

ASLA LANDMARK AWARD

REFUGE FOUND

TWENTY-FIVE YEARS AGO, DESIGN WORKSHOP PLAYED A PIVOTAL ROLE IN THE REBIRTH OF ROCKY MOUNTAIN ARSENAL WILDLIFE REFUGE—A SPRAWLING SITE THAT CONTINUES TO THRIVE IN THE HANDS OF THE U.S. FISH & WILDLIFE SERVICE.

BY SCOTT KIRKWOOD

D. A. HORCHNER/DESIGN WORKSHOP



IT'S 8:55 A.M. ON A SUNDAY IN FEBRUARY, only 24 hours after a storm has dumped seven inches of snow on Denver. In spite of below-freezing temperatures, two dozen people are lined up outside the visitor center at Rocky Mountain Arsenal Wildlife Refuge, waiting for the doors to open. I've made the 15-minute drive just north of the city to meet two Denver Audubon volunteers, Hugh and Urling Kingery—retirees who witnessed the site's evolution from an abandoned chemical manufacturing plant to a premier destination for wildlife viewing. Although they're both worried that the newly fallen snow and cold temps have eliminated any chance of finding open water (and, therefore, any birds), we head to nearby Lake Ladora hoping for the best. In the next two hours, we'll see 38 gadwalls, five red-tailed hawks, three black-billed magpies, a great horned owl, a canvasback, a bufflehead, a bald eagle, and an American coot. I don't know how many of those species appear on the typical life list, but this first-time birder was impressed by the tally. And that doesn't include the

dozen bison, groups of white-tailed deer, and countless prairie dogs poking their heads through the snow.

From the perspective offered by a satellite map, Rocky Mountain Arsenal is a conspicuous, if unremarkable, 27 square miles of open space hemmed in by industrial sites to the west, housing to the south, and Denver International Airport to the east. Up close, however, it's a unique prairie landscape with occasional stands of cottonwood trees clustered near lakes and streams. But the occupants are what make it special: more than 100 bison, reintroduced in 2007; hundreds of black-footed ferrets, reintroduced in 2015; deer; coyote; and thousands of prairie dogs, who carve out tunnels that eventually house new residents, including those ferrets and burrowing owls. Bald eagles, ferruginous hawks, and other raptors come and go with the seasons, but with ample prey, their numbers have risen gradually over the years. (The human presence requires one aspect that's unusual for a wildlife refuge: A chain-link fence

U.S. FISH AND WILDLIFE SERVICE, REGION 6



DESIGN WORKSHOP

surrounds the property to keep bison and deer from wandering the streets of surrounding Commerce City.)

Between reminders to look to the treetops where eagles and hawks are likely to spy their prey, Hugh and Urling share memories of the past 20 years—leading double-decker bus tours before the site was designated a refuge and standing behind a chain-link fence as the first 16 bison were brought to the site. Signs of the arsenal's history are here, too. We see the former officers club, now reserved for occasional agency meetings and public events, its old swimming pool filled up decades ago. And we pass the Army Historic Trail, part of a 10-mile system of paths open for hiking, cross-country skiing, and snowshoeing.

