(Sojourns

summer/fall 08) **CELESTIAL ISSUE**

"If the Stars should appear one night in a thousand years, how would men believe and adore. . . . But every night come out these envoys of beauty, and light the universe with their admonishing smile."— RALPH WALDO EMERSON

A Place That Night Calls Home

A "natural lightscape" is a place or environment characterized by clean air, the natural rhythm of sun and moon cycles, and dark nights unperturbed by artificial light. Natural lightscapes are resources unto themselves, valued and protected in national parks of the West. Many animals depend on darkness in order to hunt, conceal their locations, navigate, or reproduce.

Plants also can be affected by artificial light. A tree growing beneath a bright streetlight, for example, will lose its leaves later in autumn than do other trees nearby. It is not only humans who need the restorative power of the dreaming hours for natural mending of the wear of the day. On the Colorado Plateau a rare confluence of altitude, aridity, and lightly inhabited spaces creates a home for night. Looking toward infinity we are dazzled by the sparkling universe.

AZTEC BUTTE, CANYONLANDS NATIONAL PARK, UTAH

Visitors in the House of the Sun

MICHAEL ENGELHARD

ON THE LONGEST DAY of the year the sun arcs across unblemished blue before the northern hemisphere swings back on its winter trajectory. Light knifes through a keyhole slit and onto Entrada Sandstone, where it focuses like radiant steel. Within seconds, the beam mutates into an arrowhead—razor-edged, notched, and tapered like a perfect triangle—that aims downward, at the head of a snake petroglyph. Skillfully rendered, the body flexes for more than thirty feet across the cliff face. Six dips and seven crests scroll into the shape of a 900-year-old reptile, adding up to the total of new moons in a year. The lightshow lasts about half a minute before the bright star hurries on.

FACING: This petroglyph at a southern Arizona site looks much like a comet, and appears with elements that may depict a portal and spirit figure. The composite image uses Comet Hale-Bopp to help imagine the possibilities. Photo by Frank Zullo.
TOP: Petrified Forest National Park, Arizona. NPS photo by Scott Williams.
BOTTOM: Cave of Life, summer solstice. Photo by Sam Hosler.

GREER CHESHER

On a Wing and a Prayer

Snowy egret in mid wingstroke.

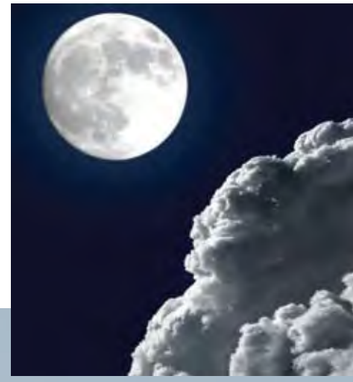
March 2008, Rockville, Utah

My calendar will not mark the spring

equinox for another week. Not till then will the ancient Puebloan red-rock clock upcanyon in Zion National Park make its annual tick as a coyotes's gnomon-cast shadow swallows a petroglyph sun. Although the official date has not arrived, spring's chores consume me as they did native and pioneer alike. I've a garden to plant, a pasture to till and reseed. As I pause in my yearly yard debriding, raking winter's dross from groundbreaking lilies, tulips, and irises, a tight arrowhead of Canada geese cuts its way north overhead, urgently oblivious to my vernal labors—but not to this canyon. Lying abed one cold morning last week, I'd heard them out beyond the house, quacking and burbling their satisfaction with the spring-full Virgin River. I imagined them there, wriggling their shapely butts, tasting the snowmelt waters, garrulous upon their return. And yesterday, in the barn, the unexpected cheeping of unseen rafter avians left me surprised at the sudden change.

Migration is nothing if not about change.

Changing seasons, changing locations, different foods, new families, fresh possibilities. But as much as migration is about change it is also about dependability, consistency, and endurance. A steadfast sort of change—the same change—year after year for millennia. Spring's timeless movement across latitudes must be redundantly, sustainingly, predictable: the frozen north must suddenly buzz with spring's tasty insect bloom, middle latitudes must burst with flowers, nectar, and the celebrated pulse of young bunnies, the nesting hawk's baby food.



