed acoustic spaces on campus, created for aesthetic effect to connect purposeful academic experience with place and community.

The UCCS campus sits upon what once was a lonely hill with a breath-taking panoramic view of the Front Range. Pikes Peak and Cheyenne Mountain meet your eyes from just about any campus location as the city extends across the north-south line of the mountain front. In the distance

The metal "ribbon" in the Library rotunda

below the Peak, the jutting red rocks of the Garden of the Gods and Waldo Canyon Fire burn scar are recognizable. Main thoroughfares of the region circumscribe the university's borders to the east, west, and south, emitting a steady pulse of traffic noise into the soundscape. On the north side of campus, the Austin Bluffs rise behind the university before sloping down into suburban neighborhoods.

The full expanse of the campus is represented by an elaborate tapestry of sonic environments. For instance, to the north of the central campus nestled below the majestic sandstone bluffs of Eagle and Pulpit Rock you will find the Heller Center of the Arts and Humanities. This cherished hidden oasis of the campus sits on the property, bequeathed to UCCS by Dorothy Heller. It includes the exquisitely restored Heller main house, the guest house, a small gallery, and the student gardens. In this corner of campus, the tempo of life slows down and the decibels diminish to the clockwork of the natural world. Southwest desert plants meet the beautiful manicured lawns surrounding the restored main house. Wildlife darts and stops, charting ways around the humans who are present, sometimes making themselves heard, calling to others with sharp warnings. Your sense of geographic place – deeply southern Colorado where plains meet foothills – is restored.

Still, new sounds are being produced on the property. Among pieces of dilapidated fence, old carts, and some rusted-out steel work, you can spy a row of old wooden telephone poles leading away from the main Heller house and across the field to the west. These old wooden posts have found a new function as musical instruments, transformed into a series of *wind harps*. Demonstrating his efficient ingenuity, composer and sound artist Philip Blackburn created the harps out of the most pedestrian of materials – fishing line, cat food cans, and wire clothes hangers. Blackburn, whose great-great-uncle stayed at the Cragmor Sanatarium from 1916 to 1918 along with his friend the poet H. Phelps Putnam and whose father is UCCS Professor Emeritus in the English Department, was invited to put up this permanent sound art installation in 2012. With a few metal nuts and bolts, these telephone poles now resonate gentle but clear musical notes, which change depending on how the harps are "tuned." The mildest motion of wind and breeze "plays" the harp strings, which are long fish wires that run up the length of the poles. As a part of his visiting artist residency, Philip, who is President of the American Composers Forum, also created a *hyper-opera* with the UCCS interdisciplinary stamp, since it reflected collaboration between the VAPA Music Program, Theatre Program, and the College of Nursing. He completed his residency with the creation of a full-length film called *The Sun Palace*, a 2012 tribute to the 1905 Cragmor Sanatarium. The wind harps and hyper-opera are just two examples of how the natural sounds

The eerie sounding wind harps at the Heller Center

and history of the UCCS property are being incorporated into the current production of art, sound, music, and use of space on campus.

At UCCS, sonic environments play a meaningful role across the campus and landscape. The soundscape of UCCS will continue to change with the university and in response to the interdisciplinary and innovative culture that encourages communication across disciplines, the colleges, and into the Colorado Springs community.

Recorded examples of campus sounds that can be downloaded from the web site — http://www.uccs.edu/vapa/music/fieldguide.html

Wind Harps – Heller Center for the Arts and Humanities
Nature Sound Walk – Heller Center for the Arts and Humanities
Top of the bluff – Heller Center for the Arts and Humanities
Kraemer Family Library – Entrance Rotunda
Main Campus Sound Walk
***The Sun Palace* –** Film on the Cragmor Sanatarium by Philip Blackburn
http://www.youtube.com/watch?v=L9q1UTdMHWw

UCCS Trails

David Havlick
Geography and Environmental Studies

When Dr. Frank Houck arrived at the Cragmor tuberculosis sanatarium in the late 1910s, building recreational trails was likely one of the farthest thoughts from his mind. In between sessions treating his tubercular "lungers," the young doctor must have found occasional spare moments to explore Cragmor's natural surroundings, and he quickly recognized the advantages of getting his ambulatory patients outside and keeping them active. By the early 1920s Houck had single-handedly planned, measured, and built a 3.5 mile loop around the bluffs behind campus and north to the Garden Ranch valley. Outdoor recreation turned out to include a rather expansive set of activities: Houck's winding path was soon nicknamed the "Happy Trail" due to the romantic dalliances that it afforded Cragmor's friskier patients. Outdoor pleasure seekers notwithstanding, the rugged terrain surrounding the trail failed to win over all trail users. According to Doug McKay, one TB patient morbidly labeled the trailhead entrance, "Opening of Pleural Cavity," and dubbed a nearby canyon feature, "Lung Collapse Chasm." Whether seductive or menacing,

Houck's meticulously built trail marked the first explicit application of recreational trail interests upon the array of bluffs that now frame the UCCS campus.

The overgrown steps once used to get to the Happy Trail

Houck's trail also set something of a precedent for the trails to come later at UCCS. Over time, its early popularity drifted toward decline and neglect, and by 1937 the trail had fallen out of use so completely it faded from view. Today, the Happy Trail has largely been subsumed by urban development and suburban cul-de-sacs. Portions of the early trail have doubtless also been incorporated into the informal network of trails that now extend across the UCCS grounds, but lacking clear documentation or a map of the original route, most users pass by with little recognition of the features or frolics that came before. Yet the therapeutic intent of that early trail atop the bluffs lingers today as an array of trails – some sanctioned and planned, but most developed incrementally at the whim of a handful of regular users – reach up, around, and through the bluffs, slopes, and valleys that now belong to UCCS.

Many of today's campus trails reflect contemporary interest in exercise and recreation, rather than the themes of recuperation or illicit romance that characterized the Happy Trail. College students, of course, are not always immune to temptation either. Several short trail spurs evident today work their way to secluded rock outcrops that surely see their fair share of clandestine activities.

The health and fitness emphasis of UCCS trails was expressed most explicitly in the early 1980s when the campus ROTC and Penrose Hospital teamed up to develop a mile-long fitness trail up the ridgeline immediately north of Main Hall and running west above the Cragmor parcel of the UCCS campus. The trail attracted substantial interest initially. In the lead-up to UCCS's 25th anniversary in 1990, at least one planning committee lobbied to adopt the theme, "On the Trail to the Future," and to couple this with a concerted effort to develop a more extensive campus trail system. The trail planning effort was scuttled, at least in part due to liability concerns, and in the end neither the fitness trail nor the motto it inspired managed to hold lasting interest.

Twenty years hence, the fitness trail's pull-up bars, sit-up ramps, and balance beams are more derelict than functional, but the trail that wends its way along the ridge between these features has become popular and increasingly well maintained. In 2011, the eastern half of the fitness trail was the site of an undergraduate honor's thesis and work project focusing on restoration and erosion mitigation. Portions of the trail were subsequently

treated to additional erosion control and re-vegetation measures organized by the student Restoration Club.

Although UCCS trails historically were footpaths, much of the resurgence in trail development on UCCS lands has been spurred by a more recent use: mountain bicycles. The rugged terrain of campus' immediate backdrop has long been a deterrent to all but fairly hardy (or determinedly amorous) residents, but the popularity of lightweight bicycles starting in the 1980s and "freeriding" bicyclists in the 2000s, who sought challenging cross-country terrain, opened up these lands to a new demographic. Though mountain bicyclists remained something of a rare sight on campus trails, a devoted cadre of cyclists increasingly began to develop or adopt informal routes, including highly technical lines along the bluffs surrounding UCCS.

