

# TREES WORTH TREASURING

**Montana's cottonwoods provide essential habitat for birds and other wildlife. But where rivers are altered, these iconic trees can struggle to regenerate.**

BY JULIE LUE

For the last 25 years, I've lived on a dry sagebrush ridge overlooking a ponderosa pine forest in Montana's Bitterroot Valley. Yet when I think of the state as a whole, I think not of pines but of cottonwoods—especially those corridors of trees, known as gallery forests, that grow along all our major waterways, marking the riparian lifelines that stretch from mountains to plains.

After a long winter, there's no more welcome sight than that first green-up along a Montana river, when cottonwood buds shed their sticky husks to reveal leaves as soft as lettuce. And there's nothing prettier in fall than a broad river valley seamed by cottonwood forests glowing yellow and gold, their foliage transforming even long, lonesome stretches of interstate into scenic byways.

Cottonwood galleries also offer a reassuring presence, especially in arid country.

They orient us to the landscape, telling us where the river is or used to be. They lead us to water, shade, fish, and a huge diversity of birds and other animals. These forests are a sign of a place that can sustain life.

Unfortunately, many cottonwood stands are struggling to sustain themselves. Over millennia, the trees have adapted their reproduction strategies to wild rivers with natural variations in seasonal flow. But where rivers and riparian areas have changed—whether from storage dams and water management, other stream alterations, development, or invasive species—they are less able to provide the conditions cottonwoods need to establish new generations.

As older trees die, there often aren't enough younger trees coming up to replace them—not enough seedlings, saplings, or middle-aged trees to help perpetuate some of our most vital and productive wildlife habitats.

## A BOON FOR BIRDS

From frogs to flying squirrels, a huge variety of animals use riparian (streamside) areas, which in much of western North America are dominated by cottonwoods.

But walk through a cottonwood forest in spring and the first sound you're likely to notice is birdsong. Though riparian areas cover less than 4 percent of the state, 85 percent of Montana birds depend on them during critical parts of their life cycles such as nesting and migration.

"Cottonwood habitats—and riparian systems in general—are immensely important for breeding birds," says Bo Crees, an avian specialist for the Montana Natural Heritage Program and Montana Audubon.

Cottonwoods' tremendous value to birds and other wildlife stems in part from their susceptibility to the fungal disease "heart rot." These fast-growing trees tend to only live around 100 years (though one cottonwood in North Dakota dates back to 1641), often decaying slowly from within. Crees, who floats 150 to 400 miles of the Missouri and Madison rivers every two years while doing bird surveys, says it's not uncommon to hear large limbs or trees fall. "All of a sudden there's this huge crash behind you and you think you're about to get whacked."

Woodpeckers excavate holes in dead trees or dying parts of live trees, chiseling cavities that can be used later by roosting bats or by nesting birds like chickadees, screech owls, kestrels, and wood ducks.

On the plains, cottonwoods are often the

*A frequent contributor, Julie Lue writes from Florence in the Bitterroot Valley.*



**GREEN GALLERIA** The gallery forests of mature cottonwoods gracing Montana's river corridors are lush oases for birds and other wildlife. Yet these areas often lack younger age classes that will replace older, dying trees and maintain these valuable natural assets over time. PHOTO BY JACOB LILLEY



Lewis's woodpeckers



only trees that can support the heavy nests of bald eagles and great blue herons.

The herons, which are a state “species of concern,” vastly favor mature cottonwoods for their nesting colonies.

Crees uses aerial and satellite imagery to “fly” above hundreds of miles of Montana rivers as part of a project to map great blue heron rookeries, looking for groups of nests that appear as clusters of tiny blobs in the treetops. Comparing aerial photos from different years, he is also able to track cottonwood loss, which affects not just herons but countless nesting songbirds.

“It’s really interesting to toggle back and forth between years and see the dramatic difference,” he says. Sometimes many acres of trees or entire rookeries disappear from one year to the next, due to development, agricultural conversion, and other transformations. Flooding can also remove cottonwoods, but it’s the one force that can give back as much as it takes out.



