

Great Rivers of the West: COLORADO



ERIC ANESTAD



WESTERN RIVERS
CONSERVANCY

Report prepared by Tim Palmer and Ann Vileisis



TIM PALMER

Yampa River. Cover: Gunnison River.

Letter from the President

Rivers are the great treasury of biological diversity in the western United States. As evidence mounts that climate is changing even faster than we feared, it becomes essential that we create sanctuaries on our best, most natural rivers that will harbor viable populations of at-risk species—not only charismatic species like salmon, but a broad range of aquatic and terrestrial species.



That is what we do at Western Rivers Conservancy. We buy land to create sanctuaries along the most outstanding rivers in the West – places where fish, wildlife and people can flourish.

With a talented team in place, combining more than 150 years of land acquisition experience and offices in Oregon, Colorado, California, and Washington, Western Rivers Conservancy is well positioned to fulfill its mission in 11 western states.

Yet if we are to conserve the great rivers of the West, we need to know which rivers these are. To develop an inventory of the highest quality rivers, we turned to Tim Palmer—a noted author and photographer with 35 years of experience exploring hundreds of streams throughout the West.

The principal goal of the survey was to develop a list of the most outstanding natural rivers—the great rivers of the West. Criteria included free-flowing length, natural flow regime, water quality, biological health and habitat, ecological and regional diversity and recreational suitability, among other attributes. A committee of

noted scientists and other experts reviewed the survey design, and state-specific experts reviewed the results for each state.

The result is a state-by-state list of more than 250 of the West's outstanding streams, some protected, some still vulnerable. The Great Rivers of the West is a new type of inventory to serve the modern needs of river conservation—a list that Western Rivers Conservancy can use to strategically inform its work.

This is one of 11 state chapters in the report. Also available are a summary of the entire report, as well as the full report text.

With the right tools in hand, Western Rivers Conservancy is seizing once-in-a-lifetime opportunities to acquire and protect precious streamside lands on some of America's finest rivers.

This is a time when investment in conservation can yield huge dividends for the future. We invite you to join forces with us as we work to buy and conserve high-quality lands on the Great Rivers of the West. Please visit our website at www.westernrivers.org, or you may contact me at sdoroff@westernrivers.org or 503-241-0151 to learn more.

For Our Rivers,

A handwritten signature in blue ink, appearing to read 'Sue Doroff'. The signature is stylized with loops and a long horizontal stroke at the end.

Sue Doroff
President

Introduction

Great Land, Great Rivers

Rivers and streams may be the most valuable of all natural resources in the western United States. They provide for a wide range of human needs—everything from drinking water and recreation to hydroelectricity and agriculture. At the same time, they offer crucial habitat and migration routes for fish and wildlife—often in otherwise arid landscapes. Even more fundamentally, they sustain vital natural processes—the hydrologic cycle, the flow of groundwater, and the growth of forests—that nourish all of life.

An extraordinary network of rivers flows from mountaintops to deserts, lowlands, and seashores. Among thousands of streams, several hundred remain as exemplary natural waterways.

Bound for the Pacific Ocean, rivers of the coastal states flow through remarkably varied terrain—from high elevations to sea level, and through drylands as well as the greatest temperate rainforests on earth. In California, the Smith River is the only sizable undammed river in the state and still supports runs of wild salmon. In the Sierra Nevada, the Kings, North Fork of the Kern, and other streams flow magnificently from alpine headwaters to lower foothill elevations. In Oregon, the Elk and Illinois are criterion natural rivers of the Pacific Coast Range, and the Rogue is one of few rivers that winds without development or roads as it cuts through these far-western mountains. In Washington, an incomparable suite of still-wild rivers drops from towering Mount Olympus, and in the glacier-carved North Cascades, the Skagit and Sauk River systems are among the finest for salmon, steelhead, and deep forest frontage with long, free-flowing mileage.

In the Rocky Mountains, a few rivers remain with exceptionally long reaches of undammed, watery pathways through the rugged terrain, and others are critical to fish and wildlife even though they are shorter. The Salmon of Idaho, perhaps America's premier river



Gunnison River

for combined length and natural mileage, runs for more than 400 miles through a geographic maze of eight major mountain ranges and still supports one of the West's most notable runs of salmon. The Selway is even wilder, pulsing down from its headwaters in the Bitterroot Mountains. Montana has the forks of the Flathead—each remarkable for its clarity, beauty, and habitat of rare bull trout and wildlife including grizzly bears and wolves. The Yellowstone flows for more than 600 miles without large dams, its nature still largely intact from Rocky Mountain heights to the heart of the Great Plains. In Wyoming, rivers of the renowned Greater Yellowstone Ecosystem include outstanding tributaries to the upper Snake and its incomparable riparian corridor beneath the craggy peaks of the Tetons. In Colorado, the Yampa has one of the finest cottonwood forests in the West and still supports endangered warm-water fishes of the Colorado River basin.