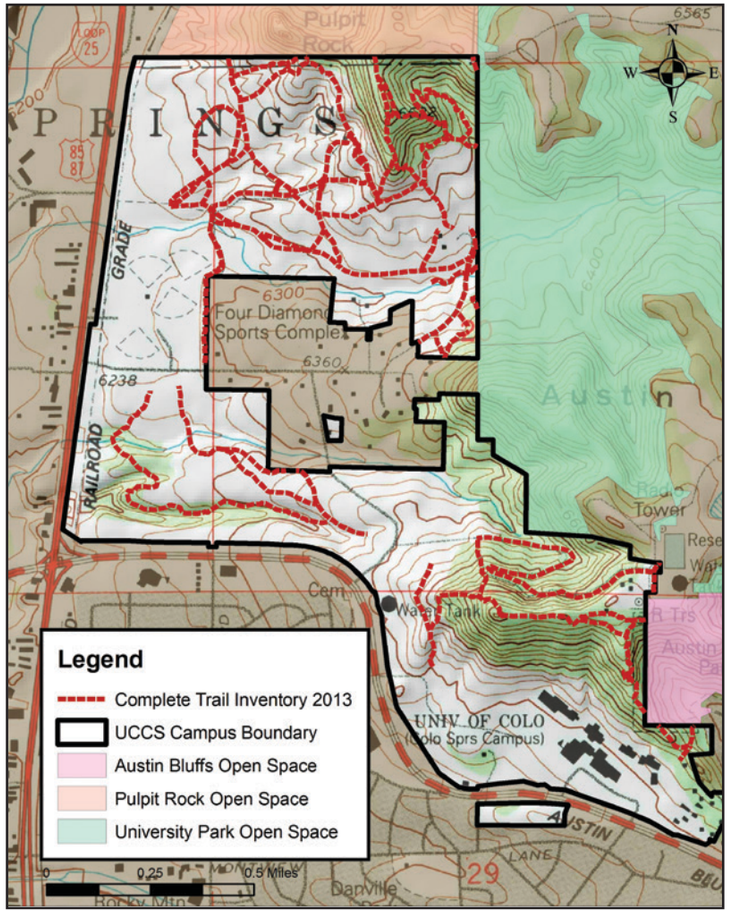
In 2008, several UCCS faculty members in the Geography and Environmental Studies (GES) Department began to take notice of the condition and extent of trails sprawling across campus lands. By this time, universities from North Carolina to Maine to Hawaii were touting their recreational trail systems as amenities to attract and retain students, yet the UCCS trails were largely unrecognized and little appreciated by most students and administrators. In fact, a quarter-mile path – the "Sherpa Trail" – connecting the Summit Village and Lodge to the Alpine Village residential cluster was at this point the only trail actively built and maintained by UCCS. Completed in fall 2004 in conjunction with the Alpine Village housing complex, the trail was built with funds generated by campus parking operations and linked to parking lot construction accompanying the new residential buildings. Intended initially as only a "dawn to dusk" trail, the Sherpa Trail received so much student foot traffic across extended hours that lighting and security phones were added in 2007. The trail continues to serve as a primary connecting route for students living in Alpine Village to reach the main UCCS campus, but rill and gully erosion and unstable slopes create chronic maintenance challenges.

Along the Sherpa Trail

In 2009 and 2010, students from two GES courses set out to identify and document the condition of UCCS trails using Geographic Positioning Systems (GPS) and digital mapping technologies. This initial inventory found approximately 8.5 miles of trails coursing through UCCS lands, multiple loops and connections to trails on adjacent city and county open space lands, and easements through residential developments atop the major bluffs north of campus. This inventory led to a couple realizations: first, that trails at UCCS represented a real opportunity for

recreational, educational, and research opportunities; and second, that the lack of trail planning or maintenance was leading to a number of trail problems, including soil erosion and the proliferation of informal, user-created "social" trails. The rapid growth of the UCCS student population during this period also heightened the potential for conflicts between trail users seeking diverse experiences. These included recreational hikers, runners, and mountain bicyclists; student commuters, looking for a direct route on foot or bicycle from free parking at the Four Diamonds sports complex to the main campus; classes setting out to study archeological sites, native plant communities, or apply a range of research techniques; individuals seeking opportunities for solitude and contemplation; and organized groups such as ROTC and local cycling clubs conducting training exercises or competitive events.

By 2012, concerns about trail conditions, severe erosion threatening campus infrastructure, and the spread of unplanned trails prompted GES faculty members to invite UCCS administrators, Recreation Center staff, and interested students on a hike up and around the bluffs above campus to discuss trail planning and stewardship. The hike also coincided with final stages of the UCCS Master Plan revision and a proposal to expand campus recreation facilities. By the end of the hike, Vice Chancellor Susan Szpyrka had formulated a plan to link trails and open space planning and funding with an April 2012 student vote on recreation center expansion. When the recreation center measure passed, a formal process to create a UCCS