**ROOK STARS** Cottonwood stands attract great blue herons (above) looking to build communal nesting colonies known as rookeries (top). These are often the only trees on the open plains strong enough to support herons’ hefty nests. Great blues are a state “species of concern” due largely to the lack of cottonwood regeneration along many Montana rivers.

### RAISING THE BARS

A mature female cottonwood can produce millions of short-lived, golden-brown seeds each year, releasing them in late spring and early summer in a blizzard of silky white puffs set adrift on wind or water.

Yet those millions of seeds may not produce a single seedling or sapling, much less a tree that survives to maturity, if they don’t land on the proper seedbed. To germinate, cottonwood seeds need bare, moist soil in full sun. Then for longer-term survival, young trees need to grow close enough to the river to receive adequate moisture but also far enough above it to avoid getting blasted by high water or ice jams.

Similar to aspens, larch, and lodgepoles, cottonwoods are a pioneer species that takes full advantage of disturbance. It’s no accident they shed their seeds to the wind right

when rivers usually flood.

“If you want to track where cottonwoods are going to appear successfully on the landscape, look for freshly deposited sandbars,” says Dr. Michael L. Scott, a retired U.S. Geological Survey (USGS) research ecologist who has spent decades studying cottonwoods along the Missouri River and throughout the West. “If you eliminate the conditions that create sandbars—basically, large flows that erode, transport, and deposit sediment—you’re going to limit natural cottonwood reproduction.”

According to Scott, “Flows of 50,000 cubic feet per second account for about 70 percent of the cottonwoods along the Missouri below Fort Benton.” But peak flows are now smaller by about 20 percent and less frequent, he says, with large storage dams and the changing climate playing a role.

Before dams, Missouri River flows reached 50,000 cubic feet per second or more about every 9 years at Fort Benton, where records date back to the late 1800s. But since dams have controlled the flow, the Missouri has reached this level just once every 17 years. “This has reduced the river’s ability to create suitable establishment sites for cottonwood,” Scott says.

And where we lose cottonwoods, says Torrey Ritter, an FWP nongame biologist based in Missoula, “We lose a lot of birds, a lot of fishing. We lose water storage. We lose water purification.”

### A RIVERBANK DELICACY

Montana has three distinct species of cottonwood—black, eastern (aka plains), and narrowleaf—as well as a hybrid of narrowleaf and plains called lanceleaf.



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None are in danger of extinction, but the habitats they dominate are in peril.

In June 2022, historic flooding on the Yellowstone, the longest free-flowing river in the United States, reshaped the floodplain across a broad swath of Montana. Soon afterward, “point bars and inside bends were just loaded with little cottonwoods,” says Bryan Giordano, an FWP fisheries biologist based in Billings. In 50 to 70 years, these point bars—low, curved ridges of sand and gravel deposited by floods along the inner bank of a meandering river—may host mature cottonwood forests that help prevent future bank erosion. But those seedlings and saplings face a long and precarious path to maturity.

