Crown of the Continent
Research Learning Center

National Park Service
U.S. Department of the Interior

Glacier National Park

Science in the Crown

Fall 2011 • Journal for the Crown of the Continent Research Learning Center • Vol. 7, No. 1

Ice Patch Archeology – Connecting Past, Present, and Future

By Melissa Sladek, Science Communication Specialist, CCRLC

With a giant heave, I load my pregnant body into the compact government car. My fellow co-workers look on with discomfort at the thought of the long drive ahead. Spring has sprung in Glacier National Park, signaling the onset of summer and my impending due date. I accompany members of Glacier's cultural resource staff to a meeting on ice patch archeology regardless, hoping to learn more about this exciting research.

As I adjust my disproportional body to fit within the confines of the back seat, I too begin to have reservations. After all, even though I have great interest in this project, this meeting would need to produce an epiphany of sorts to warrant traveling in my condition.

Arriving at our destination intact, I settle into my seat and survey the scene. There are many more people around the long stretch of tables than I anticipated. I estimate 12–15 people are clustered around the room, a diverse group of various backgrounds. After several minutes of greetings and laughter, the meeting begins.

But unlike most meetings I attend, this one begins with a traditional Kootenai blessing, asking for the Creator's guidance.

NPS Photo

One of 49 ice patch locations, out of hundreds found in Glacier, that are being surveyed for artifacts.

Most of the group assembled today is part of the Cultural Resource Management Group (CRMG) for the ice patch archeology project in Glacier National Park, a project funded by the National Park Service Climate Change Response Program. The CRMG acts as a planning body for the project, establishing protocols for any discoveries made in the field.

Ice patch archeology is a recent field of study occurring in mountain areas around the world. As the temperatures in mid-latitude mountain regions rise due to climate change, glaciers and ancient patches of ice and snow are melting and receding at unprecedented rates. Ice patches form as a result of seasonal accumulations of windblown

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SCIENCE IN THE CROWN

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"Science in the Crown" is a periodically published journal of the Crown of the Continent Research Learning Center (CCRLC).

The CCRLC serves Waterton-Glacier International Peace Park, Grant-Kohrs Ranch National Historic Site, and Little Bighorn Battlefield National Monument.

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CCRLC is part of a network of research learning centers that the National Park Service established to promote research and scientific understanding.

Director's Corner

By Tara Carolin

As we move from our busy summer and fall season into the calm and beauty of winter, it's time to look back on some of the events and projects accomplished over the past year. We've had some tremendous successes in our Citizen Science Program which were highlighted in a *Park Science* article. With coordinator Jami Belt in a term position, we have had the opportunity to expand the program to involve 70 local high school students from the International Baccalaureate Program at Flathead High School. These students participate in both field work and analysis of scientific research questions (see p. 5).

Through funding from the Glacier National Park Fund (GNPF), Unilever, and the NPS Climate Change Response program, we were able to hire three student interns, Rob Dusing, Hannah Schwalbe, and Nicholas Lui-Sontag, whose energy and enthusiasm were a great boost to our program. Besides organizing field work for loons, invasive plants, and high country mountain goats and pikas, our interns increased our communication outreach about the park's sustainability efforts (see p. 10), produced a weed pocket identification guide, created invasive plant curriculum materials, and developed online training and database reporting tools for the Invasive Plant Citizen Science Program. We are also gearing up to add new opportunities for citizen science involving aquatic insect sampling and counting golden eagles during fall migration.

Besides being the primary support for our Citizen Science Program, GNPF also provided seed money for a pilot project to study packrat middens. Students from the Bigfork High School Cave Club discovered several feet of midden materials in a park cave and collected a sample for us, which was sent to paleoecologist Dr. Saxon Sharpe, of the Desert Research Institute. We learned the materials were roughly 2,000 years old. Dr. Sharpe delivered educational programs for both the public and students which included an opportunity for hands-on exploration of midden material.