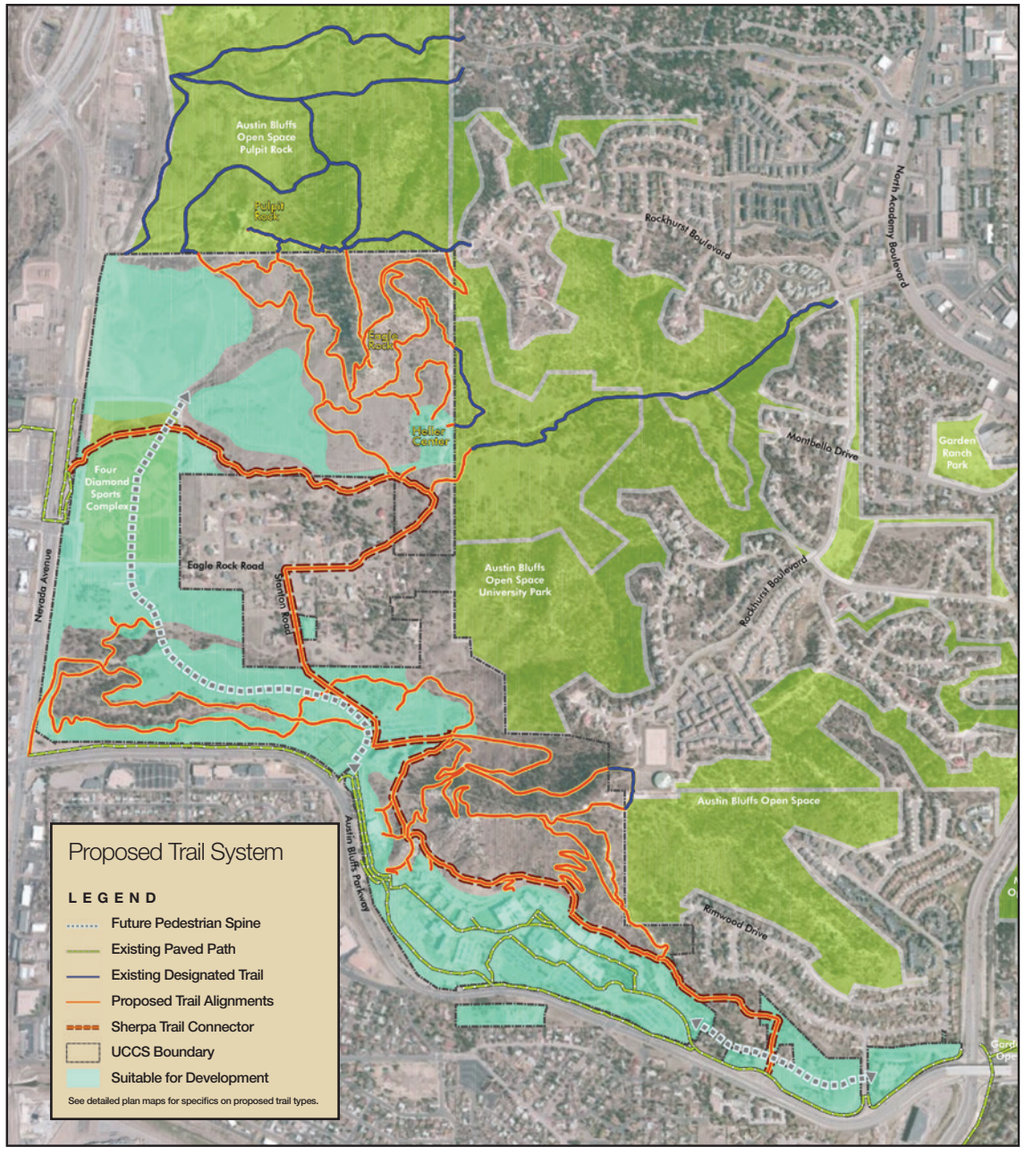


Trails Inventory - 2013

Trails and Open Space Committee was begun. The group consisted of roughly a dozen faculty, staff, and students and was charged with producing a "micro-master plan" that would integrate trails and open space planning into the newly approved campus Master Plan. The era of a concerted, intentional process to manage UCCS trails was thus launched.

By the end of fall semester 2012, the Trails and Open Space Committee had defined values and goals for the campus trails network, and by the end of spring semester 2013 the committee selected a local design firm to work with UCCS faculty, staff, and students to generate a formal plan for campus trails to satisfy the diverse interests of the campus community. The trails plan is envisioned to serve as a guide to trail use and stewardship for decades to come, to foster partnerships with local government and nonprofit trail interests, and to promote linkages to adjacent open space lands.

Considering the overall arc of trails at UCCS, what we find looking back is several phases of attention and inattention culminating in a long-term vision for a functional, sustainable, and valued trail system designed to serve as an amenity for UCCS and the surrounding community. Beginning with Dr. Houck's well constructed if also inadvertently labeled "happy" trail, through several decades of disuse and decline, then informal expansion and use, UCCS trails now stand poised to provide a variety of trail benefits including recreation, education, interpretation, health, reflection, transportation, and research. If effectively planned and managed, the trails and open spaces of UCCS also



promise to support plant and wildlife communities that have long thrived in the area and are increasingly suffering from encroachment and disturbance due to the residential and commercial growth of Colorado Springs.

UCCS has been bestowed a spectacular physical setting, perched against sandstone bluffs, hoodoos, and grottos looking across the Monument Creek valley, Garden of the Gods, and the Pikes Peak massif. As the campus celebrates fifty years of life, and more than a century of development including its initial period as the Cragmor Sanatarium, it seems only fitting that its physical and cultural landscapes find some productive synthesis in the form of a well planned trail system. It is also possible – and perhaps not overly much to hope for – that providing students with opportunities to get outside and attend to the diverse features of campus lands will, in turn, help them focus and attend to their studies back in the classroom.

UCCS Trail System Values and Goals

Values

- Our valuable natural characteristics of the campus are crucial to successfully developing UCCS for future generations.
- Outdoor recreation is a core concern for the campus community.
- Trails are a crucial part of our heritage and our transportation network.
- Social trails degrade the natural capital of the campus.

Goals

- Protect the natural environment while providing a robust trail system for recreation and transportation.
- Protect wildlife habitat in the undeveloped lands of the campus including the connectivity and movement corridors.
- Restore land that has been degraded (especially by erosion) due to trail use and devise plans to develop trails that will mitigate future erosion problems.
- Develop a trail system in concordance with our educational mission including informative trailheads and kiosks.
- Create a variety of trail experiences for all levels of trail use.

Stewardship

Carole J. Huber
Geography and Environmental Studies

"Our goal is a delightfully diverse, safe, healthy and just world, with clean air, water, soil and power – economically, equitably, ecologically and elegantly enjoyed – period."
William McDonough

"Sustainability at UCCS started as a grass roots effort by a group of dedicated students, faculty, and staff. These individuals advocated for the university to provide leadership, academic instruction, and an environment to prepare our future leaders to approach the sustainability challenges the world currently faces."
Message from the Chancellor, 2008 Campus Sustainability Report

I am tempted to suggest that the inception of sustainability at UCCS coincided with a trip a handful of students and faculty took to Boulder in 2003 to attend a sustainability conference and the subsequent founding of Students for Environmental Awareness and Sustainability (SEAS), the UCCS student environmental group. However, stewardship of this incredible place we now call UCCS started decades, even centuries, earlier. It was evident when Dorothy and Larry Heller gathered rocks from their property to build their home by hand and protected the grasslands from overgrazing, thus preserving beautiful acres of short-grass prairie in the middle of a burgeoning metropolitan area. When Dorothy was asked in her later years if she and Larry ever went on vacation, she replied no because they thought they were already on vacation on the land they loved and cherished. It was apparent when Virginia and Dean Trembly built their rambling home by hand from rocks gathered on the property, siting it near the foot of Eagle Rock where they were afforded an incomparable view of Pikes Peak and the Front Range. Centuries earlier the native peoples of the region recognized the incredible gifts offered by Eagle Rock and the surrounding bluffs which served as inspiration for spiritual visions, a lookout spot for the movement of elk and deer they relied on, and a wonderful source for the chert and welded tuff they needed for their stone tools. And seeds had been planted more recently when committed faculty, prodded by a longtime faculty environmentalist, organized the Faculty Assembly's Advisory Committee on Sustainability in 2002.

Students Lead the Change

Nonetheless, it is hard to tell the story of the transformation we have seen at UCCS during the 21st century without giving much credit to students who have been the real campus leaders in terms of stewardship. The SEAS mission statement was simple – "To create a community of involved students, faculty, staff, and administration to implement sustainable practices at UCCS" – and their initial campaigns were basic – encouraging people to "Reduce the Juice" by turning off lights and reducing energy consumption in other basic ways, initiating a viable recycling program on campus, and working with IT to implement double-sided printing in campus computer labs. Over the years SEAS always recognized its mission had two major components: education and activism. To raise awareness about environmental issues, the SEAS students have hosted many campus events, ranging from Earth Day celebrations, Bike to School and (Park)ing Days, Hanging Out Day and film screenings, to the nationwide Focus the Nation event. As they became increasingly recognized as strong campus advocates for sustainability, the SEAS students set their sights higher and encouraged campus leadership to look beyond

The campus' first LEED building — the Recreation Center

the simple bottom line as they made campus decisions. The SEAS students were passionate and persistent, and despite a good deal of initial resistance, they were instrumental in getting UCCS to commit to their first LEED certified building, the Recreation Center, before Executive Order # D005 05 required it of all Colorado government buildings. LEED is the United States Green Building Council's rating system for designing and constructing green, energy efficient buildings.

