Nature Notes

GRAND CANYON NATIONAL PARK VOLUME XXIII, NUMBER 1 SUMMER 2008

A Biologist's Biologist: Remembering Eric York 1970–2007

Many of Eric York's colleagues and friends throughout the National Park Service contributed to this memorial.

With the passing of Eric York on November 2, 2007, Grand Canyon National Park lost an extremely talented and dedicated wildlife biologist. More importantly, the mountain lions, carnivores and other wildlife he studied lost one of their most knowledgeable and devoted human allies and advocates. Eric's work, in fact his life, centered on his passion for wildlife, the outdoors, and grand landscapes of our national parks and other wildlands.

Eric worked at Grand Canyon National Park as a wildlife biologist studying carnivore movement patterns from July 2006 until his death, and previously as a contract biologist starting in 2003. He previously worked for Santa Monica Mountains National Recreation Area in California, Lake Clark National Park and Preserve in Alaska, the U.S. Geological Survey Biological Resources Discipline and the University of California–Davis' Wildlife Health Center on mountain lions and other large carnivores, specializing in live-capture techniques. Eric worked at Santa Monica Mountains NRA for more than 10 years and was critical to the establishment of their carnivore research program, which focuses on the ecology, behavior and conservation of bobcats and coyotes in that complex urban environment. In 2002, Eric initiated a project using global positioning satellite radio collars for the study of mountain lions in that park.

Grand Canyon Lion Study

Beginning in 2003, the National Park Service participated in a radiotelemetry study of mountain lions within the Grand Canyon ecosystem to complement existing studies using remote cameras, track surveys, and scat and hair collection. Eric's skill with trapping techniques and compassion in handling captured cats was key to the successful implementation of the telemetry program that allowed collection of specific information about lion predation habits, reproductive activity and other behaviors.

An additional component of Eric's work for Grand Canyon's Division of Science and Resource Management was his active collaboration with interpretive staff for outreach and education about his research on lions in the park. This outreach, via ranger programs, site bulletins and the Grand

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Eric York. NPS photograph

Editor's Note

This issue of Nature Notes is dedicated to National Park Service biologist Eric York. Eric died unexpectedly in the fall of 2007 from circumstances related to his work in Grand Canyon National Park. The following articles introduce Eric and the projects he was accomplishing. Eric's death affected his fellow researchers and the entire staff at Grand Canyon National Park, in particular his colleagues in the Division of Science and Resource Management. Our sympathy goes out to his family.

Inside:

Eric and a colleague weighing a tranquilized mountain lion. NPS photograph

Canyon Web site (e.g., http://www.nps.gov/grca/naturescience/200710mtlionkit.htm), reached thousands of visitors each year.

Pneumonic Plague

In 2007, Eric was monitoring up to 10 collared lions in and around Grand Canyon National Park, and also collecting data on bighorn sheep, black bear, bobcats, coyotes and other species. Two of the collared female lions produced litters in the summer, and Eric found the kittens, which he ear-tagged to incorporate them in the study. A few days prior to his death, he found the mother of one of these litters dead and recovered her body to perform a postmortem examination.

The Centers for Disease Control and Prevention confirmed pneumonic plague as the cause of Eric's death. With the detection of the same strain of plague in the remains of the necropsied mother lion, the CDC concluded that Eric contracted the disease from the animal. Although plague can be transmitted to humans through the bites of rodent fleas, Eric's exposure likely came through direct contact with the infected lion. Plague is endemic in northern Arizona, but cases of pneumonic plague in humans are extremely rare. Eric's death reminds us of the inherent hazards, including the less obvious ones, that biologists are exposed to while working to manage and conserve wildlife.

The National Park Service is developing additional guidance to assist biologists in identifying risks and the appropriate work practices and personal protective equipment to make their job safer. Taking actions to ensure that a tragedy such as Eric's death never happens again is a way that all biologists and all NPS employees can honor this great man.