Our science communication team, Melissa Sladek and Glenn Johnson, had a highly productive year. Funding from GNPF and the Rocky Mountains Cooperative Ecosystem Studies Unit supported the development of a new website for the CCRLC. Glenn has been hard at work creating pages for the site. He also finalized a new podcast on the Invasive Plant Citizen Science Program. Melissa worked with students from the University of Montana to produce a series of podcasts emphasizing various characteristics of Glacier's unique Avalanche Basin. Watch for this series to be posted on our publications and media web page.

We look forward to continuing work with numerous partners in the coming year, including hosting our annual Science & History Day with Waterton Lakes National Park, working with some 75 or more research scientists, providing library services, as well as cooperating with regional educators, local and regional NPS staff, numerous university groups, and our dedicated citizen scientists when the cold of winter turns into the warm and busy spring once more.

"Ice Patch" continued from pg. 1

snow, which can turn into ice due to a process called nivation. Unlike glaciers, ice and snow patches don't move. This means that organic materials left on ice patches typically stay there, preserved in a shroud of ice.

One example lies in Canada, where the remains of a nearly 500 year-old individual, complete with clothing and tools, was found on the melting margins of a small glacier. Although most North American archeological discoveries have occurred farther north, explorations in high elevation areas of Yellowstone and Rocky Mountain National Parks have also found archeological materials, such as atlatl darts and foreshafts, and paleobiological specimens like bison remains, large game feces, and the fallen remains of enormous trees.

Scientific researchers and tribal experts believe that these areas of permanent snow and ice attract game animals in search of a reprieve from biting insects and warm temperatures. For millennia, hunters have identified these opportunistic areas and have trekked to them, sometimes accidentally or purposefully leaving belongings behind.

The snow and ice fields of Glacier National Park are no exception. In addition, the park is often cited as the "poster child" for climate change within the National Park Service. In the last two decades, climate change scientists have documented the rapid recession and, in many cases, disappearance of the 150 glaciers found in the park at its creation in 1910. While much of this research focuses on the ecological effects of losing glaciers, little has been studied on how this change may affect cultural resources within the park. Fragile artifacts and paleobiological materials exposed by melting ice are in need of swift stabilization or they will quickly deteriorate. They are also vulnerable to illegal collection.

Glacier's Ice Patch Archeology Project is an attempt to preserve any artifacts melted out of the ice. Researchers have identified 49 ice patch locations, out of hundreds, that are highly likely to contain such materials. According to Dr. Craig Lee of the University of Colorado, one of the principal investigators (PI) for the project, there are several factors that influence site selection. Ice patches must be accessible by foot, have existed in the high melt year of 2003, and offer a flat forefield or area below the ice patch where objects would remain rather than slide downslope.

NPS Photo

Dr. Kelly places a paleobiological specimen into a labeled plastic bag, to be identified at the University of Wyoming.

As is typical of ice patch surveys, researchers head to the field in early fall when seasonal snowmelt is at its maximum, searching among forefields and any existing streams running from the ice patches for artifacts. What makes this particular project incredibly unique is that the research and its findings are guided by the CRMG, a diverse group consisting of university scientists and students, tribal members, and park staff. The CRMG is responsible for creating a protocol for documenting, handling, and analyzing artifacts that incorporates both culturally and scientifically appropriate guidelines. This partnership is what Dr. Lee describes as "the cornerstone of the project, since all (participants) work together with a common interest, enhancing the project as a whole."

This is the eclectic group I have come to learn from at today's meeting. We tick off items listed on the agenda; budget, paperwork, contract agreements are all addressed. . .no epiphany seems to be in sight. The meeting continues with archeologists Dr. Craig Lee and co-PI, Dr. Robert Kelly of the University of Wyoming, summarizing the findings from last year's (2010) fieldwork. Several paleobiological specimens were found and identified. Dr. Kelly informs us that through radiocarbon dating, one of the specimens, a piece of wood from a Pacific yew tree, is around 5,300 years old. This is interesting because it was found at a high elevation on the east side of the park, where yew is rarely present today. They discuss the possibility of sampling ice cores to collect insect parts and pollen in the coming 2011 field season; these could also be dated, furthering our understanding of the type of climate that existed during the ice's formation.