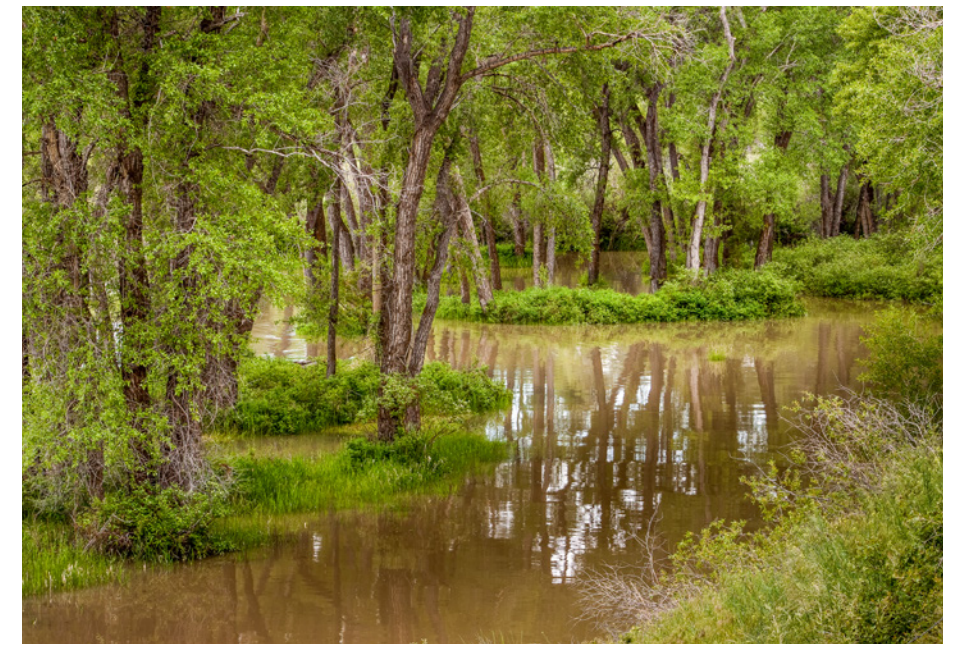
Like aspens, sprouting cottonwoods are a protein-rich delicacy for deer, elk, cattle, and other grazers. They’re also far more palatable than competing invasive species such as Russian olive, salt cedar, and common buckthorn. To give cottonwoods a temporary boost, habitat managers sometimes place fencing around stands of young trees until they grow tall enough to survive the extra attention—or entire riparian corridors to keep cattle away from the river bottom, instead providing stock tanks or other supplemental water sources on higher ground.

“As cottonwoods are maturing, periodic, short-term controlled grazing can actually be beneficial if it’s an area that’s been fenced off for a long time, but they can’t handle cattle just hanging out all the time along the river,” says Jeannette Blank, program director for Montana Freshwater Partners, a nonprofit organization in Livingston dedicated to stream and wetland restoration.

Along the Yellowstone River near Emigrant, landowner Jeff Reed witnessed a flurry of cottonwood regrowth after his ponds flooded in 2022. He recommends that to protect young trees from deer, “any time you get regrowth, fence it. If it’s open



**FOUNTAINS OF YOUTH** Living up to their name, cottonwoods fill the late-spring air along river corridors with fuzzy seeds just as high water is receding—strategic timing to cover freshly deposited sandbars in thickets of young trees (above). If that soil stays moist and the trees can survive beavers and over-browsing, some may grow into massive pillars. Below: Cottonwoods are one of very few trees that can survive having their trunks buried in sediment.



CLOCKWISE FROM TOP LEFT: LEA FRYE/LINNET LONG; ELIZABETH MOORE

FROM TOP: NATHAN COOPER; DEE LINNELL BLANK

# How Flooding Creates Cottonwood Forests



- 1** In spring, high water from mountain snowmelt raises river levels. Muddy from erosion, the water also floods low areas, called “floodplains,” next to river channels.
- 2** Flooded floodplains create wetlands, channels, and pools—habitat for frogs, shorebirds, and waterfowl.
- 3** Standing water seeps down and recharges groundwater. Underground microbes purify the water.
- 4** In June or July, cottonwood seeds float through the air. The “cotton” carries the seeds in the wind and on the water surface.

- 5** When seeds land in moist silt and gravel left by floodwaters, they take root. Cottonwood seeds can germinate only in moist areas exposed to sunlight.
- 6** Key plants that wildlife eat also grow on these bare, moist soils, including goldenrod, milkweed, snowberry, and others.
- 7** Thick stands of “doghair” cottonwood saplings produce twigs and leaves eaten by deer. Beavers feed on the bark and twigs of all ages of cottonwood.
- 8** Migrating birds moving along the river corridor feed on insects and rest on cottonwood branches. Other birds nest in the branches.