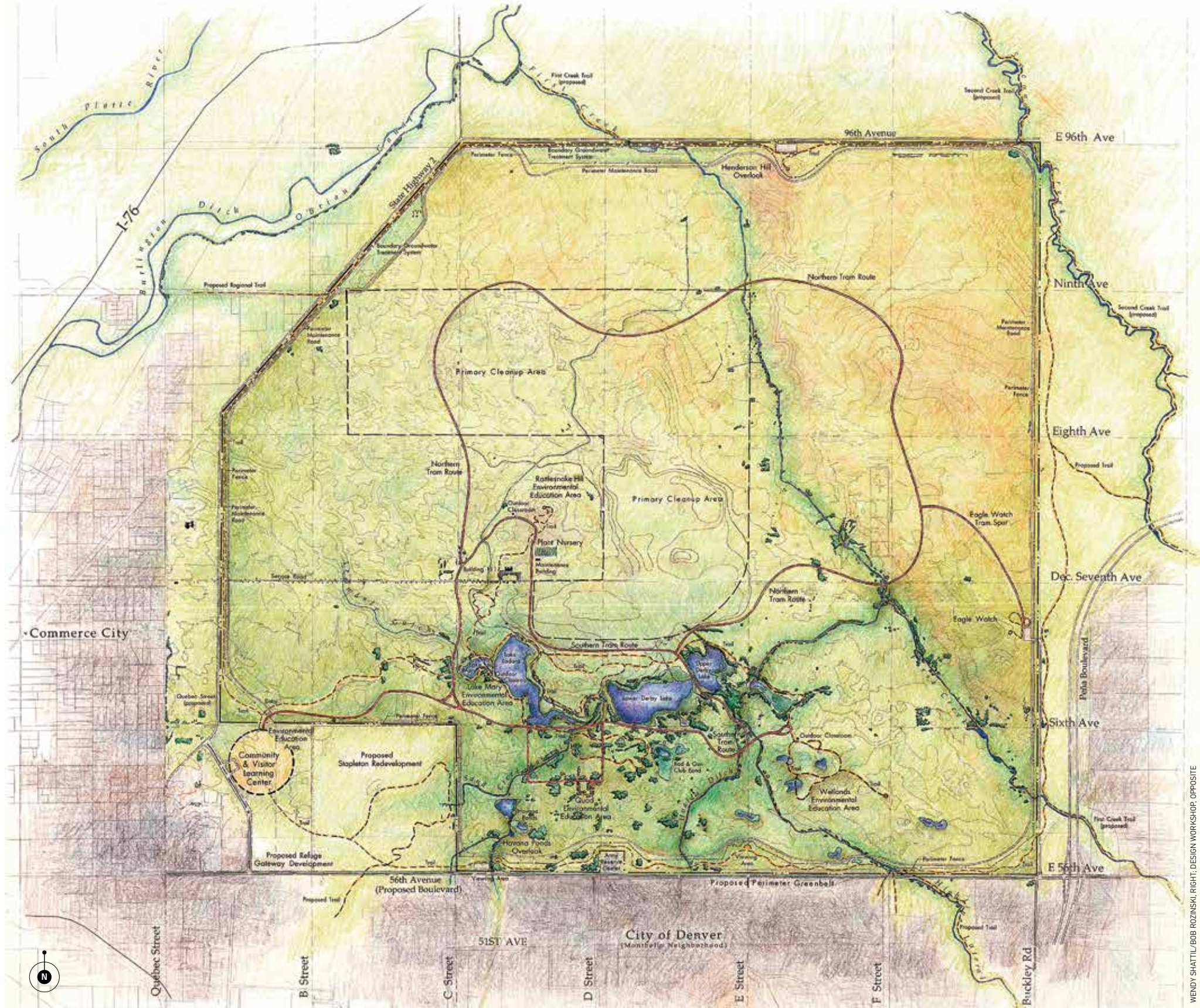
As soon as I moved to Denver, I started seeing the same image in the pages of *5280* magazine, the *Denver Post*, and my own Instagram feed: A handful of bison grazing on an open prairie with a

dozen skyscrapers in the background and the Rocky Mountains looming in the distance. A single frame that sandwiched an icon of the modern West between icons that defined the region for thousands of years. But with so many outdoor activities beckoning Coloradans—hiking, mountain biking, and rock climbing, not to mention the world's premier ski resorts—Rocky Mountain Arsenal Wildlife Refuge lingered at the bottom of my to-do list for years. And I certainly wasn't alone.

But that's changing. In 2011, the refuge hosted 23,000 visitors; that number leapt to 180,000 just two years later, and topped 450,000 last year. Most of them come to hike the trails, add one of 280 bird species to their life list, and drive the 11-mile wildlife drive for up-close views of bison that are rare outside Yellowstone and the Badlands. Last October, Rocky Mountain Arsenal received the 2018 ASLA Landmark Award, given to sites that have kept their design integrity for 15 to 50 years while contributing to the public realm.

ABOVE
Rocky Mountain Arsenal Wildlife Refuge is a pocket-sized prairie just a short drive from downtown Denver.