In Memoriam

Eric will be remembered as a biologist's biologist, and his expertise went far beyond that of his intimate knowledge of the lions and other species he tracked at Grand Canyon and elsewhere. During his career, Eric captured and tagged 23 different species of carnivores. He worked in many areas of the United States and the world, including Chile, Nepal and Pakistan, where he researched the elusive snow leopard. In her comments made at the celebration of his life held on the canyon's South Rim on November 15, 2007, Elaine Leslie, Eric's former supervisor, said, "Eric was much like the lions he stalked. To catch a glimpse of the elusive Eric, you needed to be up at dawn as he hurried in and out of the office to gather up his freshly charged radio, dart pistol and other tools of the trade. By sunrise you could find him on the carcass of a freshly killed deer or elk, carefully reading the signs and placing a snare. Then off he would run, yes run, to check his traplines."

She also said, "If you couldn't be Eric York, you at the very least wanted to hang out with him in the field and absorb every ounce of skill the man had to offer." Those who learned from Eric — NPS wildlife biologists, interpreters and educators, researchers in Chile, Nepal and Pakistan, and his family and friends — will remember Eric by continuing his research and by continuing to share his passion for big cats, wildlife and wild places.

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Eric York was a native of Shelburne, Massachusetts. He earned a bachelor of science in wildlife management from the University of Maine and a master of science in wildlife conservation from the University of Massachusetts.

Cards, letters and condolences may be sent to Eric's parents, Tony and Launie York, 180 S. Shelburne Road, Shelburne, MA 01370. Donations can be made in Eric's name to (1) Grand Canyon Association, Attn: Brad Wallis, P.O. Box 399, Grand Canyon, AZ 86023, http://www.grandcanyon.org; (2) Felidae Conservation Fund, 14 Cove Road, Belvedere, CA 94920, http://www.felidaefund.org; and (3) the Wildlands Fund, Division of Massachusetts Fish and Wildlife, Attn: Julie, 1 Rabbit Hill Road, Westboro, MA 01581.

A version of this article will also appear in *Park Science*.

Mountain Lion Research in Grand Canyon National Park

R.V. Ward, Wildlife Program Manager

The mountain lion research conducted by Eric York prior to his tragic death in November 2007 has significantly added to our knowledge of this keystone predator in Grand Canyon National Park. Thanks to his efforts, we now know the size, shape and location of numerous mountain lion home ranges within the park. We know where mountain lions continually cross dangerous paved roads within the park. We know at what time of day and in which seasons the greatest number of road crossings takes place. We know the mortality rate and the causes of death in our lion population. We know what their prey base is and we know where they cache their kills. All of this information, collected through the hard work and devotion of Eric York, is used by park management to ensure the continued survival of mountain lions within the park. This article presents a summary of how this information was acquired and of the results of some of Eric's work.

Radiotelemetry Lion Study

In 2003, National Park Service biologists at Grand Canyon National Park initiated a radiotelemetry study of mountain lions in and around GCNP. Methods included using both very high frequency radio signals and global positioning satellite technology to acquire accurate location information from collared mountain lions. Investigation of GPS locations allows biologists to gather information about lion behavior, including predation habits, reproductive activity, habitat selection, intraspecific interactions and interactions with other carnivores.

Eric York's consummate skill and experience in tracking and trapping mountain lions elevated a small pre-existing study involving track counts and scent posts to a more detailed and in-depth study of mountain lion behavior in the rugged environment of Grand Canyon.

Objectives of the study included:

1. Determining behavior patterns of mountain lions that utilize human-populated areas.
2. Documenting mountain lion prey composition and predation rates.
3. Determining impacts of features such as highways, human developments and artificial water sources on mountain lion behavior.
4. Analyzing effects of human activities on the mountain lion population.

Mountain lions were captured with Aldrich-type foot snares using standard methods and equipment for trapping lions. A total of 127 traps were set along game trails, ridge lines, canyon walls and other common lion travel routes. At any one time, up to 25 traps were set from 1- to 50-day periods, year-round, depending on personnel availability and weather conditions. Traps were checked twice daily — visually in the morning near sunrise, and again in the afternoon either visually or by capture-activated transmitter on the trap. Traps were closed during periods of extreme weather.