Yampa River

RIVER NETWORK

The drylands and deserts also have their riverine highlights. The Green of Utah flows for nearly 400 miles with native fish habitat through spectacular canyonlands, and the Virgin River is centerpiece to Zion National Park and a greater region of redrock canyons. Nevada has mountain streams where the rare Bonneville and Lahontan cutthroat trout survive. New Mexico has the fabled Rio Grande and the still-wild upper Gila; Arizona has the biologically rich Verde and the one-and-only Grand Canyon of the Colorado River.

These are just a few of the rivers and tributaries that still flow with exceptional natural assets throughout the American West. Much of value remains, yet much of natural worth has been lost during the past two hundred years, and even some of the best-protected

waterways are threatened by mismanagement, development, or pollution from near or distant sources.

To protect and restore the finest rivers that remain are goals of top importance for the future of the West, yet no recent comprehensive survey has been completed to identify the best natural rivers that remain. That is the intent of this report prepared by the Western Rivers Conservancy.

Great Rivers of the West: The Western Rivers Conservancy Survey of Eleven States

Western Rivers Conservancy (WRC) is dedicated to protecting the outstanding rivers of the western United States. Based in Portland, Oregon, but working throughout an eleven-state region, this nonprofit, private organization purchases riverfront property from willing, private landowners and assures that the land will be conserved as open space. In this way, the group has successfully protected dozens of critical riverfront tracts along streams such as the Sandy, Illinois, Chetco, and Willamette Rivers in Oregon; the Hoh River and Icicle Creek in Washington; the Snake River in Hells Canyon of Idaho and Oregon; the Sun River in Montana; the Smith River and Chico Creek in California. However, both the need and the opportunity to protect rivers far exceed the ability of this—or any organization—to accomplish all that should be done. Many rivers and their landscapes must be safeguarded so that natural ecosystems can continue to function and provide for people's needs in the future.

To clarify its mission and focus its efforts, the WRC in 2005 adopted a strategic plan to “protect outstanding river ecosystems in the western United States” and to “conserve the great rivers of the West.” These are described as “healthy, natural rivers where ecological functions are still intact.” The plan emphasized “whole ecosystem protection” and recognized the importance of headwaters, riparian lands, estuaries, and regions that have “a high density of high-quality rivers.” To plot this ambitious course, the WRC recognized the need to complete a survey to identify the highest quality rivers. Simply stated, if the organization is to save the “great rivers of the

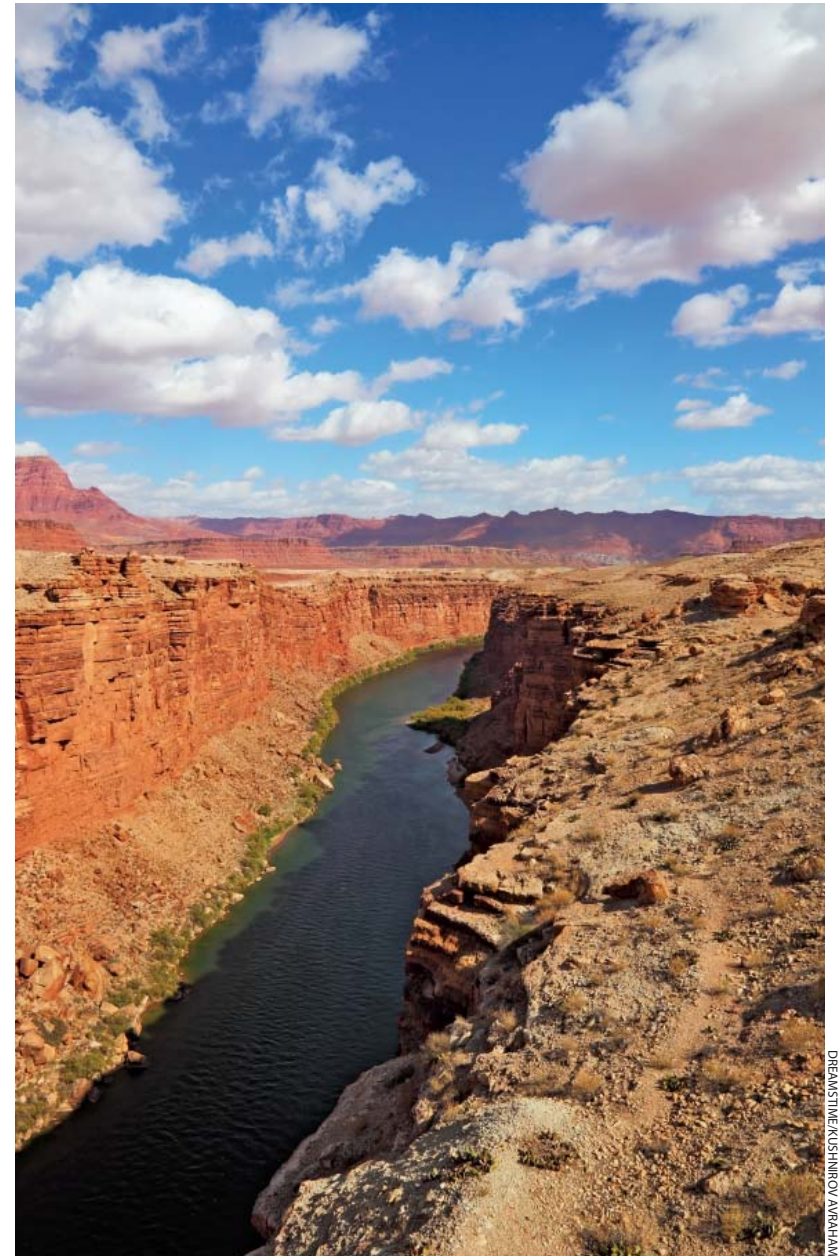
West,” it needs to know which rivers these are.