- 9** Large cottonwoods are often the only trees big enough to hold the heavy nests of eagles and great blue herons.
- 10** Shade from tall trees keeps water temperatures cool and allows shade-dependent shrubs like chokecherry and Wood’s rose to grow. Roots anchor soil.
- 11** When old cottonwoods die, the dead standing trees, called snags, provide habitat for many cavity-dwelling species including woodpeckers, wood ducks, chickadees, bats, squirrels, and owls.
- 12** Morels grow under dead or dying cottonwoods.

- 13** The dead “rottenwood” attracts ants and beetles that many birds eat.
- 14** Eventually, dead cottonwoods topple. Ospreys may build a nest on the broken top. The fallen logs provide habitat for amphibians, rodents, and small predators like shrews and mink.
- 15** When floodwaters return, they wash logs and branches into the river. This creates underwater logjams that provide fish habitat—and better fishing.
- 16** Sediment builds behind logjams, forming sandbars where new cottonwood stands grow. ■

ILLUSTRATION BY LIZ BRADFORD

and grassy and there are seedlings, they're gone.”

Beavers also gnaw down cottonwood trees for food or building material, a natural behavior that presents problems where trees are sparse and natural regeneration is limited. Reed says he allows beavers to take down some of his old cottonwoods—which may die soon anyway—and focuses on protecting middle-aged trees.

He also leaves dead cottonwood trunks and logs deposited by floods. When washed back into the river by future high water, this dead wood can help create superb fish habitat.



**FALLEN ANGELS** Cottonwoods provide habitat even after they collapse into rivers. Boaters might not appreciate these “sweepers,” but they slow the flow and improve fish habitat.

#### HARDENING OF THE ARTERIES

Healthy rivers have a much larger footprint than the water we see flowing past us from the banks. Water is also flowing through the soil beneath our feet, out across the floodplain, and even beyond it. The more space a river has to wander freely and slow its flow in lazy oxbows, the more time it has to recharge the local aquifer. This in turn helps maintain flows once snow has melted off from the high country.

Yet many rivers in Montana have been straightened and riprapped to make room for crops, housing developments, roads, and other human uses, to the detriment of riparian areas and cottonwood regeneration. Once a river hits major flood stage, these modifications can worsen flooding for everyone downstream by increasing the rate and volume of water that would have been slowed and partially absorbed on a healthy meandering river.

“A straightened, riprapped river becomes like a massive fire hose blasting water downstream,” Ritter says. Some landowners also clear out shrubs and dead wood in an attempt to create a “park-like” setting, retaining only the large living trees. This can lead to unintended consequences when the river tops its banks.

“The floodplain’s ability to dissipate energy is being cleared away,” says Ritter. “Now when the river gets up on these flat surfaces, there’s no dead wood or shrubs or anything to slow it down.”

Kept in their more complex, natural state, riparian habitats provide better cover, shade, and food for birds, mammals, and fish—the very things that often attract people to live by the river in the first place.

“In a lot of streams and rivers, fish will get their food from what’s called allochthonous sources, which means from outside the river,” says David Schmetterling, FWP’s recently retired native fisheries research coordinator in Missoula. “When you see a thick tangle of rose and dogwood

and hawthorn and chokecherry and logs on the banks, you can just imagine how it’s alive with insects and small mammals and other things that may drop to become fish food.”