OPPOSITE
The refuge is open year-round, welcoming 10,000 visitors a week, even in the depths of winter.



BISON, BLACK-FOOTED FERRETS, DEER, COYOTE, AND THOUSANDS OF PRAIRIE DOGS.

ABOVE
Even during the arsenal's era as a chemical weapons plant, deer and prairie dogs were a constant presence, inhabiting a buffer zone that kept the public at a safe distance.

OPPOSITE
An early rendering of the site envisioned a tram route, which ultimately inspired an 11-mile wildlife drive where visitors can see herds of bison.

If you were to guess at the arsenal's history armed with nothing but its name, you might assume the wildlife-refuge designation was a convenient solution for a landscape destroyed beyond rehabilitation. But the wildlife had been here all along. They survived on the fringes of family farms when homesteaders turned prairies into pasture at the turn of the century. When the U.S. Army took over the land to manufacture mustard gas and other chemical weapons during World War II, wildlife quickly filled the surrounding buffer zone; prairie dogs no longer had to battle farmers, and red-tailed hawks discovered a landscape ripe with prey. After wartime production ebbed, the army leased the facilities to Shell Oil, which produced fertilizer, DDT, and other agricultural chemicals, but the buffer zone—and the wildlife—remained.

Shell ceased production in 1982, and cleanup efforts began two years later. It wasn't immediately clear what would come after those efforts concluded, but the discovery of a roost of bald eagles in 1986 triggered endangered-species protections,



opening the door for the U.S. Fish and Wildlife Service. In 1987, the Environmental Protection Agency listed the arsenal as a Superfund site, identifying nearly 600 different chemicals that would consume a \$2.1 billion environmental cleanup effort.

“When I arrived at the arsenal in 1987, it was a remarkable place,” says Pete Gober, one of the first employees of the Fish & Wildlife Service to work at the site full-time. “We’d see a ferruginous hawk kill a prairie dog, and in a matter of minutes, more hawks would dive in to get a piece of the prey, then a bald eagle would swoop in and take it for himself. Finally, a coyote would dash out from behind a bush to get any leftovers. It was a real prairie dog smorgasbord for so many predators, both avian and terrestrial.”

As the U.S. Army and Shell worried about their long-term liability for the site’s safety and threats of lawsuits swirled, the National Fish and Wildlife Foundation proposed the refuge model, putting the site under the purview of the Fish &

ABOVE
The U.S. Army established the arsenal in the months after Pearl Harbor. As military production ebbed, Shell Oil leased the facilities to produce fertilizer, DDT, and other agricultural chemicals.



LIBRARY OF CONGRESS

U.S. FISH AND WILDLIFE SERVICE REGION 6

RIGHT
The arsenal was one of the nation’s first Superfund sites, the focus of a \$2.1 billion environmental cleanup effort.

BELOW
Although Design Workshop had considered retaining some of the arsenal’s historical structures to tell the site’s story, contamination levels made that impossible.



RIGHT

Postcard images of Denver suggest the mountains are a stone's throw away, but in reality, the arsenal is one of the few natural landscapes within a 10-minute drive of the city's 700,000 residents.

Wildlife Service, making it a sanctuary for wild animals and a platform for environmental education. It was a solution that worked for everyone. In 1992, Congress enacted the Rocky Mountain Arsenal National Wildlife Refuge Act. Ironically, the organochlorine pesticides manufactured on the site were responsible for the decline of the bald eagle, the species that would help reclaim the site for wildlife. And without the history of chemical manufacturing, every acre would have certainly been developed long ago.