To develop the survey, the WRC hired Tim Palmer—a noted author of ten books about rivers and river conservation, a planner trained in landscape architecture, a photographer, and an inveterate rivers enthusiast with thirty-five years of experience exploring hundreds of rivers throughout the West. A committee of noted river scientists and other western river experts reviewed the survey design as it was being developed, and state-specific experts reviewed the results for each state.

The survey examined rivers of Washington, Oregon, California, Idaho, Montana, Wyoming, Utah, Colorado, Nevada, Arizona, and New Mexico. For pragmatic reasons, Hawaii and Alaska were excluded.

Rather than start from scratch, the WRC survey built on past river inventories. These include significant studies following the National Wild and Scenic Rivers Act of 1968, such as the Nationwide Rivers Inventory (NRI), and a wide variety of other more recent studies, inventory lists, articles, and research papers. Typically, for each state, 15 to 20 such sources were consulted. Each of these had its own “take” on the definition of quality (e.g. native fish abundance, water quality, recreation values), and some lists addressed only specific regions within a state. None told the whole story, but in aggregate, these earlier efforts all pointed the way or offered useful evidence. If a particular river was identified as excellent by half a dozen different sources, for example, it was considered likely to be a “better” natural river than one that was identified only once. To specifically consider rivers’ biological values, several experts—usually fisheries biologists or ecologists—were interviewed for each state. Their perspective and firsthand knowledge of local rivers provided essential insights for this survey’s analysis.

The Great Rivers of the West does not include of all rivers deserving protection. That would be a far larger list. To state this important point another way, if a river does not appear in this report, it implies no agreement that dams, pollution, new roads, or development can occur without significant public losses in river qualities and ecosystem functions. This survey, however, is the WRC’s attempt to identify the very best rivers that remain with outstanding natural



Colorado River

DREAMSTIME/KUSHNROV ANAHAM

values. Furthermore, restoration efforts for rivers that are not even mentioned in this survey might someday reinstate their natural qualities so that they, too, will again become “great rivers of the West.”