Captured mountain lions were immobilized with a mixture of tranquilizer chemicals, delivered via blow dart. Immobilized lions were fitted with GPS/VHF radio collars and were weighed, and morphological measurements were taken. Blood was collected for genetic analysis. All capture methods and drugs used were approved by National Park Service veterinarians. Collars were programmed to acquire 8 to 12 locations per day 6 days a week and 24 locations on Saturdays. Each download of data, which occurred approximately every 60 days, consisted of 500 to 1,000 GPS locations.

Home Ranges

Nine individual mountain lions were captured between late 2003 and August 2006. Four (two male, two female) adult resident lions were tracked for more than 11 months to determine home range size and location in the GCNP study area. Another male's (P01) home range was calculated after dispersing out of GCNP south to the Coconino National Forest just north of Flagstaff. The illustration below shows the home range of P02, a female that was legally hunted and taken outside the park in March 2006. As expected, males had larger home ranges than females and traveled

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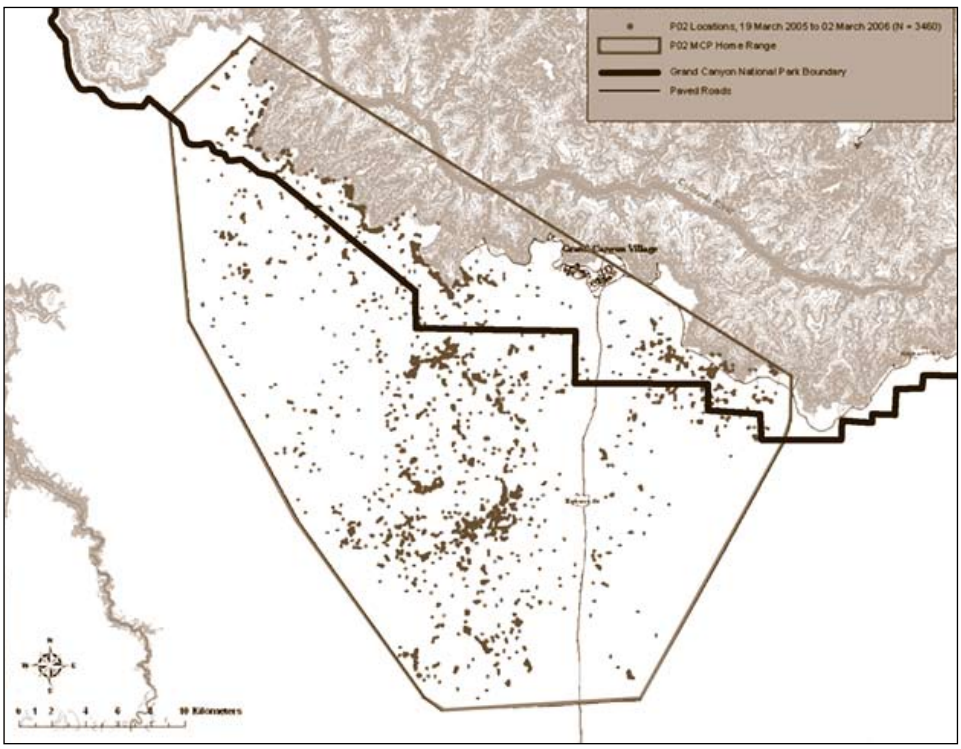


Locations of P02 and her known range on Grand Canyon's South Rim. NPS map

extensively through several female ranges. Home range size varied from 322 to 480 square kilometers (124 to 185 square miles) for males, and 198 to 445 square kilometers (76 to 172 square miles) for females. Although most of the radio-collared cats had GPS locations less than one kilometer (0.6 mile) from the developed areas of Grand Canyon Village, no mountain lions were located directly in the developed areas. There were no lion/human interactions with collared lions during the study. The only human interactions with the mountain lions were at the time of the lions' deaths, either by vehicle collision or hunting.