Institutionalizing Sustainability at UCCS

With that first campus LEED building, the institutionalization of sustainability at UCCS was finally getting going. The subsequent official story can be tracked with a look at campus sustainability, strategic, and master plans. In their June 6, 2005, final report, the Chancellor's Task Force on Sustainability recognized the responsibility of institutions of higher learning to take a leadership role in creating a sustainable future and envisioned UCCS as a campus that integrated "social, economic and ecological values into institutional policies, programs and practices." The report identified specific goals in three categories: leadership, operations/facilities, and education/curriculum. As an outgrowth of the taskforce's work, UCCS issued its first Sustainability Strategic Plan in 2007. The plan provided five-year targets, performance indicators, and action steps in the three categories identified by the taskforce – education, leadership, and operations.

Subsequent strategic and master plans reflected the fact that sustainability was now clearly identified as a campus goal. The 2006 Facilities Strategic Plan was a collaborative effort in which faculty, staff, and students participated in a more open process than historically had been the case, and one of the plan's guiding principles specifically referenced "protecting and preserving the environment." Recognizing that as the designated growth campus of the CU system UCCS was destined to grow, the plan called on future development that addressed energy conservation, pedestrian and bicycle orientation, water conservation and management, and preservation of native landscapes and open space. For the first time we saw acknowledgement of the philosophical tenets of sustainability as the report referenced "place making" and "honoring the landscape."

The UCCS Strategic Plan 2007-2012 was the first to specifically feature sustainability as one of the campus strategic goals. That same year the Chancellor signed the American College and University Presidents Climate Commitment which recognizes the threat global warming poses and commits UCCS to develop a comprehensive plan to achieve climate neutrality and integrate sustainability into the curriculum in order to produce educated graduates who can better address the issue. UCCS completed its first Climate Action Plan in 2010.

Accelerating Top-down and Bottom-up

In October 2005 with strong advocacy from members of the Faculty Advisory Committee on Sustainability, UCCS established the Office of Sustainability and hired its first sustainability officer who had been one of SEAS' student founders. This marked a monumental

step forward in sustainability at UCCS; for the first time the campus had a sustainability advocate with the specific task of working across campus departments and reaching out to the larger community in areas of sustainability. Responsibilities range from planning to educating to implementing. With an eye on the triple bottom line – environment, economy, equity – the office's mission focuses on supporting campus and community efforts to "sustain natural resources and protect the environment, ultimately ensuring the ability of future generations to meet their needs too." The office has grown from a single individual to a number of paid staff and student interns as its responsibilities and impacts have expanded. Now office personnel can be seen providing expertise on development plans, organizing campus events from Bike Jam to RecycleMania, serving on a wide range of campus committees, introducing incoming students to the UCCS culture of sustainability, cleaning up local waterways, and much more.

Office of Sustainability activity

Even with the Office of Sustainability and its director, student activists continued to be instrumental in pushing the campus to take the next big leaps in sustainability. Two of the most notable student-driven campus changes impact what you see and what you don't see at UCCS. *Take Back the Tap* is a nationwide crusade that aims to eliminate the sale of bottled water on campuses across the United States. The UCCS *Take Back the Tap* campaign was the dream of one student, the chair of SEAS, in 2009. The campaign took two full years of education and action that ranged from water taste challenges to film showings and outlandish costumes as well as discussions with less than enthusiastic administrators.

Take Back the Tap student campaign at Earth Day 2010

The reward was a successful student referendum passed in April 2010. The result: no bottled water will be sold on the UCCS campus as of August 2014.


Take Back the Tap water bottles are given to all UCCS freshmen

To help students as well as faculty and staff make the transition, student-funded hydration stations have been installed in all academic buildings on campus, and beginning in fall 2013 all incoming students receive free refillable

water bottles, funded by matching funds from the student green fee and the UCCS administration.

The second notable campaign established the Green Action Fund (GAF). In 2008 students overwhelmingly passed a referendum to assess themselves a $5 per semester fee to fund solar panels on campus. In 2010 students enrolled in a geography and environmental studies course worked to place on the student ballot an initiative to convert the solar fee to a more general green fee and shift the decision-making about how to spend those fees from the administration to a committee of students. The referendum passed in April 2010, and students who had led the campaign quickly organized to form the Green Action Fund committee. The results have been astounding. Approved projects have ranged from hammocks to hydration stations, from wind turbines to garden tools, and from bicycle repair stations to refillable water bottles. As you walk the campus, look for the Green Action Fund signs that remind everyone how student fees are making UCCS more sustainable.

GAF funded bike repair station

Exciting Futures: Feeding the Mind and Body

The movement to make our world more sustainable has many components. Two major ones include transforming our food systems and educating, especially the next generation, about the need for all of us to live more sustainable lives. Major initiatives are altering, in some cases even revolutionizing, these two systems at UCCS.

One of the notable curriculum goals to emerge from the initial 2005 report from the Chancellor's Task Force on Sustainability was the proposal to establish a Minor in Sustainable Development. Approved in 2006 the Minor's stated goal is to prepare students more fully for the challenges and obligations of the 21st century. Housed in the Department of Geography and Environmental Studies, the multidisciplinary program requires students to pursue coursework in the three basic areas of sustainability – environment, equity, and economics – which draw on courses from many disciplines and colleges. Freshmen Seminar courses that specifically focus on sustainability are now an option for incoming first-year students. The all-campus read offers another avenue to reach a large number of students. The book selected for the 2011-2012 academic year, *No Impact Man*, proved a successful choice and introduced the topic of sustainability to a large number of students in a wide range of disciplines. It was wonderful to see how faculty from different disciplines integrated aspects of the book into the curriculum. One of the most captivating was the mechanical engineering students' pots-in-pots project.

By its own account as documented in its 2013 film, "Fooducation," UCCS has initiated a revolution in campus food and eating. After initially focusing on sustainable habits in food operations – reducing disposable products, increasing waste differentiation options to include composting as well as recycling, and going trayless to reduce food waste – the food revolution turned its attention to the actual food itself. Faculty, with strong leadership from the Health Sciences program, and students again led the way; then the enthusiasm and commitment of individuals in the administration really kick-started the revolutionary changes we have witnessed. Fast food selections were replaced with healthier options, and there was increasing demand to source more local and organic food.

Students in the Health Sciences nutrition program take The Flying Carrot and their food literacy message to the community

Heller student garden's first harvest, September 2010

In late 2009 SEAS was granted permission to establish a student garden at the Heller Center (although children and their teachers were way ahead of the rest of the campus on this one – the successful garden at the Family Development Center predates all others on campus). SEAS viewed the garden not only as an opportunity to plant and harvest local, organic food but, perhaps more importantly, as a place a create community.

"Yawn Valley" Student Garden farm market 2012

Students harvested their first crop the following year, and in 2012, with monetary support from the administration for a paid garden intern, students hosted their first weekly "Yawn Valley Student Garden" campus market.

UCCS campus greenhouse and garden

In 2012 the campus took its commitment to healthy, sustainable food to a whole new level – UCCS constructed a 3000 sq. ft. greenhouse and hired a greenhouse manager. The operation provides fresh produce directly to the campus cafe. From seed to table, the food revolution at UCCS has been astonishing in its reach and speed; expect the revolution to continue!