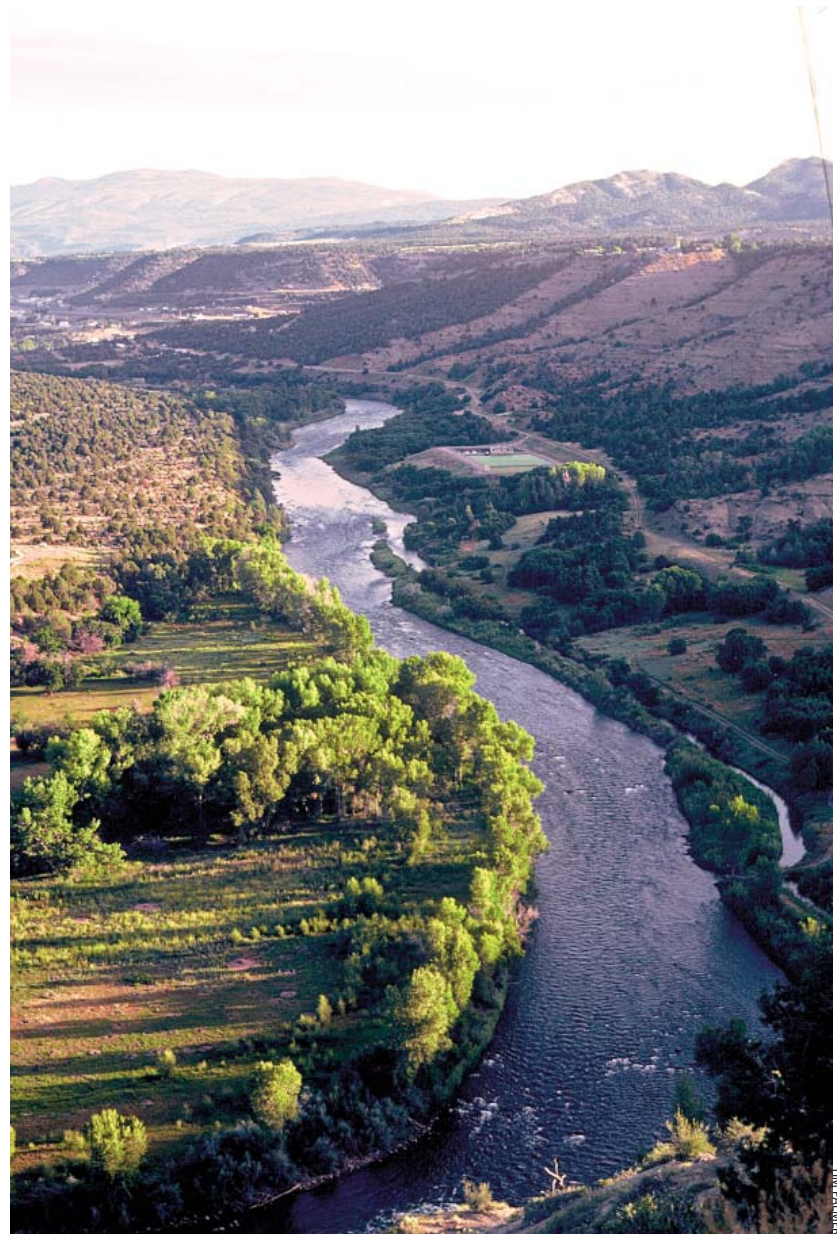
Based on this survey, the Western Rivers Conservancy will be able to better identify prime opportunities for its involvement. However, no land will be acquired for open space simply because a river appears on our list. And in cases where open space may eventually be bought to conserve the rivers, acquisition would be only from willing sellers who voluntarily agree upon all terms. The work of the Western Rivers Conservancy and of other conservancies and land trusts simply gives property owners an opportunity to have their land protected if they want to do so.

The need for river protection is becoming more urgent as western streams are increasingly affected by pressures of a rapidly growing population; of the 10 fastest growing states in the nation on a percentage basis, 7 are in the West. Such growth intensifies needs for water and energy and spurs suburban development of farm and ranchlands. The urgency of conserving rivers is also heightened by the aggravating effects of global warming and by neglect of problems that have been accumulating for many years across the watersheds of the West. In this challenging context, it is the aim of this survey to inform the conservation of the best remaining rivers of the West.

Surveying Colorado's Great Rivers

The Rockies rise as a massive north-south backbone across Colorado. Mountain country makes up about half the terrain of this sixth-largest Western state, while the other half lies either in the Great Plains to the east or in desert and red-rock canyons of the Colorado Plateau (Nevada-Utah Semi-Desert ecosystem province) to the west.

Colorado, like Wyoming, is one of America's key headwaters; 18 states receive water that begins its seaward journey in Colorado's Rockies. These towering mountains boast more peaks that rise over



Animas River



Yampa River, Cross Mountain Canyon

14,000 feet than any other state and 75 percent of the nation's land exceeding 10,000 feet in elevation. All this highcountry is key to the state's hydrology. Soaring mountains push clouds up high enough to reach cool, dew-point-temperature air, wringing snow or rain from even relatively dry air masses that have already dropped the lion's share of their moisture on the windward heights of the Sierra. Three-quarters of Colorado's precipitation comes as snow, which blankets the mountains each winter with a deep pack that melts into an extensive system of rivers in late spring and early summer, and then subsides sharply. Wet storms also come to the state from the south, and bring late summer rain to the southern mountains and plains. Still, lying in an extended rain shadow, and located south of the storm patterns that soak the upper latitudes of the West, Colorado receives far less precipitation than states in the Northwest and the Northern Rockies.

The high and snowy Colorado Rockies give rise to four major river systems. The Colorado drains the entire western half of the state and flows to the Gulf of California as the nation's seventh-longest river (1,450 miles) and the major artery of the Southwest. The Platte drains the northeastern Rockies and northern Great Plains and flows to join the Missouri River in Nebraska. The Arkansas—at 1,460 miles the sixth-longest river in the United States—collects its flows from the southeastern Rockies and runs across the southern plains to join the Mississippi in Arkansas. And the Rio Grande, America's fifth-longest river with 1,885 miles, flows from Colorado's south-central mountains to its mouth at the Gulf of Mexico, though it is heavily diverted in southern Colorado and New Mexico and scarcely flows in several reaches.