Ira Matt, an anthropology graduate student and Salish tribal member working on the project, comments on his experience in the field, taking GPS points of the ice patch margins and the paleobiological materials found. The project is relying on the GIS expertise of the Confederated Salish and Kootenai Tribes' (CSKT) tribal historic preservation team to combine traditional archeological site locations and ice patches with cultural information from the CSKT and Blackfeet Nation, such as trail routes and place names, to help researchers identify highly potential ice patch locations.

Maria Nieves Zedeno, a professor of anthropology from the University of Arizona, discusses her upcoming work conducting oral history interviews and tribal archival research with Blackfeet tribal elders. Through this research, the Blackfeet hope to identify cultural hunting areas, plant gathering locations, and historic trail systems relevant to the archeological work.

It is then that the tone of the meeting strays from the more typical research-oriented meetings I am familiar with to one of a different nature. John Murray, of the Blackfeet Tribal Historic Preservation Office, relays a story about traditional Blackfeet uses of the land that now encompasses Glacier National Park. It is a story that meanders and diverges into many directions, one that my linear mind finds hard to comprehend. Just as I think I am lost, a message rises to the surface. And it is clear. The Blackfeet have always been tied to this landscape, park or no park, and they will always remain so.

It is this belief, this connection to the land and the ancestors who once journeyed in it, that the Blackfeet, Kootenai, Salish, and Pend d'Oreille tribes all possess and one of the reasons their input is so valuable to the success of this project. Researchers can piece together more of the archeological story by including those who have the strongest connections to the people who wrote it.

The meeting ends with talk of the upcoming 2011 season. There are high hopes for what might be found, but all agree that the project will be a success whether they find archeological materials or not. For, in its short duration, this research has not only identified valuable paleobiological resources, but also forged strong relationships that will last beyond the project's lifespan.

In the months that follow, I learn that last winter's high snow accumulations have not melted enough for researchers to survey the ice patches this fall. Although this is disappointing to the group, they remain hopeful for next year's field season.

And although my mind is now focused on other things with the birth of my son, I cannot help but think about the ice patch project. I feel tied to this research. Maybe it is my longing for my son to know my relatives, those special people in my life now long gone, or my hope that one day his children and grandchildren will somehow know me. His birth has given me a new perspective. I now feel that I truly understand what it means to be connected to something both in the past and in the future. . .and I begin to wonder if this research project has given me an epiphany after all.

A Tribute to Carly Phillips

By Staff

Left: Carly Phillips Right: Rebecca Goe

The CCRLC staff want to remember and honor the life of Carly Phillips. Carly and fellow student Rebecca Goe, Master of Sociology Students at the University of Montana, completed an evaluation of the CCRLC's High Country Citizen Science Program in 2009. This evaluation surveyed citizen science participants to determine why they participate in citizen science, what benefits they derive from the program, and their demographic make-up.

Carly passed away on March 8, 2011, in Bend, Oregon, at the age of 27. She was a lover of the outdoors and enjoyed the beauty of Oregon, where she was raised, and Montana, where she resided with her boyfriend, Mike Elliott, and their pets. We at the CCRLC will always remember her geniune spirit and enthusiasm for her work and life.

High School Students Say Yes to Science!

By Jami Belt

Golden aspens and red huckleberry bushes dot the slopes of Calf Robe Mountain signaling a clear autumn day, perfect for high country citizen science surveys. An excited group of students from Flathead High School's International Baccalaureate Program files off the bus with daypacks loaded with GPS units, site maps, binoculars, and spotting scopes, beginning their journey towards Firebrand Pass. Driven by the promise of ripe huckleberries at higher elevations, the group hikes at an impressive pace, periodically checking their GPS units to find our study area. Turning into the basin, we come face-to-face with the heavy winds that are part and parcel of Firebrand Pass. Undeterred, students in search of mountain goats set up spotting scopes, while pika surveyors leave the trail and head towards the talus field.

In the classroom, I asked how many students had ever seen a pika and was surprised to see only one hand raised. Now, sitting in the talus, a student spots a flicker of movement. "I see one," he says, almost startled. Another pika from behind us issues its characteristic "eep!" call and triggers three other pikas in the talus field to call out a response. The students vigorously write on their data sheets to keep up with the activity.