Where We Are Today

The UCCS Sustainability Strategic Plan 2012-2020 highlights some of the major progress the campus has made in sustainability since 2005: hiring a sustainability officer and creating the Office of Sustainability; constructing four LEED Gold buildings with three more underway; establishing the multidisciplinary Minor in Sustainable Development; and, developing the UCCS Sustainability Strategic Plans. As of 2012 sustainability had saved the campus more than $1,000,000.

The 2012 UCCS Master Plan catalogues how far the campus has come philosophically since 2005. Two of the plan's four goals address sustainability directly. The third goal, Develop the Campus in a Responsible & Sustainable Way, calls for principles of smart growth, high performance buildings and landscapes, and alternative modes of transportation.

Most exciting, the Master Plan opens with goal number one:

Preserve a Sense of Place

The Colorado Springs campus offers uninterrupted, impressive views of Pikes Peak, the Front Range, and Pulpit Rock, which differentiates it from every other university in the state and nation. Respecting this natural beauty and dramatic topography of the university setting is critical to avoid environmental damage as enrollment grows and campus development expands.

The Master Plan sites buildings to maintain and frame important views. Drainage corridors are respected and enhanced to accommodate stormwater runoff. Where appropriate, large stands of native vegetation are preserved, and native species are reintroduced to developed landscapes. Evidence of archeological remains uncovered during building excavations for new development will also be monitored and documented or preserved as appropriate.

Amazing what a handful of committed individuals can achieve!

Pot-in-Pot Refrigerators: Bringing "No Impact Man" to the Engineering Classroom

Rebecca Webb
Mechanical and Aerospace Engineering

Pot-in-the-pot project

In *No Impact Man* Colin Beavan searches for an electricity-free method of refrigeration. His solution was the "pot in the pot" method developed by Mohammed Bah Abba of Nigeria. A pot-in-pot refrigerator is constructed of a smaller pot placed in a larger pot with the gap between the two pots filled with sand. The sand is kept wet, and evaporation from the moist sand keeps the inner pot cool. Beavan built one of these refrigerators, but in his own words, "for reasons I could quite never figure out, I could not get the dumb old pot in the pot to work."

Sophomores in Thermodynamics 1 were asked to use what they had learned in class to analyze the pot-in-pot refrigerator. They reread the relevant chapter of the book, constructed a theory using thermodynamic principles to explain why Beavan was unsuccessful, and then built pot-in-pot refrigerators to test their understanding.

Thermodynamic students and their pot-in-pot project

Using their analysis, the students designed and built pot-in-pot refrigerators the last week of class. Their goal was to create a design that would keep the inside of the inner pot significantly cooler than the outside air. The refrigerators were constructed from terracotta pots and saucers, play sand, and water. The size of pots and saucers used, the amount of water added to the sand, and the frequency with which water was added to the sand were the variables left up to the individual teams. The temperature of the inner pot of each refrigerator was measured two days after it was built. The best result was an inner pot temperature of 63° F with an air temperature of 77° F. As always happens with preliminary engineering designs, there were some failures. This was definitely not the goal, but as we all know, sometimes more is learned from a failure than a success, so this wasn't as bad as it seemed. Overall, the students left with a better appreciation of the all-campus read, a deeper understanding of thermodynamic principles, and a greater awareness of some of the energy issues our country is facing.

UCCS Master Plan 2012

Gary Reynolds
Facilities Services

Respecting the Responsible Capacity of the Land

A university master plan for an existing campus needs to accommodate its past as well as its future. An understanding of where the university has been as well as where it is going is the key to a successful plan. In some cases past development provides valuable insight and direction while in other cases it may be a liability. A successful master plan will take from the past, work with the present, and weave the best of both into the future.

While the physical assets of the campus are an important part of a university, they are not the "essence" of the campus. The students, faculty, and staff are the reason the physical assets exist. Having said that, numerous studies have shown that, while excellent facilities are not sufficient for a successful university, they are necessary.

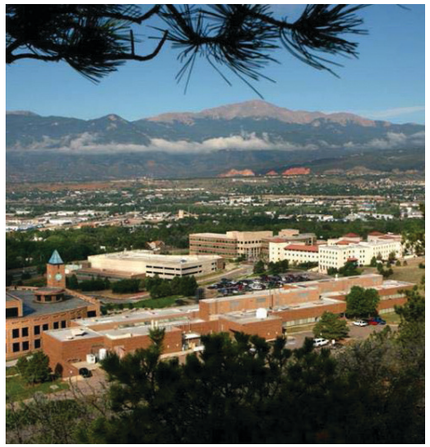
In other words, while facilities may not overtly impact the perceptions and experience of the campus users, they do play an important, however subtle role, in the sense of place and connection of the university to the learning experience. It was with this philosophical background that the University of Colorado Colorado Springs Master Plan was developed.

The University of Colorado Colorado Springs (UCCS) is located in Colorado Springs, CO, on a site that offers unique opportunities to recognize and honor the many assets (past and present) that are part of UCCS. It is noted in the 2012 Master Plan that "the Colorado Springs campus offers uninterrupted, impressive views of Pikes Peak, the Front Range and Pulpit Rock." In addition, the location on the side of Austin Bluffs offers rich resources in native vegetation, geological formations, and archaeological sites that provide additional opportunities for development in a way that respects the responsible capacity of the land.

Goals of the Master Plan

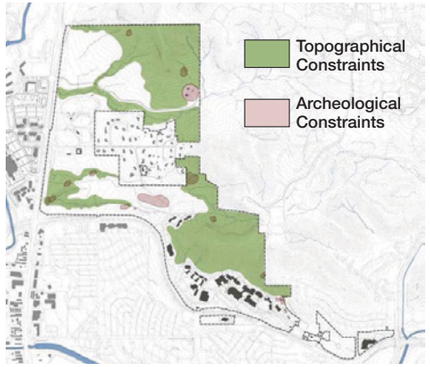
There are four main goals of the 2012 UCCS Master Plan: 1) Preserve a Sense of Place; 2) Connect Campus Destinations; 3) Develop the Campus in a Responsible and Sustainable Way; and, 4) Engage the Community on the North Campus. These goals became the primary drivers for the Master Plan.

UCCS sits on the side of Austin Bluffs wrapping around its perimeter and flowing down its sides to the west where it is bounded by a major thoroughfare. From this location there are spectacular views to Cheyenne Mountain, Pikes Peak, Garden of the Gods and Pulpit Rock. From steep bluffs to rolling high plains prairie, UCCS sits in an extraordinary and precious environment that uniquely says Colorado. It quickly became apparent that the Master Plan needed to preserve this sense of place so unique to UCCS.



Goal #1: Preserving a Sense of Place

While the campus has approximately 535 acres, an analysis of the topography, drainage, vegetation, and archaeological sites indicated that if these important features of the University land are to be preserved, only about half of the 535 acreage could be developed responsibly. Thus, the Master Plan process carefully evaluated where buildings and infrastructure should be placed with thoughtful



Map of campus constraints

consideration of the topography, soils, flora and fauna, archaeological sites, weather influences, and view corridors.

Goal #2: Connecting Campus Destinations

The challenge of this beautiful setting is that the campus has become long and linear. And while development has remained on the original parcel of land, it is apparent that in order to grow, the campus must develop land that is not so easily connected to the original Cragmor parcel. Thus, the Master Plan provides an internal spine (shown in red in the following diagram) as an integral part of the solution to connecting the campus destinations by accommodating the many forms of transportation from pedestrian, to bicycles, to vehicles, as well as an internal shuttle bus system to move students, faculty, and staff efficiently among the various campus destinations.