Biological highlights of the Colorado rivers estate include long riparian corridors of cottonwoods, willows, and sometimes box elder trees and red-osier dogwoods, together providing excellent habitat for a diverse array of birds, fish, and other wildlife in a semi-arid landscape. The Yampa, White, and lower Animas are superb in this regard, and many other rivers, including the Elk, Rio Grande, San Miguel, Green, and Gunnison, also have rich riparian corridors.

Endemic fish are another point of biological interest. Three imperiled subspecies of cutthroat trout still survive here in select

small rivers with high water quality. The greenback cutthroat were thought to be extinct but in fact had been reduced to two streams—tiny Como Creek and the South Fork Cache la Poudre. Successful reintroductions have increased their range to 42 streams, half of which have stable and reproducing populations (though genetic analysis in 2007 revealed that the number may be much lower owing to the stocking of Colorado River cutthroat trout by mistake). The populations that until recently were thought to be greenbacks total only 5 percent of the fishes' historic extent, and are scattered in short segments of streams along the Front Range from the North Fork of the Cache la Poudre near the Wyoming border, to Apache Creek, south of the Arkansas River. Another subspecies, the Colorado cutthroat trout, once had 144 distinct populations. These were sharply reduced but have now increased again to 56 groups in short stream segments throughout much of the Colorado Rockies and especially in tributaries of the Yampa, the White, and Elk, and in small streams of the West Elk Mountains in the central portion of the Rockies. The Rio Grande cutthroat survives in a small set of streams in that basin, with the most viable cluster flowing west from the Sangre de Cristo Mountains. However, one wild trout subspecies, the yellowfin cutthroat, has already gone extinct, underscoring the urgency of protecting high-quality aquatic habitat.

No less important, four species of warmwater fishes—the Colorado River pikeminnow (formerly squawfish), the humpback chub, bonytail chub, and razorback sucker—survive in parts of the Colorado River basin but their populations have been drastically reduced. These fishes had adapted to the warm, turbid, greatly fluctuating levels of rivers in the western parts of the state but are now considered endangered owing to radical changes in flow regimes resulting from dams and diversions, and from predation from introduced, exotic species such as the voracious northern pike. The strongholds of these ancient fishes include the Yampa River below Craig, the Colorado River below Rifle, the White below Rio Blanco Dam west of Meeker, the Green below the Yampa confluence, and the Gunnison below Delta. These five reaches, which have been designated as critical habitat for the pikeminnow, humpback, bonytail, and razorback, represent 29 percent, 28 percent, 14 percent, and 49 percent respectively of the historical habitat for these four

fishes, according to the Upper Colorado River Endangered Fish Recovery Program.

Colorado's Rocky Mountains include many short, spectacular, high-country streams in wilderness or remote areas. As in the rest of this survey, only a few of these small streams are recognized here owing to their numbers and to the high degree of protection that many of the best already have in wilderness or national park areas. Rivers on the west side of the Continental Divide eventually gather and flow into the Colorado Plateau as a remarkable set of canyon and dryland rivers: the lower Yampa, Green, White, Gunnison, and Animas. The east slope drains to the Great Plains, where rivers flowing across Colorado's portion of this vast grassland are universally diminished by diversions and agriculture. Yet sections of three rivers, the Purgatoire River, Tempest Creek, and Arikaree River, retain more of their natural values than most of the Mississippi-bound waterways.

Colorado has a number of exceptionally popular recreational rivers, including the Arkansas, which is one of the most-floated whitewater reaches in the nation, the Big Thompson in Rocky Mountain National Park, the Gunnison in the national monument protecting the phenomenal Black Canyon, the Yampa and Green in Dinosaur National Monument with its superb multi-day rafting run, the Animas in Durango and in the deep canyon upstream, and the South Platte, which flows through Denver. Some of these waterways are included in this report because they also retain important biological values; all are vitally important to people who live near them and to people who come from elsewhere to enjoy and experience these streams.