Creatures from microorganisms to humans migrate, whether a few millimeters or thousands of miles. But what seems most apparent to us are the winged ones that flutter, swoop, honk, and glide past our windows on seasonal peregrinations. Every year millions of birds, bats, moths, dragonflies, and butterflies leave home with nothing but some extra body fat and an innate faith. Their hope and salvation is that what they need will be where they expect it when they arrive. As our world changes in unpredictable ways, as the very nature of change changes, I wonder how not only individual species, but also migration's precision clockwork will survive. Like Rachael Carson's Silent Spring, will there come a day when I no longer lean on my rake to the skyward honk of migrating geese? According to David Wilcove, Princeton professor of ecology and evolutionary biology and author of the book *No Way Home: The Decline of the World's Great Animal Migrations,* it's already happening.

This morning on my daily post-office walk, mourning doves cooed from leafless pecans, white-crowned sparrows tussled through shoulder-high sage, and near the old church, two male English house sparrows engaged in serious range-determining discussions—and none of them was here yesterday. Migration's miracles dazzle. Take, for example, the bird usually cited as the world's distance record holder. The Arctic tern travels 20,000 miles yearly on its near pole-to-pole flight. But scientists recently fitted electronic transmitters on migrating sooty shearwaters and doubled the record: these birds travel 40,000 miles annually. Why?

Scientists recently narrowed competing migration theories and determined that the primary drive to leave home springs from seasonal food scarcity. When food disappears, few choices remain: hibernate, migrate, or stay home and diet. Thus red-tailed hawks leave Canada for the Gulf Coast before snow buries their small-mammal prey; western bluebirds forsake Central America in March before their insect quarry fails in winter's oncoming cold. Birds that head north not only find more food, but double or triple their clutch size over Neotropical homebodies. Bats migrate or hibernate, or both, or neither. By August, most migratory bats are en route, but usually travel less than 300 miles. The bat distance record-holder, however, the Mexican (aka Brazilian) free-tailed bat resident throughout the Colorado Plateau, travels as far south as Mexico or Brazil, more than 4,000 miles.

Migrating animals anticipate seasonal change, leaving early enough to avoid starvation and stake out optimal northern nesting territories. Even before their departure, they stay ahead of the curve, preparing for the journey by accumulating fat. Blackpoll warblers, for example, who normally weigh eleven grams, double their body mass in days to ready themselves for their flight. Flying, more intense than walking or swimming, requires huge energy stores. Migrating bats lose about half a gram of their fourteen-gram body weight for every sixty miles they travel; thus travel must be accurate and efficient.

Every breath you take

Our family camped for a few nights last fall at Natural Bridges National Monument in southeast Utah. The end of the monsoon season made our canyon hikes green and muddy. In the evening, we watched silent, ghostly thunderstorms flickering over Monument Valley far to the south. Overhead, the Milky Way was a brilliant cloud, studded with sparkling constellations. It was the quintessential "park experience," connecting with the landscape. Heading home, we stopped at Muley Point, far above the famous Goosenecks of the San Juan River. I have always considered it one of the best views in the entire Colorado Plateau, have visited it many times over the years, and have even camped there now and again. But this was our sons' first visit, and I was disappointed. The spires of Monument Valley were easy to pick out, but they were flat and blue. The Mesa Verde country to the east was mostly hidden in a thin gauze of haze. As the air quality specialist at Grand Canyon National Park, I knew the source of the haze all too well. Tiny particles and droplets in the air had absorbed some of the lingering humidity from the fading monsoons. As morning sunlight ricocheted off these swollen "aerosols," it created a visual static in the scene, a sheer veil. I could still see landmarks more than sixty miles away, a range seldom reached in most parts of the country. But this was the Colorado Plateau, home to some of the clearest air left in the United States, and air pollution had yet managed to steal much of the color and texture from this spectacular panorama.