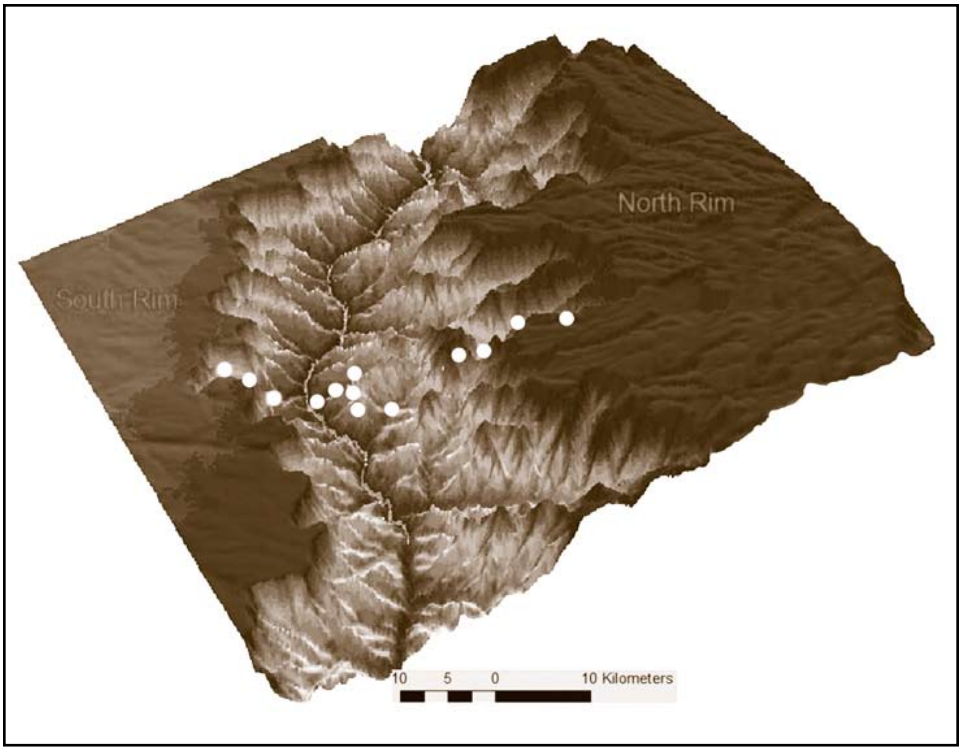
Dispersal

The extreme vertical structure of the Grand Canyon represents a formidable barrier to large mammal movement. In addition to the limited access into the canyon, the Colorado River represents a constant obstacle for crossing the canyon. Resident adult mountain lions on the South Rim of the canyon use the rim as a distinct territory boundary. Research found very little use of the canyon by lions, except areas just below the rim that were often used for short periods of resting during the day. The ledgy Kaibab and Toroweap formations provide ample resting sites for lions. Only one mountain lion (P05), a young female, traveled into and across the canyon (see illustration below). This lion dropped off the South Rim, swam the Colorado River and climbed to the North Rim in the space of eight hours. The other dispersing lion (P01), a young male, traveled along the rim before dispersing approximately 70 kilometers (40 miles) south to the San Francisco Peaks area, just north of Flagstaff.

Survival

To determine mountain lion mortality causes and rates, radio collars are equipped with a mortality sensor. The sensor is activated by six hours of immobility, typically much longer than a mountain lion would rest. Once the sensor is activated, the VHF signal of the radio collars quickens to alert a biologist of the mortality (or the detachment of the collar). Annual survival rates of collared lions were calculated using the computer program MICROMORT.

Eight collared mountain lions were tracked for 8 to 408 days. Of these, four animals have died. All deaths have been human-caused. Two lions (P01 and P02) were killed by hunters outside of GCNP, and two (P06 and P08) were killed by cars inside the park. Survival rates for males and females were 0.65 and 0.56, respectively. In other words, an individual lion had a 65 percent or 56 percent chance of survival for the length of the study, depending on the lion's gender.