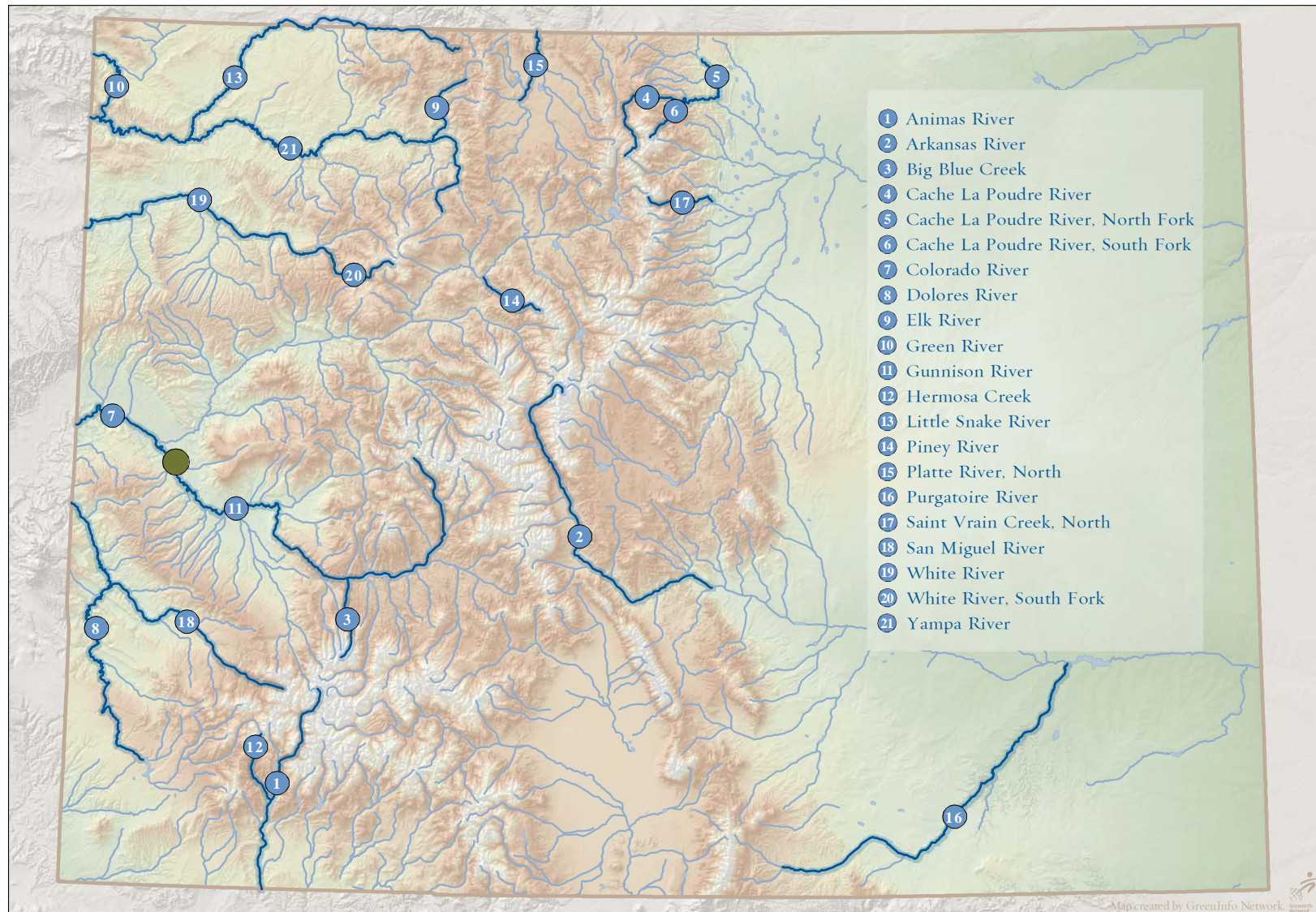
Out of tens of thousands of miles of rivers and streams in the state, portions of only 2 rivers have been designated in the National Wild and Scenic Rivers system—the Cache la Poudre and its South Fork. Another 10 rivers—principally on national forest land—were formally studied for designation, and 7 of those were recommended, but Congress has designated none. Clearly, though, a number of Colorado streams qualify for the national system and deserve protection.




As with the other western states, rivers in Colorado are degraded by dams, diversions, ranching, farming, logging, mining,

urbanization, and global warming. However, degradation problems here tend to be more severe owing to a high population relative to other mountain states, dry climate, and a long history of intensive resource use. Early in the settlement of the state, pioneering ranchers diverted almost all major streams and many of the minor ones where runoff flowed out of mountains and entered productive lowlands, creating a pattern of irrigation that persists to this day. Hard-rock mining (silver, copper, lead, molybdenum, etc.) has scarred more mountains and polluted more waterways here than elsewhere in the West and has left a grim legacy of neglect in abandoned sites that have caused depressed invertebrate life, fish-kills, and human health threats. More recently, energy development has been intensive in oil and gas fields of the West Slope or Colorado basin, and new threats include the possibility of highly water-consumptive and polluting oil-shale extraction. Finally, increasing population with its footprint of urban sprawl is rampant at the base of the Front Range and near booming recreational towns throughout the mountains, drawing water from streams to meet residents' demands and crowding more riverfronts with development. For all these varied reasons, Colorado has fewer rivers meeting criteria for natural quality than states to the north and on the West Coast.