What the Colorado Plateau lacks in water, it makes up for in air—clean, invisible, life-sustaining air. Though it is free for the taking, it cannot be taken for granted.

Air pollution is not a new problem on the Colorado Plateau. When Woodrow Wilson signed "An Act to establish a National Park Service" in 1916, I doubt the phrase "to conserve the scenery" made him think of air pollution. Through the early twentieth century, most national parks were isolated from these kinds of "urban" problems, but as our population and our inclination to travel grew, this protective cocoon of empty space gradually unraveled. By the 1970s, an environmental movement had found traction, and a number of laws were passed to protect and improve our nation's environment: the National Environmental Policy Act, the Endangered Species Act, the Clean Water Act, and the Clean Air Act, to name a few. The Clean Air Act offers specific protection to large national parks and wilderness areas established by the year 1977 (called "class I Federal areas" in the act), protection that goes beyond that afforded by the 1916 National Park Service Organic Act. Only minimal increases in air pollution are allowed, and restoration of natural visibility levels is set as a national goal. Armed with new legal tools from the Clean Air Act, efforts to protect and improve air quality in national parks and wilderness areas have proceeded on many fronts.

Our first objective is to understand the problem. In scores of Class I areas, we collect data on air pollution. How much ozone is in the air? How many and what kinds of particulates? What kinds of haze-causing aerosols? What pollutants are in the rain and snow? How are pollution loads related to weather patterns? Working with the NPS Air Resources Division and other partners at Grand Canyon National Park, we collect about four million data points every year to document current conditions. Across the Colorado Plateau, parks from Arches to Zion are making similar measurements.

Of course, numbers in a database are just that, numbers. By themselves they don't clear the air. But through sophisticated computer analysis and modeling, they can show us where the problems are, and what the trends look like. For example, we find concentrations of ozone getting worse at Mesa Verde, Grand Canyon, and Canyonlands. Across the plateau, the clearest days are getting clearer, yet the haziest days at Petrified Forest are getting worse; and only in southeast Utah, at Arches, Canyonlands, and Natural Bridges, might they be improving. These detailed descriptions of current conditions and accurate representation of trends provide the kind of information that we can take to federal, tribal, and state air quality regulators—the institutions that issue the permits and write the rules governing who can emit how much, where, and when—to argue our case for cleansing the air. And then, there are the meetings—with regulators, industry, environmental groups, all levels of government, sometimes all together, sometimes one on one, trying to find common ground in pursuing our interrelated goals.

In our efforts to maintain clean air, forest fires are a major issue. Let's take a step back from the present, back about a century. At that time President Theodore Roosevelt was forging a systematic approach to managing our nation's resources by proclaiming national reserves, forests, and monuments across the west. His Progressive agenda was summed up by a phrase in the new U.S. Forest Service's mission statement as "the greatest good for the greatest number in the long run." Forest managers were debating the role of forest fires then as well as today. Were they a necessary part of the ecological system or a terrible waste of resources? In 1935, the forest service decided the issue by establishing its "10AM policy"—control all forest fires by ten o'clock in the morning of the day after they started.

Cloud World, 1925, Oil on Canvas, 34 x 62 inches, Private Collection

When the California-born artist Maynard Dixon first traveled to Arizona in 1900 he felt he was coming home. "Arizona—The magic name of a land bright and mysterious. . . Its sun was my sun; its ground was my ground."[1] Between sun and ground stretched a broad and luminous domain—the southwestern sky—that Dixon would embrace as a subject for the next half-century.