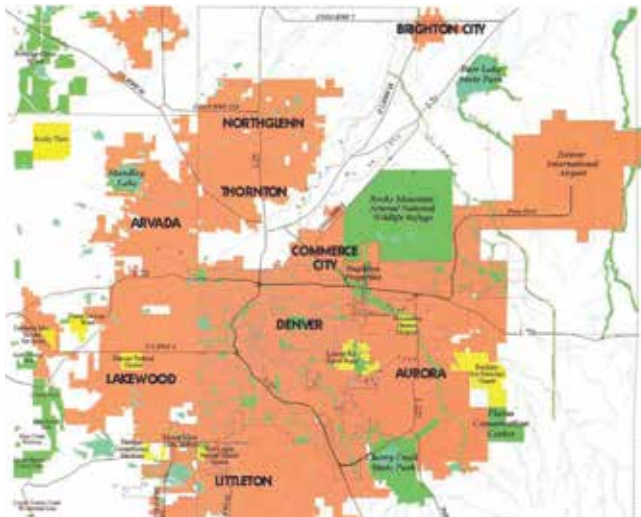
In 1994, the Fish & Wildlife Service hired Design Workshop's Aspen, Colorado, office to oversee the planning process, lead extensive public engagement, develop a comprehensive conservation plan, and see that plan through the environmental impact assessment process. The firm's analysis demonstrated distinct differences between the north and south portions of the site, including soils, vegetation, water, wildlife use, and historic land use including farmers' irrigation. As a result, the landscape was ultimately divided into three regions that are still recognizable to this day: a southwestern "partnership" zone, which would eventually house a visitor center; a southeastern "educational" zone, with ponds and lakes that required little cleanup, making it ideal for public-use trails; and the northern "restoration" zone, which required the highest levels of cleanup, and initially called for a tram to safely shuttle visitors across the landscape.

"Some of the early concepts for the site were heavy on the darker aspects of its history, including wartime manufacturing, whereas other people wanted to create a bucolic site that looked like nothing had happened at all, so there was a definite tension there," says Paul Cawood Hellmund, the project director for Design Workshop at the time, now the head of his own firm in Fort Collins. In the end, "bucolic" won out; a handful of old military structures remain, and the visitor center details the wartime history, but the landscape isn't home to any significant monuments. ↘