Nevertheless, the magnificent river systems that remain here need to be protected from future energy development, population growth, damming, and global warming. And many of the rivers that have been degraded can potentially be restored to at least some measure of their historic worth to conserve important river values for generations to come. ■

Colorado's Great Rivers: List



 Great Rivers of Colorado  Other Rivers and Streams  WRC Project Location

Colorado's Great Rivers:

River Narratives

COLORADO'S "A" RIVERS

Elk River

With rare wildness for the southern Rockies, the Elk River flows for about 42 miles. It has no dams or major highways along it and has robust flows from deep winter snowpacks.

One of the largest Yampa tributaries, the Elk begins on the flanks of Mount Zirkel at 12,180 feet, the highest peak in north-central Colorado. In Routt National Forest, the Elk's North and South Forks each run for 12 miles (with trail access) from opposite sides of Zirkel and then join to form the main stem. Five miles below the confluence, the Elk leaves national forest and flows mostly through privately owned ranches with some excellent cottonwood groves for 25 miles to its mouth at the Yampa downstream from Steamboat Springs.

A tributary to the upper main stem of the Elk, Willow Creek hosts imperiled Colorado River cutthroat trout. The upper main stem is a popular trout fishing stream and a whitewater boating run in early summer. The Elk is one of seven Colorado rivers studied and recommended for the National Wild and Scenic Rivers system. As discussed later in the Yampa River section, the North Fork Elk and Elk combine with the Yampa, Green, and Colorado to make up the longest dam-free river mileage in the West—587 miles.

Hermosa Creek

Hermosa Creek is one of the longer streams in Colorado that is



Elk River

mostly roadless, and one of the longer entire streams in the state with no dams. Out of 144 surviving and restored populations of Colorado River cutthroat trout, Hermosa offers the longest contiguous length of stream (about 28 miles) and has the most adjoining tributaries (12) that currently provide habitat for this fish.

With headwaters in the San Juan Mountains, Hermosa Creek's upper watershed backs up against the Dolores basin, and flows due south for about 28 miles to join the Animas River north of Durango. The stream begins at Bolam Pass at an abandoned mine site, and its first 7 miles are paralleled by a 4-wheel-drive mining road to the mouth of the East Fork. Then Hermosa Creek drops in a rush of whitewater for 18 completely roadless miles, with only a trail along its banks. Then an unimproved road follows the river's final 3 miles (perched about 300 feet above the stream), and leads out of the valley to Highway 550.

Hermosa Creek has about the ninth-longest reach of stream in the state with no dams or roads and is probably the third-longest full stream with no dams. According to Trout Unlimited's analysis, it appears to be the longest reach of stream anywhere supporting the Colorado River cutthroat trout. And, with essentially all its tributaries also providing habitat, it is the only complete watershed system available to this imperiled native fish. Nearly all the basin is in public ownership in the San Juan National Forest, but private lands near the mouth, along with two separate parcels along the lower creek and at the mouth of the East Fork, are private and appear to be mining claims.

Little Snake River

Virtually unknown to most people beyond the local ranching area, the Little Snake is a small but long river that connects the highcountry of Mount Zirkel at the Continental Divide with the arid lowlands and canyons of the Yampa River near Dinosaur National Monument. Though it lacks wilderness or even long roadless mileage, almost all the river flows through extremely remote terrain with no dams, little access, and almost no development. Some rare native fish survive here and in select tributaries.

The river's route begins with its Middle Fork, which reaches nearly to the continental divide of the Sierra Madre Range, just 6 miles south of the Wyoming border. It flows for 14 miles through Routt National Forest with only two unimproved roads crossing the stream. The Middle, North, and South Forks join to form the main

stem near the state boundary, and then the Little Snake flows west, bending into Wyoming twice for a total of 40 miles in that state and then flowing southwest through Colorado toward the Yampa. The total main stem length is about 188 tightly meandering miles.

Counting the dam-free mileage continuously occurring downstream in the Yampa, Green, and Colorado Rivers, the Little Snake marks the beginning of 554 miles of essentially free-flowing river (there may be some low diversion structures on the Little Snake)—the second-longest such combination in the West (the longest is the Elk/Yampa/Green/Colorado system).

Much of the river's course, and especially its upper reaches, are extraordinarily beautiful with green riverfront cottonwood forests, open range lacking development, and smooth sweeps of rolling hills with mountains in the background. The basin provides habitat for wildlife including elk, mule deer, pronghorn, and sage grouse.

Much of the land fronting and surrounding the Little Snake is in public ownership under the jurisdiction of the Forest Service at the headwaters and then the BLM downstream. However, many substantial private tracts also lie along the river, especially in its lower reaches. The potential might exist here to link public lands together by trading other tracts to private owners, thus creating continuous lengths of protected riverfront. However, new energy development proposals on BLM lands could affect the river and its management; if permitted, the BLM ownership may be more a liability than an asset.