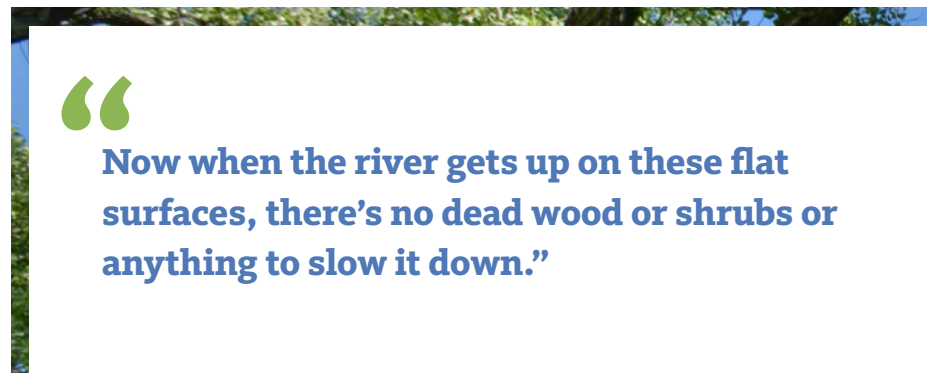
Cottonwoods and other trees that fall into rivers and streams slow the flow and create pools and logjams. In turn, logjams keep the river channel on the move and hold back sediments to create sandbars where baby cottonwoods can grow. South of Missoula on the Bitterroot River, “A lot of regeneration we see is behind these logjams or even just big trees out in the middle of cobble islands and sandbars,” Ritter says.

#### BACK TO THE FUTURE

Conserving Montana’s magnificent cottonwood stands may require a shift in perception about what healthy riparian habitat looks like, says Kristina Smucker, FWP nongame wildlife bureau chief in Helena.

“I’m hoping that with education and outreach, we can convince landowners to keep snags that aren’t a danger to people or structures, and allow shrubs and downed debris to stay put for wildlife habitat,” she says. If landowners give a river space by providing a natural vegetated buffer, Smucker adds, “the diversity of birds and critters they’ll find will be so much richer.”

Rivers with large storage dams like the Missouri offer a special challenge. Using



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**Now when the river gets up on these flat surfaces, there’s no dead wood or shrubs or anything to slow it down.”**

STEVEN AKRE

## Cottonwoods in Crisis

Before they will sprout, cottonwood seeds need bare, moist, silty soil in full sunlight. Historically, these conditions prevailed each spring when high water in Montana rivers spilled over banks and inundated adjacent floodplains. But that flooding has declined over the past century, leaving few young trees to replace the dying old stands of cottonwoods still seen along rivers.

Actions by homeowners, livestock growers, land and water managers, government agencies, and others can all help maintain healthy rivers and healthy cottonwood forests into the future.

Here are some of the problems cottonwoods face, along with proven solutions.

► **PROBLEM:** Roaming livestock can overgraze cottonwood saplings and degrade riverbanks and floodplains through trampling and soil compaction.

► **SOLUTION:** Manage livestock access with fencing, off-stream water sources, and rotational grazing to protect riverbanks and allow cottonwoods to regenerate.



► **PROBLEM:** Deer and beavers feed on young cottonwoods, preventing many saplings from ever reaching maturity.

► **SOLUTION:** Protect young cottonwoods with fencing or tree guards and replant if possible to ensure a steady supply of future trees.



► **PROBLEM:** Landowners install riprap and other bank armoring, preventing floodwaters from reaching floodplains and limiting cottonwood regeneration.

► **SOLUTION:** Avoid building in floodplains or too close to rivers, and avoid riprap by instead using natural bank stabilization methods that allow floodplain connection.



► **PROBLEM:** Invasive species like Russian olive outcompete native cottonwoods for water, light, and space, limiting regeneration.

► **SOLUTION:** Remove invasive trees and replace them with native cottonwoods and willows to restore healthy riparian forests.



► **PROBLEM:** Homeowners remove snags, downed trees, and underbrush to create “park-like” settings, eliminating habitat and disrupting natural river processes.

► **SOLUTION:** Retain woody debris and native vegetation, including snags that don’t pose a threat to people or property, along riverbanks and in floodplains to support habitat and ecosystem function.



► **PROBLEM:** River straightening and floodplain development disconnect rivers from their floodplains—speeding up flows, worsening downstream flooding, and limiting the slower, sediment-rich conditions cottonwoods need to regenerate.

► **SOLUTION:** Restore river-floodplain connections where feasible by allowing rivers to meander, limiting floodplain development, and focusing on projects that mimic natural flow and channel patterns.