Mountain lion P05 was tracked as she crossed the canyon. NPS illustration

Of the eight radio-collared mountain lions tracked, seven crossed the major paved roads in the park. Home ranges of three adult lions (males P02 and P04, and female P06) encompassed sections of Arizona Highway 64 south of and into the park, including Desert View Drive. The three transient younger mountain lions also crossed Desert View Drive. The sites where P06 and P08 were killed by cars are located less than 1,000 feet apart on Desert View Drive, near mile marker 250. Prior to this study a lion was also killed in March 2003 in this same area by a bus contracted by the National Park Service.

Mountain Lion Prey Use

To locate prey killed by mountain lions, lion GPS locations were mapped using a geographic information system. Mountain lion location clusters (many GPS points over a small area) were identified visually. Clusters, usually less than 300 square meters (3,200 square feet), consisting of multiple points over a long period (more than six hours) were investigated in the field. Prey items (bones, hair, rumen) found at mountain lion GPS clusters were identified and aged. Of the kill sites examined, elk (most less than one year old) were the most common prey. Deer were the second most common. Other prey species included coyotes and bobcats.

Future Work

This summary encompasses work conducted by Eric York from 2003 until August 2006. During 2007, Eric continued to trap and radio-track mountain lions. During one brief period in the summer, Eric was tracking 10 mountain lions with functioning collars. The data collected during this period are currently being analyzed by GCNP's Division of Science and Resource Management wildlife staff, and additional reports will be forthcoming. Three cats with functioning GPS collars still roam Grand Canyon's South Rim, and their location information is stored in their GPS collars. In spring 2008, this data was downloaded and added to Grand Canyon's growing database of mountain lion behavior and ecology.

Currently, a moratorium has been placed on capturing mountain lions in GCNP. It is hoped that after the National Park Service develops safeguards to ensure the safety and health of wildlife researchers in the park, Eric's work can be continued.

Discovering Mountain Lion Kittens, Summer 2007: A Trip Report

Lori Rome, Seasonal Supervisor Interpretation

Before dawn on a morning in July 2007, a small group gathered at the Science and Resource Management Complex to search for the future. We were looking to find Grand Canyon's youngest predators, mountain lion kittens of collared female P13.

Global positioning system data from P13's radio collar, collected as part of Grand Canyon National Park's lion research program led by biologist Eric York, showed that she kept returning to a specific location for several weeks, which could only mean one thing: kittens. Eric estimated that the kittens would be approximately five weeks old, the perfect age to capture and weigh, sex and tag them. If the kittens got much older, they would be too large to handle safely. It was the fourth day in a row that we had tried to find the kittens. Previous attempts had been stopped because telemetry data showed that the mother was in the vicinity of the den, making an attempt to locate it too risky.

Eric led our group that summer morning. National Park Service biologists Hattie Oswald and Tim Bowden were along to help with the effort to locate and tag the kittens if we found them. Frank Wallander from the Division of Facility Maintenance and I from the Division of Interpretation joined the group to help photo-document the potential discovery and to assist in any way we could. For the last two years, Eric and I had worked together,

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Mountain lion kitten P20. NPS photograph

NPS biologists Eric York (left) and Tim Bowden put an ear tag on one of the kittens. NPS photograph

sharing a passion for lions. He did lion research, and I did education and interpretation. That morning, I was thrilled beyond words about the prospect of seeing young kittens in their den. The day was to become the best of my National Park Service career.

We drove in darkness down a bumpy dirt road far from Grand Canyon Village and parked at a nondescript spot in the heart of the pinyon-juniper forest. Eric took out the handheld GPS unit and typed in the coordinates. Hattie gathered the radiotelemetry equipment, and Tim grabbed the gloves and some other equipment.

We started hiking through the forest by headlamp to the area that Eric thought may contain P13's den site. We walked over elk tracks and scat, and avoided the prickly pear cactus and low-hanging branches. The earth was damp from monsoon rains the previous day. After about 45 minutes we stopped. The telemetry antenna went up, and to our luck, silence. No radio signal meant P13 was not in the vicinity of the potential den site. We could continue.