This year's late snowpack made it difficult to survey Firebrand, giving Flathead students the first opportunity to confirm the presence of pikas this year. The pika team traverses the talus, looking under large boulders for pika scat, or droppings, and haypiles, piles of dried and stored food. Suddenly I hear, "I think I found one," and pick my way carefully across the talus to take a look. Three students proudly point out a fresh haypile, piled eight inches high with ferns, flowers, and evergreen twigs, and surrounded by little, black, peppercorn-shaped scat. They scoop 10 pellets into the sample envelope for our records and photograph the haypile with a cell phone.

NPS Photo

Students from Flathead High School's International Baccalaureate Program scan the hillsides for mountain goats during a fall high country citizen science survey.

During eight classroom sessions at Flathead High School this past spring and fall, I taught over 70 students about mountain goat and pika research. Students brainstormed potential scenarios for positive and negative effects of climate change on wildlife. In small groups, they developed research questions about mountain goats and pikas, proposed explanations to answer those questions, and discussed what broader management implications their research might have. One group wondered whether female mountain goats with young would be more likely to forage on hot days than males who could spend more time resting. Another group hypothesized that competitor species, such as ground squirrels and marmots, may inhibit pika presence and considered whether pikas would face more competition as other species moved to higher elevations with rising temperatures.

This hands-on exploration of the scientific method is part of our attempt to give students real world experience in science research. Students will refine their research questions in the months to come using new insights from their time in the field. They will then have a rare opportunity to delve into data analysis, searching for real answers to their questions using our massive

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Taking in the Night Life of Glacier During Bat Surveys

By Glenn Johnson

Bat surveys are not for those who like banker's hours. When most of us are winding down from our day's activities, bats are just beginning theirs. Leaving their roosting sites about dusk, they take to the skies and begin feeding on insects. They gorge for an hour or so, then take a break to digest their meals before heading out for more. After several courses, they return to their day roosts just before dawn to retire. To investigate bat activity and to determine which species are out there, researchers like Lisa Bate must become nocturnal.

A lead wildlife technician at Glacier National Park, Bate, along with park biological technician Courtney Raukar, spent 21 nights during July surveying bats in the park. They were trained in handling and survey techniques, and assisted in the study by Dr. Cori Lausen, a Canadian field and research bat biologist. In that three-week timeframe, the trio completed the first official bat survey of Glacier, with three new species observed – California myotis, Yuma myotis, and the eastern red bat.

Bate, who has also conducted bird studies with the U.S. Forest Service and operated a wildlife research consulting business, has had an interest in bats for a long time. The recent devastation of bat populations throughout eastern North America, however, led her to believe that immediate study within the park was warranted.

"I heard what was happening with bats back East," Bate said, referring to white-nose syndrome, a cold-habitat fungus that has killed more than 1.2 million bats in the eastern U.S. since 2006. Bats infected with white-nose syndrome (WNS) may arouse from torpor prematurely to deal with the fungal infection, thus burning up fat stores needed to survive the winter. No cases have yet been reported west of Oklahoma, but information on western bat species is lacking.

"We weren't even sure which bat species we had in the park," said Bate. "When I looked in our wildlife database, we only had records of four (species)." Two other species have also been detected within the park's boundaries, bringing the total to six prior to her 2011 study.

NPS Photo

Researchers examine the wing of a hoary bat, one of nine known bat species found within Glacier National Park.

Obtaining information on even the known species of bats isn't easy. "They're just an incredibly hard group of species to study," Bate said. "They're nocturnal, the sounds they make are not audible to human ears, and they roost alone or in very small groups."

With funding from the Glacier National Park Fund, Bate began a two year research project this year to document the presence and health of the park's bat populations. Using both capture nets and electronic recording devices, and setting up a grid system of park locations to survey, the team set out to develop a systematic and repeatable bat inventory and monitoring study to learn more about bat biodiversity. Related research was also conducted in neighboring Waterton Lakes National Park during the summer, making the study an international effort.

"Our main goal," Bate said, "was to learn what bats are in Glacier. This would provide baseline data and provide a way to assess possible impacts of WNS on our bats in the event the fungus shows up here."