► **PROBLEM:** Hydropower dams hold back high spring flows that once flooded floodplains and carried silt for cottonwood seed germination.

► **SOLUTION:** Create temporary, controlled spring pulse flows from hydropower dams that mimic historical flood events to create sandbars where cottonwoods can potentially become established. ■

FROM TOP: DEE LINNELL/BLANK; PAUL OUENEAU; DAN OLDENBURG; CRAIG LARCOM; STEVEN AKRE; CRAIG & LIZ LARCOM; JEREMIE HOLLMAN



carefully managed dam releases to benefit cottonwoods in years of ample spring runoff has been discussed for decades. But with so many competing interests and uses along the river, carrying out brief “pulse floods” of adequate magnitude has proved difficult.

“We’re so constrained along these large rivers with water management and dams,” Smucker says. “It’s really going to take creativity to find the opportunities and the places to engineer things that we would have historically counted on floods to do.”

Before Euro-American settlement, Indigenous people “basically learned to live with the wild river, which required them to only use the floodplain seasonally,” says Scott, the retired USGS research ecologist. “They would build their villages on higher ground because they knew the river was going to flood. But we have modified our rivers to serve our purposes rather than adapt. We want to tame the river, but we want all the amenities that the wild river had, and you really can’t do both at the scale of the entire river.”

While human efforts can’t match the restorative effects of a flood, people along the Missouri River have stepped in to help. The Friends of the Missouri Breaks Monument in partnership with the Bureau of Land Management have planted and tended hundreds of cottonwoods on the river’s Wild and Scenic stretch, which includes the famed White Cliffs.

This challenging project has been helped by recreational boaters lugging buckets of water to the young trees.

Northwestern Energy operates 11 hydroelectric dams on the Missouri and Madison rivers. Grant Grisak, a biologist