A hint of dawn lightened the horizon as we dropped into the canyon. The hiking was rough and we occasionally slipped on steep slopes or were jabbed by brush. The side canyon was filled with possible den sites. A lion kitten could hide from the monsoon rains or stay out of the noonday sun in the rocky crags and ledges. Our mission was to search every nook and cranny in the rocks to see if it might hold the future top predators of the canyon. Using the telemetry equipment, Hattie checked every 10 minutes to see if P13 was on her way home. At five weeks old, the kittens were big enough to spend a few days at a time on their own. We hoped that P13 would be away for the day so that Eric could do his work.

After a few hours of searching, Eric called out to everyone. It was getting warm as the sun climbed into the sky. We had found no kittens, no den site. We gathered around a large boulder to discuss what to do next.

Eric could tell the kittens had been in the area. He pointed out the stomped-down earth and exposed soil, and picked up a small piece of fur. Eric showed us how the kittens could have used the site and where they might hide. Then he called out, "Oh, yikes, there's one in here!"

The litter had retreated into the back of the den. We crawled on our bellies about 5 feet into a den barely 10 inches high. Lying in the dirt, I started the video camera. Through the viewfinder, I saw a ball of fur and bright blue eyes.

One by one, Eric pulled the kittens out, placed them in a bag and raised them up to a ledge where he could gather data. Each one was weighed and received an ear tag. The kittens became P18, P19 and P20. All were females. The largest kitten was 10 pounds, and the runt was barely 5 pounds. Each had those brilliant blue eyes, spotted fur and that heartwarming baby animal mystique. The largest one, P18, was feisty and kept hissing, spitting and baring her tiny teeth. She was clearly the dominant kitten and the one most likely to survive into adulthood. She was growling with a low rumble, doing her best to act fierce, though I couldn't help finding it cute and reminiscent of a house kitten purring.

P20 was small and not nearly as aggressive as the other two. She still tried to bite Tim, to no avail, while he held her as Eric placed the ear tags. It reminded me of when I had my own ears pierced. It stung! P20 flexed her tiny retractable claws and hissed.

The ear tags identify the kittens so researchers can track them to see if any make it into adulthood. Skin tissue from the ear tagging was placed in an envelope to be sent for DNA testing, which may allow identification of the father of these young lions.

With the kittens safely returned to the den, we packed our gear and started our hike out. It was midmorning and thunderheads began to boil overhead. Before leaving the den site, I paused and looked back to the boulder that housed the young lions. It was the kind of day that a ranger lives for — to be a part of research, and to witness the miracle and beauty of the natural world. I knew that fewer than 20 percent of mountain lion kittens make it to adulthood, but I could not help hoping that somehow this whole set of siblings might survive. They had a safe home with a fantastic view, a great food source, and the benefit of a dedicated mother to care for them and guide them. I hoped that one of them might raise her own kittens in this very side canyon one day. As we hiked out of the canyon, I took comfort in knowing that Grand Canyon's protected landscape offered the kittens a bright future with a chance to be part of the natural web of life.

Lions AND Loss

Lori Rome,
Seasonal Supervisor Interpretation

Autumn had arrived at Grand Canyon. The days grew shorter and the nights turned cold. The mountain lion research program changed from vibrant reality to a darkened memory.

In late October 2007, Eric York, wildlife biologist at Grand Canyon, picked up a mortality signal from female mountain lion P13's radio collar. P13 had been trapped in April 2007 and fitted with a collar equipped with a global positioning system unit and a radio transmitter. Eric inferred from data collected by her collar that she had a litter of kittens early that summer. He found and tagged the three kittens in July and hoped to learn about survival rates in the canyon's lion population. Having accompanied Eric in the field on the day the kittens were ear tagged, I was struck by his skill, professionalism and compassion for his work with lions.

The mountain lion research program had a busy and successful summer — Eric caught and collared eight lions and documented two litters of kittens, in addition to tracking collared lions and making other field observations.

Using the mortality signal as a guide, Eric hiked through rough terrain into the Grand Canyon to find the deceased lion. She lay peacefully curled up in an alcove with dried blood under her nose. Eric carried the 90-pound creature out of the canyon.