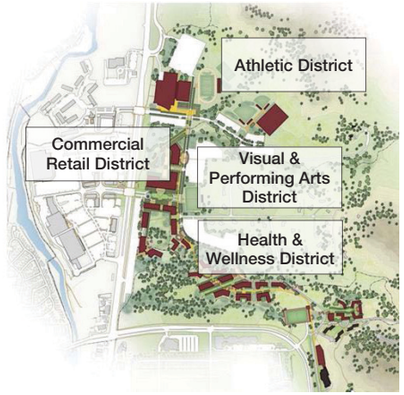
Internal connecting transportation spine

Goal #3: Sustainable Development

In addition to respecting the land, a key element of the Master Plan is to ensure that development by the University is done in a sustainable way. Thus the Master Plan includes an analysis of storm water drainage, vegetation, buildable area, and other characteristics of the land that would impact the ability to preserve a sense of place and support sustainable development. In 2007 UCCS became a charter signatory of the American College and University Presidents climate commitment and in June 2010 submitted its climate action plan. The Strategic Plan reaffirmed that the University will work to meet the goals of its climate action plan, including a 20% reduction in greenhouse gas emissions by 2020, through efforts focused on energy efficiency, conservation, and small-scale renewables. The Master Plan supports these efforts in the areas of smart growth, transportation, high-performance buildings, and landscape.

Goal #4: Engage the Community

The University has a commitment to the community and understands that the success of the University is dependent upon engagement of the community in its academic endeavors. The North Campus, situated along a major commercial and retail edge, provides an excellent opportunity to engage the community through careful and thoughtful development. Thus the Master Plan suggests that the North Campus should include such community engaging facilities as a Visual and Performing Arts District, a Health and Wellness District, and an



North Campus development – community engagement

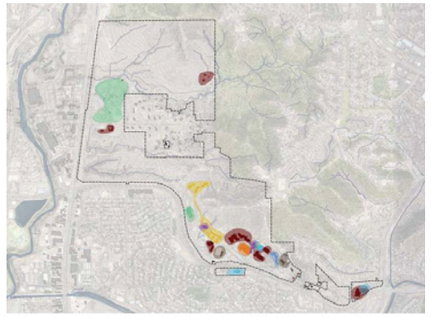
Athletic District to include a track and soccer field stadium, ball diamonds, and a sports arena.

Planning Issues

From these goals, four planning issues became apparent. First, the plan must "accommodate enrollment growth within the developmental framework of the campus." Two, the plan must "evaluate the responsible capacity of the land and create a build-out plan that respects this capacity and does it in a sustainable manner." Three, the plan must "integrate the University's North Campus into the North Nevada Avenue development and the urban renewal zone." And four, the plan must "align with the goals of the University's Strategic Plan 2020." The plan's development proceeded by analyzing each of these areas in an iterative process, cross-checking between accommodating for growth, land capacity and utilization, and the goals of the Strategic Plan 2020. This iterative process assured that the Master Plan became a wholly integrated product.

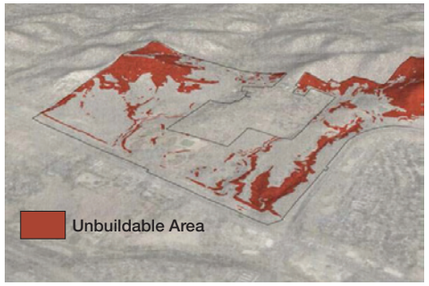
General Description of the Land

While the land upon which the University sits has a long and rich history, the University itself is a relative newcomer to the region. In the early 1960s Hewlett-Packard Company indicated that it would be willing to expand its operation if the city had a university that could support the continuing education of its engineers. A deal was struck and the Cragmor Sanatarium was sold to the state of Colorado in 1965 for one dollar. This original 80-acre parcel of land was the foundation for the development of the University of Colorado Colorado Springs. Over the next years, through philanthropic donations and land purchases, the University has grown from this original 80 acres to the 535 acres that are part of the campus today. As the campus looks to develop beyond the original 80 acres, the Master Plan identifies a number of assets and constraints. For example much of the land consists of ground with steep slopes that preclude the development for specific uses.



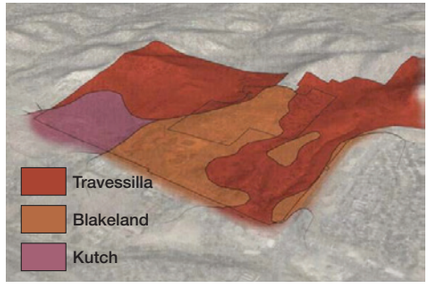
Map of land use c. 2012

Further analysis of the grounds indicates that the soils create challenges for construction of facilities on the land. For example much of the North Campus soils are very erodible, suggesting that tight construction boundaries and attention to erosion control will be an important part of any development. In addition poor nutrient levels make restoration of disturbed vegetation very difficult.

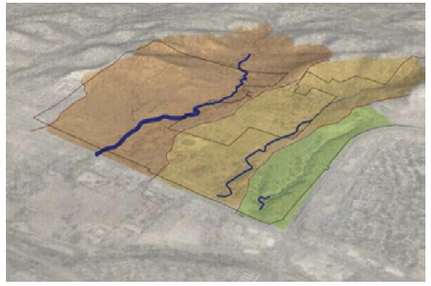


Map of unbuildablearea

One result of this combination of erodible, expansive soils, and challenges



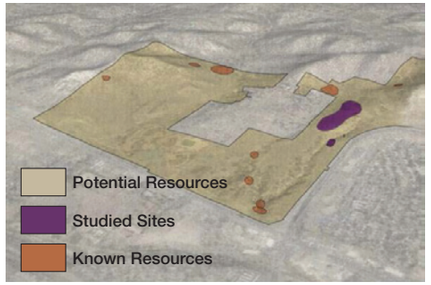
UCCS generalized soil map


Arroyos on North Campus

to re-vegetation, combined with the topography of the land, is that large arroyos have developed across a significant portion of the North Campus.

Interestingly, while the variation in altitude is slight compared to the University's neighbor, Pikes Peak, the range of elevation and diverse aspect result in a substantial variation in vegetation on the slopes of Austin Bluffs. The vegetation ranges from native prairie to mountain shrub with a variety of other types from piñon pine and juniper to cottonwood, willow Gambel oak, and Siberian elm in the upper arroyos, creating interesting biological diversity.

Native Americans occupied this site for thousands of years and they left behind evidence of this occupation. Previous studies have identified a number of locations on the campus where this evidence can be found. The cultural resources map shows a number of these locations while suggesting that the entire area was once home to Native Americans. The Master Plan has been developed by siting facilities in a way that honors and protects these identified cultural resources.