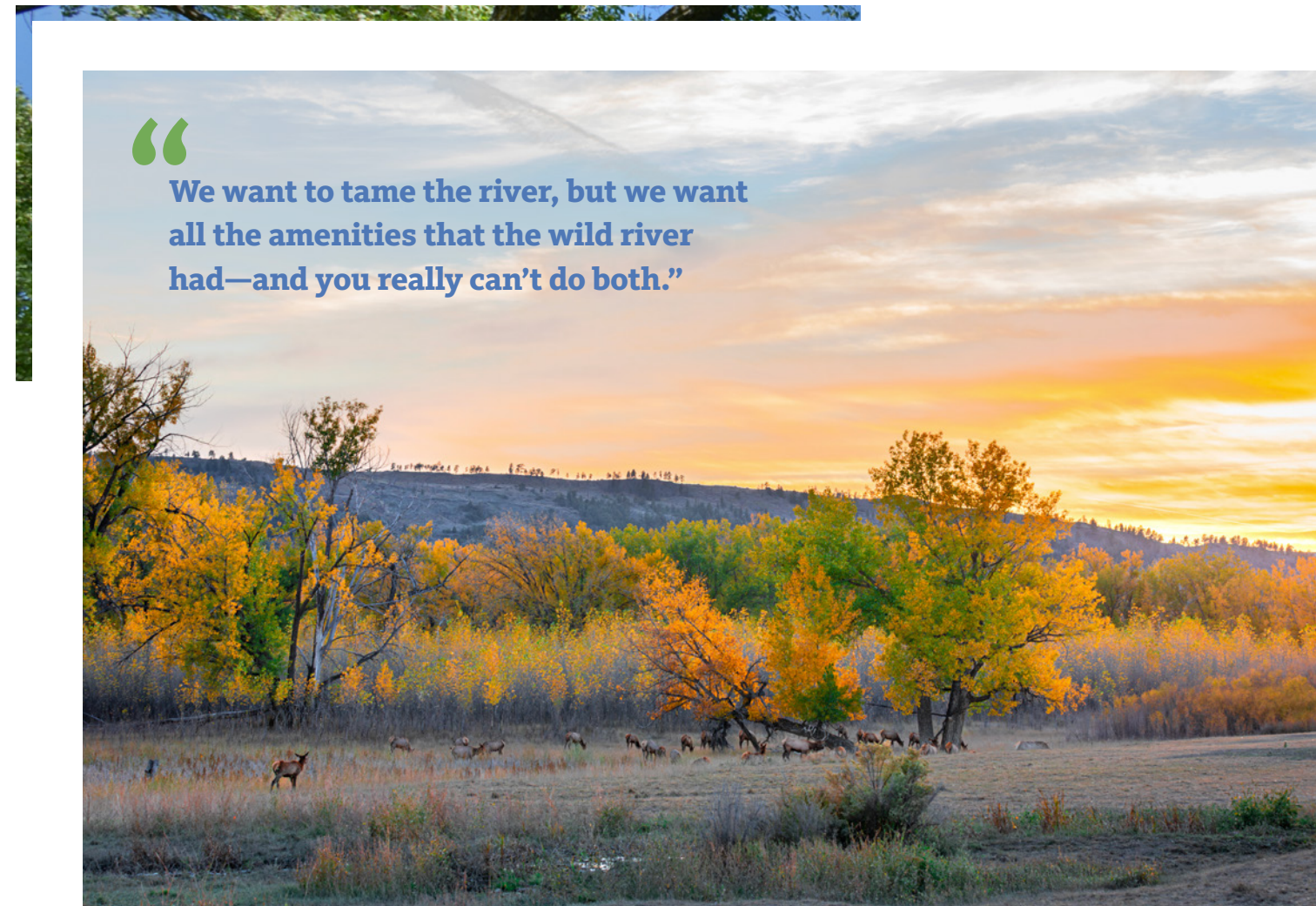


**LOFTY SHELTERS** Cottonwoods provide otherwise hard-to-find shade (above and top left) across the wide-open plains of Montana. Because many trees suffer a fungal disease known as “heart rot,” they also provide cavities that many birds and wildlife such as black bears and raccoons (top right) use for shelter.

for the utility, is experimenting with larger-scale plantings of 4 to 11 acres set back from the river to help avoid beavers. Expected to mature over the next 50 to 75 years, the plots are protected by fencing and watered by drip irrigation until trees establish enough root mass to survive on their own. Grisak, who previously worked as a fisheries biologist for FWP on the pallid sturgeon project, says this type of restoration

challenges biologists like him “to look beyond our own careers.”

Tom Philp of Winifred also takes the long view. After working in ranching and construction, he’s spent the past 16 years operating the McClelland-Stafford Ferry, which has shuttled travelers across the Missouri River for more than a century. “I can talk about cottonwoods all day,” Philp says. He has so far planted and tended to 15 trees



“We want to tame the river, but we want all the amenities that the wild river had—and you really can’t do both.”

**SO MUCH TO LOVE** Conservation work by volunteers plays an integral role in helping cottonwoods regenerate. Erecting fences around young trees (bottom right) protects them until they are mature enough to survive browsing by cattle, deer, and elk (above).

at the ferry launch, some now taller than the house where he and the other ferry operator stay. He also fenced off two naturally growing saplings to protect them from beavers and cattle. “They lasted one year,” Philp says, before an ice jam came through and bulldozed everything down, including a large metal post that tethers the ferry.

Now in his late 70s, Philp takes pride in helping promote healthy populations of cottonwoods. “I’m like that old saying,” he says. “I’m the man who plants trees I’ll never sit under.”

And like the 400-year-old cottonwood in North Dakota that cast shade over herds of bison a century before the Corps of Discovery came up the Missouri, these trees provide both a link to the past and a way to share hope for the future. 🐻



CLOCKWISE FROM TOP LEFT: CHUCK HANEY; PAUL QUENEAU; CHUCK HANEY

FROM TOP: JOSHUA RUTLEDGE; FRIENDS OF THE MISSOURI RIVER BREAKS MONUMENT