D. A. HIRCHNER/DESIGN WORKSHOP

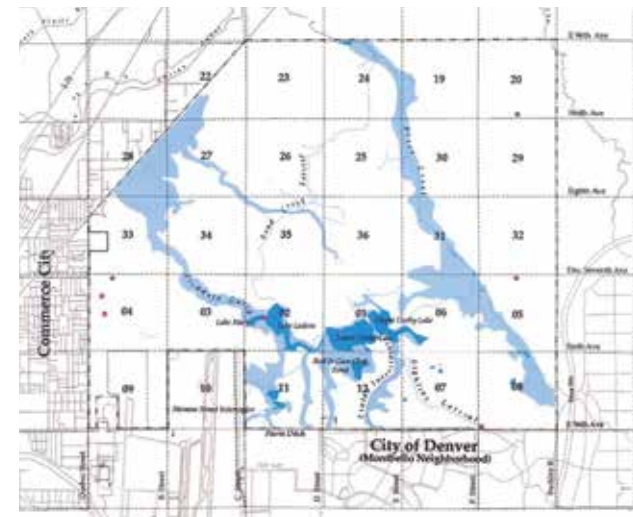
REGIONAL CONTEXT



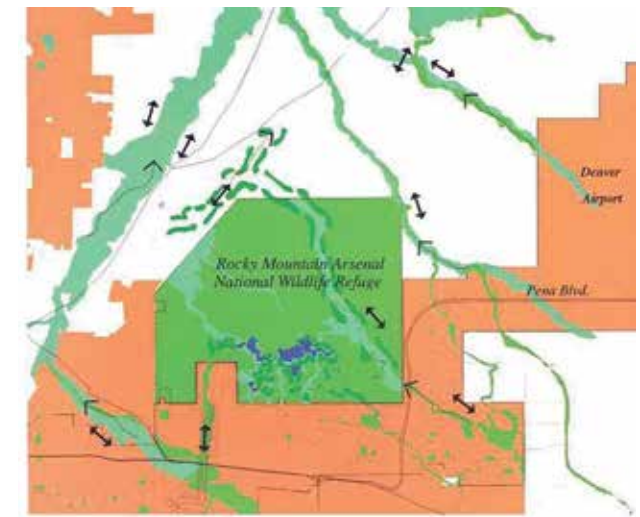
SOIL SERIES



WATER RESOURCES



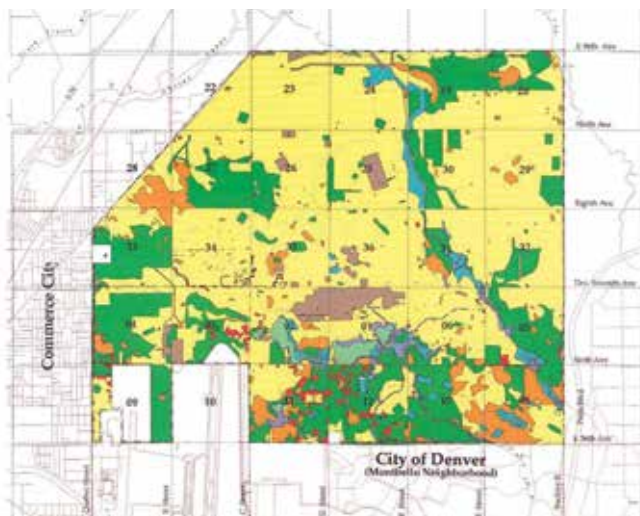
REGIONAL CONNECTIVITY



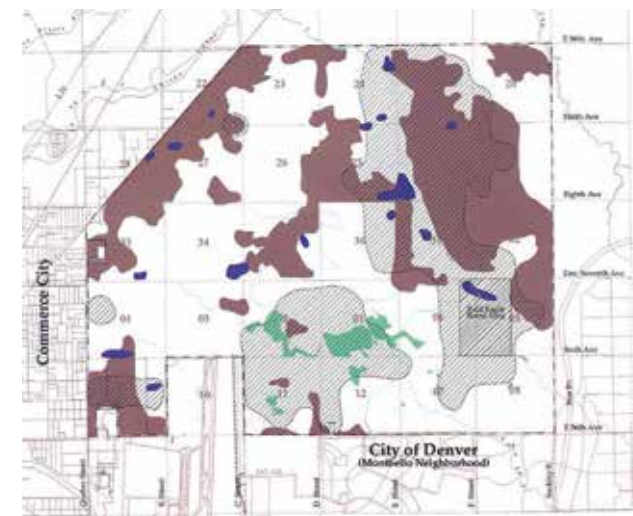
VEGETATION



VEGETATION DISTRIBUTION



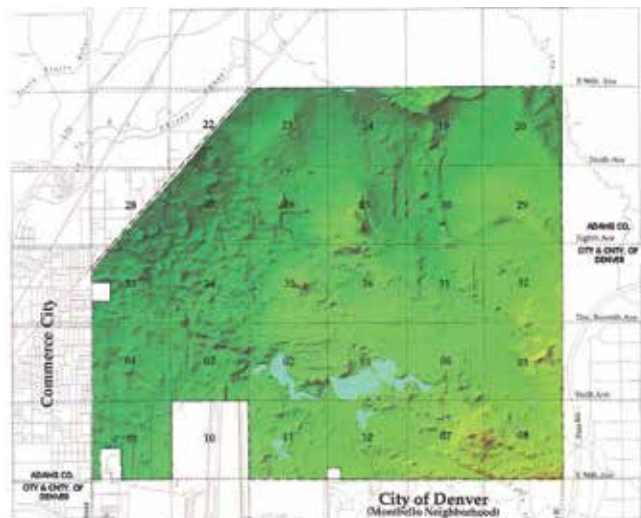
WILDLIFE HABITAT—WINTER



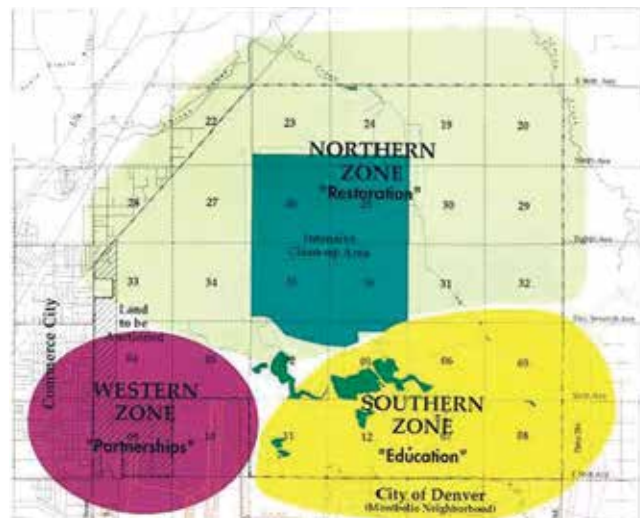
WILDLIFE HABITAT—SPRING/SUMMER/FALL



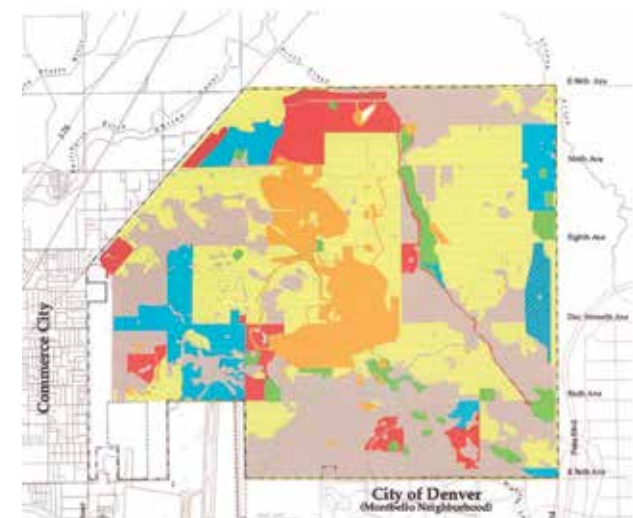
ELEVATION



PLANNING ZONES



HABITAT RESTORATION



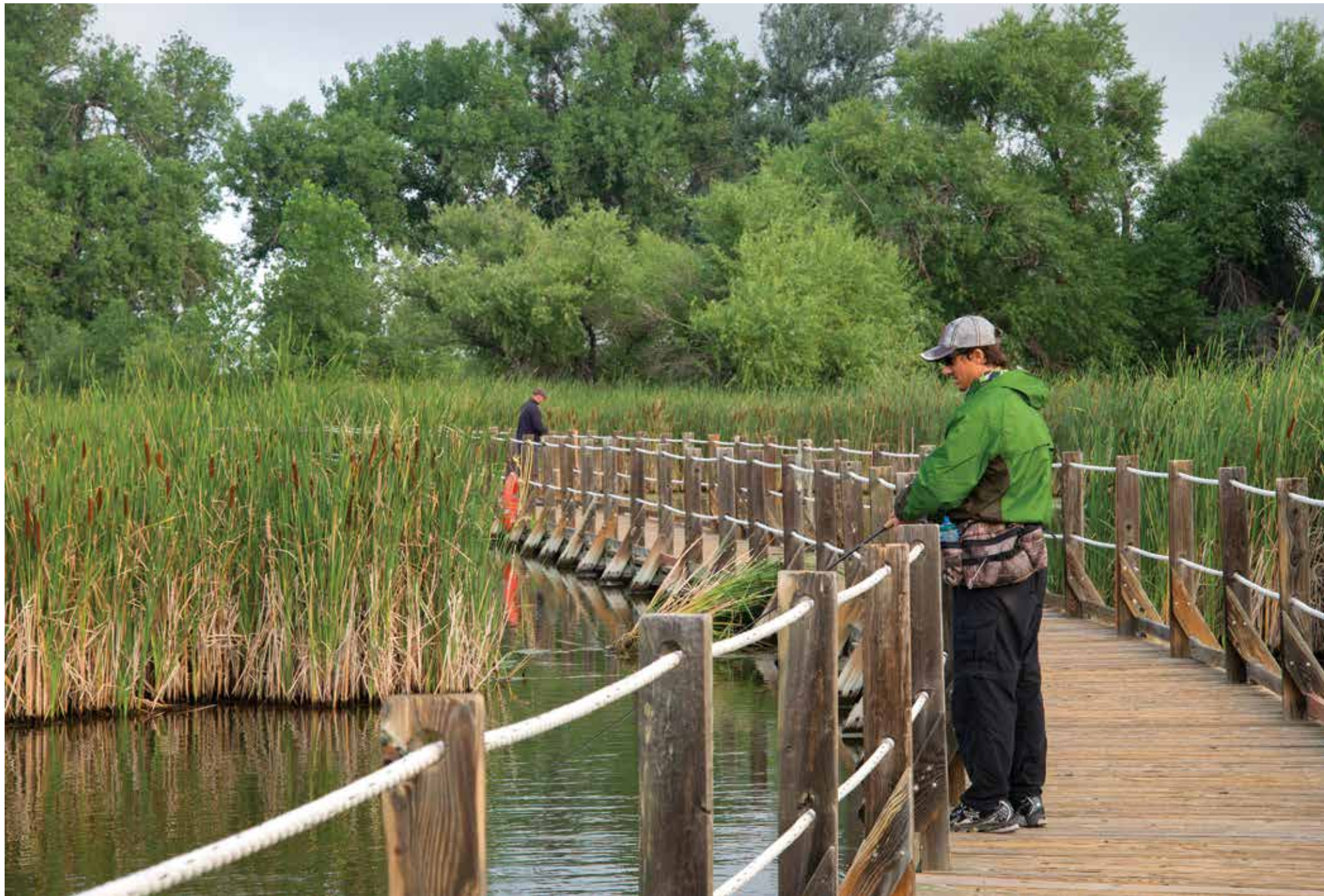
DEVELOPMENT PLAN



THIS SPREAD Design Workshop's environmental analysis suggested three distinct regions—a "partnership" zone ideal for a visitor center; an "educational" zone with ponds and lakes; and a northern "restoration" zone, which initially limited public presence owing to extensive cleanup.

U.S. FISH AND WILDLIFE SERVICE, REGION 6

THE PRAIRIE LANDSCAPE HAS EVOLVED WITH THE GRAZING OF LARGE MAMMALS.



D. A. HORNBERGER/DESIGN WORKSHOP, ABOVE AND OPPOSITE