Standard office hours were abandoned as the Glacier team settled into a routine of overnight stays at 20 monitoring sites, often hauling 200 pounds of gear to locations that were, of necessity, within a mile of a park road. Bate laughed as she recalled a "typical" bat monitoring schedule.

"We would start looking for sites as early as 3 or 4 in the afternoon," she explained, "grab a quick bite to eat, then go start setting up nets and be ready to open them at dusk,

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"Students" continued from pg. 5

dataset from over 1,000 mountain goat and pika surveys collected by high country citizen scientists.

Back in the field, another group of Flathead High students are gearing up at Autumn Creek, where they will count mountain goats and simultaneously take a high-resolution photograph using a relatively new technology called a GigaPan. The GigaPan is a robotic tripod that rotates automatically across a landscape using a digital camera to take close-up pictures of a scene, frame by frame. The hundreds of resulting photos are then stitched together in a seamless panorama that a user can navigate and zoom in and out of, similar to Google Earth.

Last spring, we taught students about measuring detection probability. This statistic gives us a percentage of how many animals in a population remain unseen when we are counting the animals we do see. The importance of detection probability became crystal clear to students during a spring field trip to Avalanche Lake, when the fog lifted off the lake just long enough for us to see three goats waiting to be counted. How many more goats were out there but not counted, the students wondered. To answer this question, we are exploring (with the same students, now in their second year of the citizen science program) whether GigaPan photos could be examined back in the classroom to detect additional goats not seen during field surveys. Flathead students will collaborate with students from Bigfork High School's GIS mapping class to research this previously unexplored use for GigaPans. We hope to give these students a taste of scientific publishing by submitting their results to a young scientist journal.

This is not the first time we have engaged high school students in citizen science. During summer field trips, they have helped us search for loon chicks, spot mountain goats, and map invasive plants. These students have heralded from many parts of the country, such as San Diego, Chicago, Houston, and Minneapolis, but until this year we have been unable to work with youth from our own backyard. Limited budgets and scheduling opportunities make it hard for local students to take a field trip to Glacier. In addition, citizen science programs have mainly occurred during the summer months. However, thanks to support from the Glacier National Park Fund, we have expanded our Citizen Science Program to months when schools are still in session.

The High School Citizen Science Program gives hands-on research experience to students at a critical time in their lives when they are beginning to ponder fields of study and careers. Students also learn volumes about the rewards and realities of field research.

At the end of the Firebrand Pass field trip, we asked students to list what they thought it would take to be a wildlife biologist. Among the character traits listed were curiosity, patience, attention to detail, and a bit of extra weight…to keep you from getting blown off the mountainside.

Become a Citizen Scientist

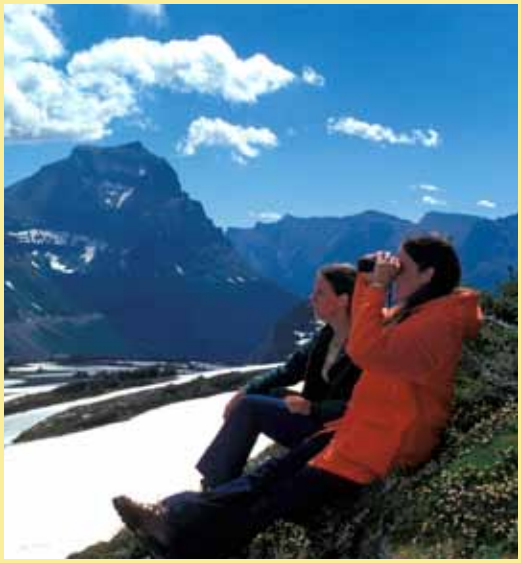
The CCRLC is looking for dedicated individuals who wish to assist with our research efforts as wildlife observers and citizen scientists. Participation in the program requires attending a 4–8 hour training session (depending on the project) and signing up as a park volunteer. Current citizen science projects include:

Common Loon Monintoring: Survey Glacier National Park's loon habitat lakes to document presence of common loons as well as breeding and nesting behaviors.

High Country: Collect data on the number and distribution of two species of concern for Glacier National Park: mountain goats and pikas.