Cloud World: Maynard Dixon and the Western Sky

THOMAS BRENT SMITH

MAYNARD DIXON roamed the remote corners of the American West seeking the essence of its landscape and inhabitants. "I aim to interpret," he said, ". . . the poetry and pathos of the life of western people, seen amid a grandeur, sternness and loneliness of their country . . . . There is something of the West that sings in us—both of the life and of the country."[2] Expressing that "singing something" in paint became the artist's devotion. For him the Colorado Plateau was "A vast and lovely land . . . saturated with inexhaustible sunlight and astounding color, visible and unbelievable distinctiveness, and overspread with intense and infinite blue."[3] The region's confluence of natural and cultural inspiration provided all the elements he needed to grow, ultimately, into one of the West's most revered painters.

When Dixon first ventured into Arizona from his home in San Francisco he was seeking experience as much as a new subject. "In those days in Arizona being an artist was just something you had to endure—or be smart enough to explain why," he would recall. "It was incomprehensible that you were just out 'seeing the country.' If you were not working for the railroad,

Moonflower. Photo by Chris Conrad.

CHRIS CONRAD PORTFOLIO

Timeless Dance

Water is a fluid canvas;

the full moon a celestial paintbrush.

The earth, moon, and stars participate in a timeless dance—a dance that may be witnessed by patient observers beneath clear skies on dazzling nights. I became aware of this choreography almost by accident while photographing landscape features as they were reflected in transient waters of the desert Southwest. Hiking out of a dark canyon one evening, I noticed stars shimmering on the surface of a small pool. I gazed at them for some time, studying their reflections from various angles. A light breeze disturbed the water's surface and the stars jiggled with the waves. Might it be possible to capture this phenomenon on film?

Photographing the night sky as it reflects in pools turned out to be tricky. In addition to learning more about the moon and stars, it required a whole new set of technical skills. Because I use large-format cameras, I set up and focus my cameras in daylight, anticipating the celestial dance that will occur when darkness has fallen. When I pick a source of water to reflect the night sky, I have to know how the stars will arc across the sky, at what height or degree from the horizon they will show themselves, and how they will interact with the mirroring water.

Because the earth is constantly in motion, its relationship with the stars is constantly changing. Though these relationships are predictable, they vary considerably from night to night. I began taking compass bearings of specific constellations, and incorporating this information into a photographic composition. When I first noted Orion's location, for example, the constellation was in the southeast at 7:00 p.m. on a February evening. "Great!" I thought, "I've got the perfect south-facing composition for this spring!" Two months later, I set up my camera at a large, remote pothole, pre-exposing the film to build up shadow detail because this moonless night would provide no ambient light on the nearby rocks. When the sky was dark enough to expose the stars as they tracked across the southern sky, I had a terrible realization: Orion was no longer in the southeastern sky—it had drifted to the southwest and it was not reflecting in the pool at all! This was a hard lesson to learn, but it taught me that the night sky changes dramatically from one season to the next.

When photographing reflections of the moon, I must consider its arc from east to west, and also how high in the sky it will climb. At the latitudes of the Colorado Plateau, the full moon ranges from 80 degrees overhead in winter to about 30 degrees above the southern horizon in summer. This has a dramatic impact on how I can capture the moon's dance on water.

Weather also plays an important role. Thick clouds can completely obscure the stars and moon; thin clouds can greatly diffuse their light. Even on a clear night, wind can cause so much surface turbulence on the mirroring water that stars are illegible, while light winds can result in fantastic shapes, lines, and patterns. And because water can be solid, liquid, or vapor, it varies tremendously as a canvas. Especially when working with hours-long shutter speeds, water can change dramatically from the beginning of a composition to the end. Freezing conditions may dissolve the reflected stars, but ice can create amazing patterns on which the moon reflects. Smooth, flowing water may stretch and skew a reflection.

By slowing down, observing, and researching, I have been able to trace the choreography of the night sky. It continues to inspire me. On nights of the new moon, the dark skies of the Colorado Plateau dazzle with countless stars. Stopping to observe, we can watch the constellations slide timelessly from east to west, or the Big Dipper pivot slowly around Polaris. I watch in wonder as I record the dance.

Chris Conrad lives and works in Moab, Utah.