→ “A project like this speaks to the importance of developing the planning skills and the design skills required of these complicated landscapes, but also the importance of political skills and community engagement skills required to make them successful,” says Kurt Culbertson, FASLA, the chairman and CEO of Design Workshop. “Rocky Mountain Arsenal demonstrates the importance of not simply responding to the design brief, but also being advocates for a positive outcome. It’s not always about you and a computer screen and a drafting table—sometimes it takes a lot more than that to make a project successful.”

ABOVE

A short stretch of the 10 miles of trails open year-round for hiking, cross-country skiing, and snowshoeing.

OPPOSITE

The refuge permits catch-and-release fishing at Lake Ladora, which features a floating boardwalk.

The arsenal opened to the public in 2004, and the former officers club was turned into a visitor center, but there were few visitors beyond occasional bus tours led by Audubon volunteers. A new visitor center designed by URS opened in May 2011—a building that featured solar arrays, ground-source heat pumps, cork flooring, beetle-kill wood, and recycled asphalt. Yet when David Lucas took on the role of refuge manager in 2013, he was greeted by staff members who had focused their entire careers on preserving the landscape behind the arsenal’s eight-foot fence, and who were struggling to manage the growing tide of visitors.



“As we worked toward our 2015 planning process, we started asking ourselves a few questions,” says Lucas. “How are we going to manage a million visitors a year while maintaining our core mission of wildlife first? How can we be more welcoming? How can we connect these future generations?”

Some of the quickest fixes involved simple infrastructure. People were ignoring signs, driving down roads that were closed to the public, so Lucas ordered the construction of 22 gates throughout the site. In 2016, an 11-mile wildlife drive was opened to the public, capitalizing on existing maintenance roads on the northern portion of the refuge. Rather than allow two-way traffic, the route would be designed as a one-way loop, making it easier for cars to pass one another during “bison jams” and

requiring 187 fewer road signs. To determine the direction of the traffic, employees drove the road with a GoPro camera, and quickly saw that a clockwise route would be dominated by a background full of industrial sites, whereas a counterclockwise route would show off the mountain range to the west.