Mapping Invasive Plants: Survey Glacier National Park's 700+ miles of hiking trails to determine the distribution and extent of noxious weeds invading the park.

For more information, please contact Citizen Science Coordinator Jami Belt (glac_citizen_science@nps.gov).



NPS Photo

"Bat Survey" continued from pg. 6

which was typically around 9:30. We set up six to ten nets along a half-mile distance and we were out all night, walking back and forth checking them. Sometimes we would not get into our tents until 5 or 6 a.m. Then we'd be up again to retrieve detectors left the previous night before moving on to the next site."

The team investigated each site to determine the best locations to net bats and make observations. They found that some sites aided their efforts, while others made the task more difficult to accomplish.

"Bats are not blind," Bate noted. "They can see these nets even in the dark and can detect them through echolocation. What we tried to do is find a trail or a road or some kind of place that funnels the bats in. Up in the North Fork, where there's a lot of burned area, it was really hard to find suitable netting sites. One of the best was at Bowman Lake, along the trails through unburned forest. We had a really busy night there."

Factors other than terrain could determine the relative success or failure of a night's survey. The late arrival of warm weather and preponderance of spring storms played their part in the work conducted by Bate and her colleagues. Bate notes that cold and rain can cause bats to go into torpor. Cool temperatures mean fewer bugs and, therefore, less bat activity. On some cold nights Bate and her team caught zero bats. On warmer nights, the team had to shut down nets because they caught too many to keep up.

On those nights when bats were active, the survey team would carefully remove trapped animals from the nets, weigh them, and take body measurements with calipers. To minimize the use of chemical disinfectants to clean equipment and eliminate possible contamination of WNS, they used a technique, pioneered by Dr. Lausen, in which bats were protected with a thin plastic bag during handling. Working this way, said Bate, "you never come in contact with the bat and there's no need to disinfect your calipers, or your hands, after handling each one."

NPS Photo

Dr. Lausen and Bate use an Anabat, an electronic system that detects and analyzes bat echolocation calls, during a night survey.

Technology played its part in the night studies as well. Dr. Lausen brought along an Anabat, an electronic system that detects and analyzes bat echolocation calls. Working in conjunction with a personal digital assistant (PDA) carried on site, this tool displays a pattern on its screen that denotes the frequency emitted by a particular bat species. This allowed the team to note the presence of bats that flew too high for net capture, or species which were physically very similar and hard to visually differentiate.

In addition to the three new species recorded in 2011, evidence suggests that two or three other species may reside in Glacier as well. Future surveys into other areas of the park, planned for next year, may bring their presence to light. For now, bat monitoring continues and will throughout the winter, using strategically placed acoustic detectors. Information from this portion of the study will help determine whether or not bats hibernate in Glacier.

Overall, the first year of the bat inventory and monitoring project was considered a huge success in helping us to understand what bat species live here and which habitats they use. The information gathered from this study not only provides important baseline data on bats in the park and surrounding region, it also gives managers a starting place to measure the impacts of WNS should it someday spread this far west. As Bate and others say, "hopefully, it never does."

Citizen Science Highlights

By Terry Peterson

As I began work in the early part of the summer, the number of calls or visits from anxious citizen scientists amazed me as they sought to find out when the Going-to-the-Sun Road would open. Other questions rolled in – Did I know if the loons had returned? How are the mountain goats getting along with their newly born kids? Had we any reports of pikas yet?

For a very long time, I had no answers. Then, ever so slowly, the road was plowed, the snow melted, and the flooding waters abated. Finally, our dedicated citizen scientists could get into the field to answer their burning questions. Once again, they could pound the trails of Glacier National Park collecting research data.

Over the summer, 46 lakes were surveyed for loons, with 44 adults and 8 chicks observed. There were 15 pairs, 14 singles, and 8 chicks in 5 broods, average numbers for Glacier. Due to high water levels in June, nests that were active early in the season became flooded, contributing to at least two nest failures that we know of. At the end of the season, two eggs were collected from one failed nest and will be analyzed.

NPS Photo

A citizen scientist collects data on pikas.