His desire to understand the natural world drove him to find answers, so he performed a necropsy. Did she die of internal bleeding? Had she been attacked by the large male, P4, who frequented her territory? Eric told me that he found teeth marks in the neck, puncture wounds in her abdomen and massive internal bleeding. Her three kittens were now orphaned.

"They won't make it," Eric said when he told me the bad news. "They are only 3 months old, and they still needed their mother for survival." As sadness came over me, he reminded me that "it is part of the natural process." The mountain lion research program went from having 10 collared lions to only three. Lions had died, collars had failed, and now the mother and kittens were gone. A dedicated biologist, Eric pushed on. He continued to set new traps and to capture and collar lions. In the last week of October, Eric was scheduled to give a lecture about lions to students at Grand Canyon School. He had packed props, projector and years of wisdom. But he felt ill and was forced to cancel. Although not feeling well, he rose at 4:00 a.m. to check his lion traps. After returning from the field, he went home early, tired with flulike symptoms.

A few days later, Eric was found deceased in his home after he failed to come to work. Eric died of pneumonic plague, contracted from his exposure to P13. Though plague is present in the Southwest, human cases are extremely rare.

As a wildlife biologist, Eric's exposure to potential hazards was high, yet he had safely worked with and handled mountain lions, bobcats, coyotes, bighorn sheep, ringtails, squirrels and other wildlife for years.

The death of Eric York is a shock and a tragedy. He was admired and respected by everyone, including me. Eric's death is also a tragedy for mountain lions in the park and for wildlife globally. Eric dedicated

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Eric York. NPS photograph

his life to researching big cats throughout the United States, and in Pakistan, Chile and Nepal. He worked with the Felidae Conservation Fund and was on their technical advisory board. At only 37 years old, he had so much more to learn and share. His sudden death has halted lion research at the park, for now.

Eric was amazing. He would rise before dawn to set and then check his lion traps, and briefly stop in the office before returning to the field to check his traps again. Cold or hot, sunny or snowing, Eric was outside with the animals he studied, covering hundreds of miles off trail in the wilds of the park. He found kill sites, followed tracks and monitored activity. Eric learned that lions have large territories here, that Grand Canyon's lions prey primarily on elk and that people affect lions more than lions affect people. Four lions in a five-year period were killed either in collisions with automobiles on park roadways or by legal hunting outside the park boundary. It was Eric's plan to educate the public about lion activity in order to decrease human-caused lion mortality. It is my hope now to ensure that Eric's message is communicated.

Eric was generous with his time and inclusive with his work. He shared his research findings with numerous park staff, from interpretation to law enforcement. He presented trainings and updates about his lion studies, as well as about other wildlife research, including bighorn sheep. With his help, thousands of visitors to Grand Canyon have been able to learn about the majestic mountain lion. As a volunteer on my days off, Eric encouraged me, and sent me out in the field using GPS data from the lions' collars to locate kill sites and collect data about lion prey. I maintained updates on the lion populations and research at the canyon. Eric allowed me to take an active role in lion research in the canyon, which made me a better park ranger. I will cherish these experiences throughout my life and career, and I am thankful for the two years I spent working with and for this inspirational biologist.

It is difficult to comprehend a loss of this magnitude. In losing Eric, we are all reminded of the fragility of life. Eric lived a full and rich life, although tragically it was much too short. His passion and dedication to wildlife will live on in the memories of all who knew him. We can't change the past, but we can affect the future. It is my hope and desire that we can all follow in Eric's footsteps by making contributions to better our world, by leading life to the fullest and by following our dreams.

Nature Notes

Nature Notes is published by Grand Canyon National Park in cooperation with the Grand Canyon Association. First published from 1925 to 1935 as a journal of research, nature observation and human experiences, *Nature Notes* is dedicated to the dissemination of cultural and natural history information and to the discussion of issues critical to interpretation and resource management at Grand Canyon. Submissions are encouraged and may be submitted to editor Tom Pittenger at the address below.

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