Before Europeans arrived, most of the area was short- or mixed-grass prairie, which was easily converted to farming and grazing. Years after the manufacture of chemical weapons ended, the army planted crested wheatgrass, a nonnative grass suited to the climate. The Fish & Wildlife Service’s habitat management plan for the arsenal aims to restore prairie habitat, catering to indicator species such as grasshopper sparrows and lark buntings.

D. A. HORNBERGER/DESIGN WORKSHOP

ABOVE

When Europeans arrived in the region, they discovered open prairie was ideal for farming and grazing, and they created canals, ponds, and lakes to aid in irrigation.

Historically, grasslands would burn roughly every seven years, so the arsenal burns roughly 2,000 acres of land every year to reproduce those historical conditions. Staff and volunteers also remove weeds and nonnative plants with machetes, herbicides, and lawn mowers. Because drought conditions have gripped the region for several years, the arsenal employs the sort of portable sprinklers you might see irrigating fields of corn throughout the Midwest.

The prairie landscape also evolved with the grazing of large mammals—enter the bison. Introduced to the arsenal in 2007, each of the 180 bison consumes 20 to 30 pounds of grass a day, leaving behind fertilizer full of nitrogen, phosphorus, calcium, sulfur, and magnesium for microbes, plants, and other animals. Bison are limited to roughly 10,000 of the site’s 16,000 acres, and aren’t given access to restored land until grasses have thrived for five to seven years.

By 2028, Lucas and his team hope to reestablish a prairie landscape that looks a lot like what settlers would have seen here more than 100 years ago: 8,000 acres of mixed-grass prairie in parcels greater than 120 acres characterized by 50 to 90 percent grass cover, with a minimum of 30 percent mixed-grass species taller than a foot; 0 to 15 percent shrubs; and less than 20 percent bare ground to provide nesting habitat for Cassin’s sparrow and grasshopper sparrow and foraging habitat for Swainson’s hawk. The most common seed mix distributed over the landscape includes blue grama, buffalo grass, prairie sandreed, and little bluestem (*Bouteloua gracilis*, *Bouteloua dactyloides*, *Calamovilfa longifolia*, and *Schizachyrium scoparium*, respectively). In the early years, arsenal staff would find seed from similar ecosystems within 60 to 90 miles of the refuge. Now that some plants are more established, workers and volunteers collect seed from within the refuge itself.



THE ARSENAL BURNS 2,000 ACRES OF LAND EVERY YEAR.

“We’ve still got a lot of work to do, and it’ll take some time, but now we’re playing with 49 cards in our deck, and that’s making it much easier,” Lucas says. “We don’t need big commercial agricultural plows anymore, because we’re doing more small-scale projects. We can water a 50-acre field with our portable Fiat irrigator instead of running miles of pipe across 500 acres. And we’re thinking about returning some endangered plants that would’ve been too challenging 10 or 20 years ago.”

As the arsenal approaches historical conditions, the agency has increasingly turned to wildlife management. Of course, the refuge will never truly be “wild.” No one wants bison and deer running through city streets, so that chain-link fence isn’t going anywhere. But the arsenal contains roughly 3,500 acres of prime prairie dog habitat, which is also ideal for swift foxes, coyotes, and raptors. Burrowing owls and black-footed ferrets are intimately tied to the species, as they both make their homes in abandoned prairie dog tunnels.

Just as wild animals found a way to survive and thrive on the outskirts of chemical manufacturing facilities, the health of the prairie ecosystem means more species are returning of their own accord, including bobcats, wild turkeys, dozens of bird species, and 14 species of bats. Lucas hopes to reintroduce beavers in the next year or two, to restore natural water flow to the landscape.

“I believe that nature is better at doing our job than we are,” he says. “Often, we just need to put the pieces in the right place, get the hell out of the way, and let things play out naturally.” ●

SCOTT KIRKWOOD IS A FREELANCE WRITER IN DENVER.

OPPOSITE
Historically, prairie grasslands typically burned every seven years, so arsenal staff burn roughly 2,000 acres of land every year to reproduce those conditions.

D. A. HORNBERGER/DESIGN WORKSHOP