The High Country Citizen Science Program got off to a slow start with the Going-to-the-Sun Road opening on the latest date since its inception, but even so, dedicated volunteers still completed three observations at most mountain goat sites. Two sites remained inaccessible for all but two weeks of the season.

Volunteers surveyed 21 pika sites. Pika presence was confirmed at 15 sites but could not be confirmed at two survey sites where they were previously observed. We did confirm pikas at one location where they had not previously been found.

Next year, Glacier National Park's dedicated and talented citizen scientists will be gathering pika data at 100 or more survey sites as a pilot project for the National Park Service Climate Change Response Program. This data has already been collected at eight national parks, but ours will be the first to rely primarily on citizen scientists learning the protocol and conducting the research. Many new volunteers will be needed to complete this work in rugged terrain. The goal is not only to collect the data, but also to provide recommendations to the Climate Change Response Program on how to implement this type of program in other parks.

This year, the Invasive Plant Citizen Science Program involved 54 participants at our Second Annual Weed Blitz as well as weed surveys along 400+ miles of backcountry trails. Next year, an online training for the invasive plant program will be available. Interested volunteers can also obtain hands-on training at our annual weed blitz in July.

Our Citizen Science Program continued to grow in 2011. A total of 186 citizen scientists from all three programs put in over 4800 hours, equaling an in-kind contribution of $96,000. In addition, an expanded grant from the Glacier National Park Fund allowed us to fund three interns to help coordinate our Citizen Science Program throughout the summer. This additional funding enabled us to recruit a great diversity of interns and expand our outreach for a very successful season.

Citizen Science Program Coordinator Jami Belt continued to expand the program by working with high school and college level students. Students from three local high schools, one from Chicago, the St. Louis Science Center, three University of Montana classes, a class from Blackfeet Community College, and members of the National Association of Biology Teachers all participated in the Citizen Science Program.

Next fall, we are launching an effort to count migrating golden eagles, a species at risk from lead poisoning and energy development impacts. We hope to determine whether eagle numbers are remaining stable or declining.

We are ever so grateful to our volunteers for all of the hard work and accomplishments they achieved this year. Thank you for your continued dedication to science and this program.

Intern Spotlight

By Nicholas Liu-Sontag

A few years ago, I had the opportunity to work on a meaningful project that required hiking in one of the most beautiful places in the United States. Through this experience I learned a valuable lesson: the pinnacle of living is being paid to work on something that inspires passion in you and is mentally challenging. I also thought it would never happen to me again. I was wrong.

This summer I had a similar experience with my internship as the High Country Citizen Science Coordinator and member of Glacier National Park's Green Team. As a participant in the National Park Service Climate Change Internship Program, I was given the opportunity to use my education, further my interests, and explore the work of the National Park Service. I not only worked on the High Country Citizen Science Program, a rewarding project that monitors mountain goats and pikas (two species sensitive to climate change),

"...the pinnacle of living is being paid to work on something that inspires passion in you and is mentally challenging."

but also took part in the park's Green Team.The Green Team is a volunteer group of Glacier employees and partners who work to promote sustainability within the park.

The Green Team needed help getting several projects off the ground. One such project was developing content for a sustainability page on Glacier's website. I compiled content for the web page and worked with staff to implement the page – little in comparison to the accomplishments of those before me – but rewarding since this new page highlights the many accomplishments of the park and its partners, and will be seen by visitors and employees alike.

As the High Country Citizen Science Project Coordinator, I trained and coordinated volunteers in wildlife monitoring. This allowed me to work with many passionate, experienced, and knowledgeable thinkers and outdoors people. If it was my job to keep these people coming back with my personal charm and engaging charisma, then I was successful...or perhaps it was those magical mountains instead!

My journey continues in China, where I will be Professor of English and Western Culture at Qufu Normal University in Shandong Province. After that, I'd like to work for an Indonesian organization that focuses on sustainable community development.

Thanks to the CCRLC staff, volunteers, and all those mountain goats for a great summer!

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Crown of the Continent Reseach Learning Center Goals and Mission:

- *Facilitate use of parks for scientific inquiry;*
- *Support science-informed decision-making;*
- *Communicate relevance and provide access to research knowledge; and,*
- *Promote resource stewardship through partnerships*