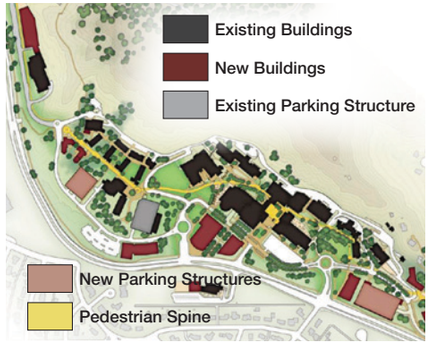
Cultural resources map

The Master Plan

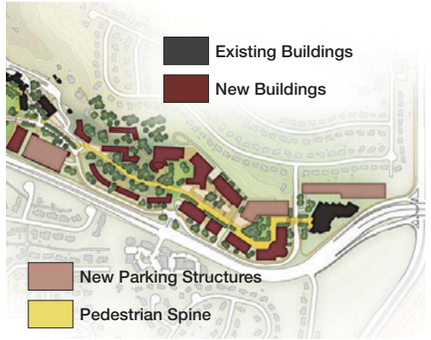
Due to its past development and geographical location, the University has been divided into three main areas: the Main Campus, the East Campus, and the North Campus. The Main Campus is the original parcel of land, part of the original Cragmor Sanatarium property, which was the basis for the development of the University in 1965. The East Campus, consisting mainly of land that was developed for residential use and housed staff that worked at the sanatarium, has been purchased over the past several decades. The North Campus is where the majority of the land additions have occurred. The following diagrams outline suggested areas and types of development.

The Main Campus

The Master Plan describes the Main Campus and its development as follows: "Today, the Main Campus consists of a mix of academic, administrative, athletic and residential facilities within easy walking distance and linked by a pedestrian spine. As athletic and visual and performing arts facilities are relocated to the North Campus, the living learning environment of the Main Campus will be preserved and enhanced through



Main Campus



East Campus

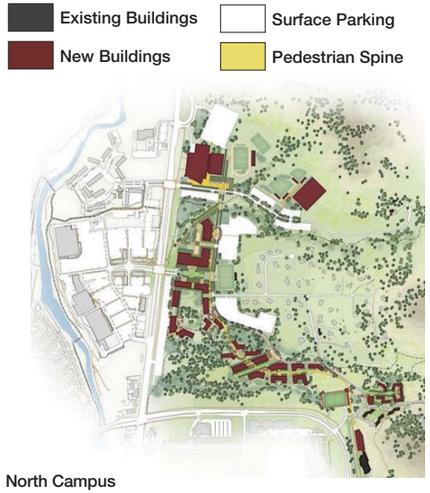
the addition of new facilities on the few remaining building sites on the Main Campus."

The East Campus

The Master Plan describes the East Campus and its development as follows: "While University Hall feels disconnected from the center of the campus today, a new residential village and academic district will connect University Hall to the campus through an extension of a living learning environment similar to the Main Campus. An extension of the pedestrian spine holds the district together by linking a series of interconnected open spaces that will contribute to a vibrant public realm."

The North Campus

The Master Plan describes the North Campus and its development as follows: "The North Campus accommodates much of the anticipated development to facilitate the University's growth. Development is clustered along the pedestrian spine in the most buildable areas of the site. Public facilities for athletics, visual and performing arts and academic health sciences create a public face to the University that draws the campus and Colorado Springs communities together, complements the commercial development at University Village Colorado, and influences the type of development along the rest of the North Nevada corridor."



North Campus

Conclusion

The Master Plan calls for new facilities, landscapes, and infrastructure across the campus with significant concentrations of new development on the East and North Campuses. Each district reflects the unique character, challenges, and opportunities of the individual sites, while the Master Plan in its entirety reflects a cohesive, unified campus.

The Master Plan describes the full build-out as follows: "As enrollment continues to grow in the years beyond 2020, the Master Plan allocates capacity for facilities that would accommodate 20,000 to 23,000 students on campus. Future land purchases would expand that capacity. Sites are available to

UCCS Master Plan

accommodate academic growth in support of the University's mission, particularly when additional parking structures are constructed. With a goal to accommodate at least 16% of its students living on campus, new residence halls will be needed. Thus, the Master Plan shows a new housing village on the East Campus as well as at the west end of the Main Campus. The North Campus has been programmed with flexibility to allow for additional housing or academic capacity depending on the University's evolution and partnership opportunities. Finally, the Athletics district can support additional programs for new facilities in support of expanding opportunities in both recreational and athletic pursuits."

Ultimately, the Master Plan creates connections that are both physical and intellectual. By connecting with our location and history, by connecting campus destinations, by connecting with our natural surroundings, and by connecting and engaging with the community, the goals of the Master Plan are met — thence, creating a vision for the University that weaves the past, the present, and the future together to the benefit of future generations of students, faculty, and staff.

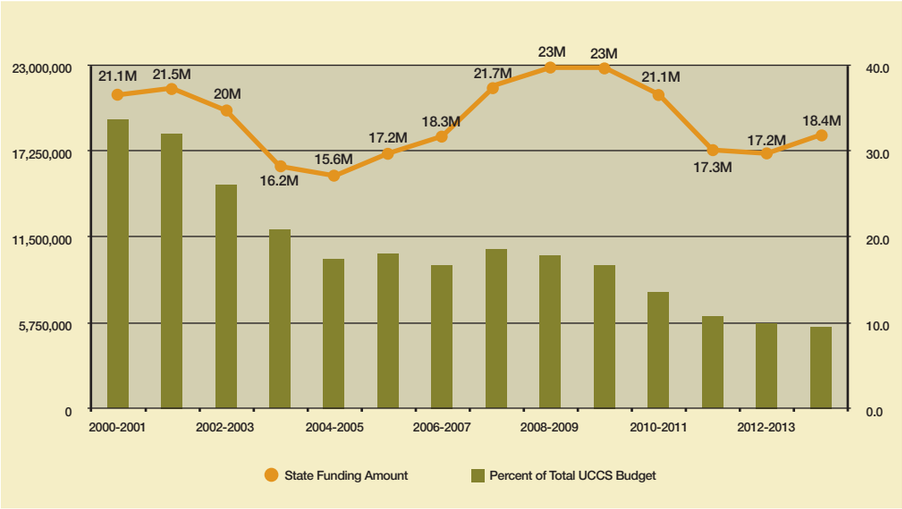
Looking Ahead: What is Next for UCCS?

John Harner
Geography and Environmental Studies

With six schools and colleges offering 36 bachelor's, 19 master's, and five doctoral degrees, UCCS has made remarkable strides since its humble inceptions as a night school branch campus for CU Boulder. Change has been profound, and with an anticipated enrollment of 13,000 students by 2020, there is much more to come. What will UCCS look like by mid-century? What challenges can we envision?

Financial challenges have been ever present since the campus' founding. Decreasing state funding has meant an increased reliance on tuition and student fees, forcing students to work more and take out larger loans. This is of particular concern for UCCS, given our disproportionately large low-income and first-generation student body that differentiates us from other selective admission universities in Colorado. Serving this demographic is particularly rewarding for the entire campus community, but also compounds the financial challenges to enable an affordable education of high

quality. The Office of Vice Chancellor for Administration and Finance plans for stagnant or decreasing state appropriations, a conservative approach to future state support that has served the campus well by not overextending itself. Clearly such a strategy must continue, and, like public universities across the nation, reliance on external funds is increasingly critical to the university's mission. But here too is cause for concern, given worries over the growth of the federal deficit and slow recovery from the 2008 recession. The viability of federal research programs remains questionable. Will we remain affordable?



State support for UCCS, 2000-2014

These external constraints are occurring at the same time that internal dynamics require increased funding. The growing research mission for UCCS demands support for graduate students, research laboratories and equipment, and research startup and seed money. Growing athletic programs require support staff of coaches and recruiters, travel funds for teams, and expensive sport facilities. A desire to give all students some type of international exposure means personnel and expenses to oversee these programs, but we simply must strive to produce graduates who are thoughtful global citizens. Will we be competitive?

UCCS is not immune to other external challenges to the traditional higher education model. For instance, online degrees, private for-profit institutions, and even massive open online courses (MOOCS) continually demand that UCCS seeks efficiencies while maintaining quality. The U.S. model of higher education has been enormously successful, so much so that it is being replicated in emerging countries like China and India. However, this also means more competition for global students and the constant need for renewed methods to deliver quality education. In an age of disruptive technologies, we need to continually question what a quality higher education experience will be. Will we remain relevant?

We also face increasing challenges running the physical campus infrastructure. Even with recent on-campus housing expansion, more buildings and options are needed for students to live on and near to campus. As our athletic program

grows, more sports facilities will be added. Sustainability challenges on energy and water consumption, storm water runoff from impervious surfaces, and generation of solid waste and air pollution are just some pressing issues. The campus remains over-reliant on single occupancy vehicle commuters, driving the need to build more parking garages and contributing to diminished regional air quality and global carbon emissions. As we grow, we may well ask whether we can continue in this mode of operation. Will we even be able to operate in the future? Can we be better community players?

Finally, because the world of higher education is increasingly competitive, UCCS needs to firmly establish a strong identity. Campus and system-wide efforts have worked to develop a coherent logo and marketing image, but to many in the country and even the state, UCCS remains invisible or misunderstood. Are we just a branch campus? A two-year school? The University of Colorado Springs? CU-The Springs? Are we Buffalos or Mountain Lions? Many people simply don't know. Administrative leaders have taken the marketing of our institution seriously, and the quality of students, faculty, and programs offered has increased greatly. Nonetheless, much work remains to develop a strong identity that is entrenched in people's minds when they think of this place and what we do. Will we have name recognition?

UCCS University of Colorado Colorado Springs

The rapid pace of technological change and global connectivity is dizzying, but UCCS must remain a relevant player with two key challenges in mind: How do we adopt and implement strategies and tactics that keep us flexible and innovative while at the same time maintaining our core values? And how do we deliver a 21st century educational experience while ensuring the highest standards of quality? We need to produce the infrastructure to adjust to new realities, but the quality of the education will always be our core niche that we can never sacrifice.

Where will we be in fifty years? Only time will tell, but the institution has a remarkably successful track record so far, so there is no reason to think this won't continue. Can we succeed? Of course we can. The institutional culture has always been to just get the work done, and there is plenty more to do.

Photograph and Drawing Credits

Photographs

Zach Albers and Nathan Richards – 210, 232

Matt Barton – 229

Jordan Beck – 106, 128

Minette Church – 155, 162 x 2, 164, 165, 166

Dames and Moore – 20

Carol Dass – 235, 237, 262

John Davis – 58

Kati Fleming, commons.wikimedia.org – 120

Jeffrey M. Foster – 18, 32, 85, 140, 190-191, 201, 203, 204, 228, 231 x 2, 250, 280, inside Back Cover, Back Cover

Kevin Gilford – 256

John Harner – Maps – 212-226

Matt Holsclaw – 27

Carole Huber – 50, 60, 86, 202, 257 (L), 261 x 2

Tom Huber – All other photographs; map – 184
William Henry Jackson – 154
Tom Kimmell – 269
Roche Lindsey – 147, 150
Horace Poley– 142
Bill Riley – 200
Kelsey Sells – 68, 168, 290
Katelyn Stover – 206, 207
UCCS Archives – 158, 160, 171, 174, 177
Rebecca Webb – 264, 265
Rex Welshon – Front Cover
http://upload.wikimedia.org/wikipedia/commons/0/0f/Black-Billed_Magpie.jpg) – 109
http://upload.wikimedia.org/wikipedia/commons/7/7b/Western_
Tanager_%28male%29.jpg – 121
http://commons.wikimedia.org/wiki/Main_Page – 130, 131, 132, 134, 135, 136, 137 (L)
Alexanderwild.com – 137 (R)

Drawings and Paintings

Pauline Foss – 110, 111, 117, 133, 134, 138
Larry Heller – 198
William Henry Holmes – 16-17
Melissa M. Kibbe – Logo (throughout book)

References

Benedict, Audrey D., 2008. ***The Naturalist's Guide to the Southern Rockies***. Fulcrum Publishing, Golden, CO.

Burnett, Brian, 2012. ***Public Funding Reduction for Higher Education in Colorado, 1970-2010***. Lambert Academic Publishing.

Carter, Jack L., 1988. ***Trees and Shrubs of Colorado***. Johnson Books, Boulder, CO.

Clark, William S., 1987. ***A Field Guide to Hawks of North America***. Houghton Mifflin Company, Boston.

Dames and Moore, Inc., 1985. ***Colorado Springs Subsidence Investigation, Vol. 1***. Dames and Moore, Golden, CO.

Foster, Helen Thompson, 1976. ***The Origins of the University of Colorado at Colorado Springs***. UCCS Master's Thesis.

Gray, Mary Taylor, 1998. ***The Guide to Colorado Birds***. Westcliffe Publishers, Inc., Englewood, CO.

Kaufman, Kenn, 2000. ***Field Guide to Birds of North America***. Houghton Mifflin Company, New York.

Larsen, Lynn S., 1981. ***Soil Survey of El Paso County Area, Colorado***. Soil Conservation Service, U.S. Department of Agriculture.

Logan, William B., 1995. ***Dirt – the Ecstatic Skin of the Earth***. Riverhead Books, New York.

Marx, Steven, ed., 2002. ***Cal Poly Land – a Field Guide***. California Polytechnic University, San Luis Obispo, CA.

McKay, Douglas, 1983. ***The Asylum of the Gilded Pill***. State Historical Society of Colorado, Denver, CO.

_____, 1991. ***UCCS — The First 25 Years: A Selective History: the Beginnings, Adversities and New Directions of a Young Campus***. University of Colorado, Colorado Springs, CO.

Mutel, Cornelia F. and John C. Emerick, 1992. ***From Grassland to Glacier***. Johnson Books, Boulder, CO.

National Geographic Society, 1987. ***Field Guide to the Birds of North America***. Second Edition, National Geographic Society, Washington, D.C.

National Oceanic and Atmosphere Administration, www.crh.noaa.gov.

Newsome, Brian, 2007. "Profit Is Against Donor Wishes." ***Gazette***. November 27.

Rice-Jones, Judith, 28 May 2013. Personal communication.

Sibley, David Allen, 2003. ***The Sibley Guide to Birds of Western North America***. Alfred A. Knopf, New York.

Siebert, Nate, 2011. "Property exchange opens up North Campus." ***Scribe***. 10/17/2011

Szpyrka, Susan, 30 May 2013. Personal communication.

Robert L. Thayer Jr., 2003. ***LifePlace: Bioregional Thought and Practice.*** University of California Press, Berkeley, CA.

Thorson, Jon P., Christopher J. Carroll, and Matthew L. Morgan, 2001. ***Geologic Map of the Pikeview Quadrangle, El Paso County, Colorado***. Colorado Geological Survey, Denver, CO.

Trembly, Virginia, 14 March 1990. ***Oral History Program.*** UCCS Archives, Kraemer Family Library, University of Colorado Colorado Springs.

UCCS, 1987. ***Oral History Program.*** UCCS Archives, Kraemer Family Library, University of Colorado Colorado Springs.

UCCS, 2012. ***Our Commitment to the Future: 2012-2020 Strategic Plan.*** University of Colorado.

UCCS, 2012. ***Master Plan.*** University of Colorado.

Watts, Susan J., 2011 and 2013. Personal communication.