No storage dams have been built anywhere on the Little Snake, though a long and bitterly contested dam on its tributary Savery Creek, in Wyoming, was recently constructed. Diversions are withdrawn for irrigated pasture, including the sizeable West Side Canal that starts near Dixon, Wyoming. Other small diversion dams may have been built along the route but do not appear on maps. Secondary roads generally follow the river's course, but they rarely run alongside and are usually set back far from the water. Only occasional bridges cross.

While much of the river's corridor and watershed have been heavily grazed, the Little Snake still nourishes substantial groves

of cottonwoods, willows, and riparian vegetation. Headwaters in Wyoming shelter the rare Colorado River cutthroat trout in the main stem as it first loops into the state; they are also present in the Roaring Fork, Battle Creek, and the North Fork and its tributaries. Downstream, the rare Colorado pikeminnow has been found, and the river has populations of the roundtail chub and flannelmouth sucker—both native species of special concern owing to declining populations.

The river is exceptional in Colorado and throughout the West in flowing for a total system length of 202 miles without any substantial dams, towns, rural development, or continuous road encroachment. Considering all these assets, the Little Snake could be one of the most eminently restorable, long, natural rivers in the drylands and mountains of the West.

Piney River

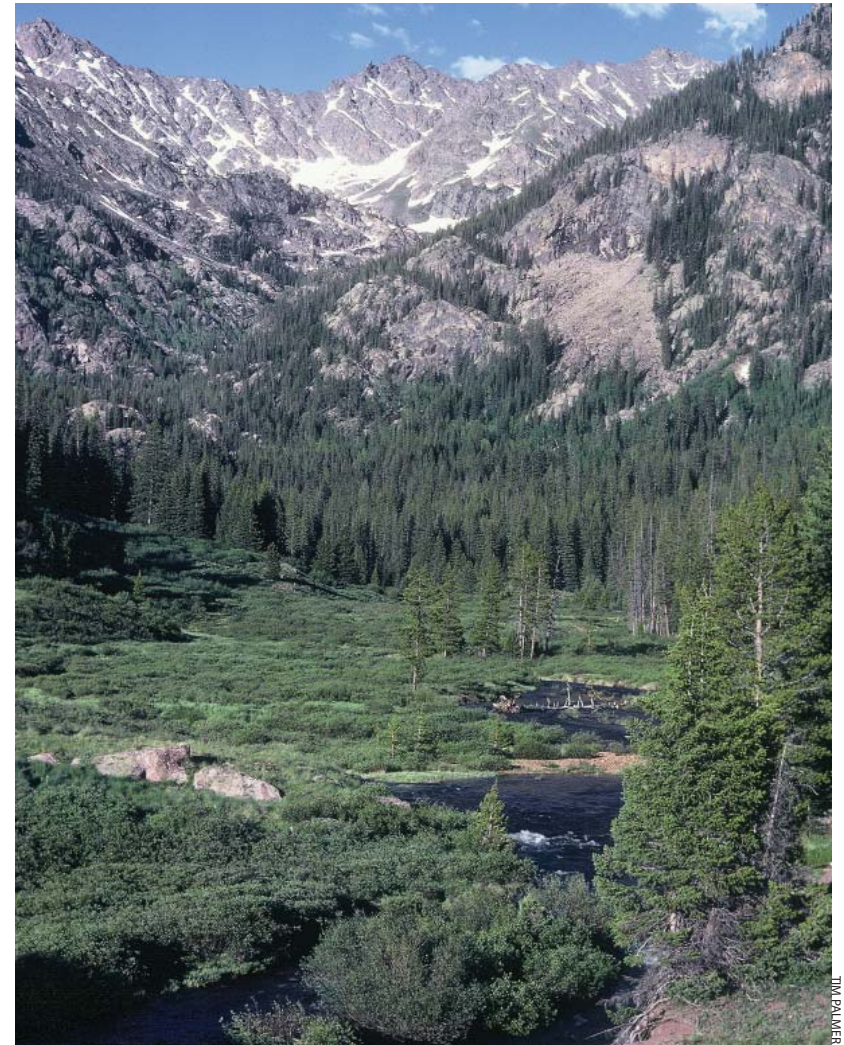
This beautiful mountain stream may be the longest entire river in Colorado with no dams and only nominal roads alongside. Colorado River cutthroat trout survive in its headwaters.

The river begins in the Eagles Nest Wilderness north of Vail and flows northwest for about 28 miles to the Colorado River. For its upper 5 miles, the river flows from the crest of the Gore Range through the wilderness area with only trail access. Downstream from the wilderness boundary, it flows another 14 miles through the White River National Forest with a trail and nominal road access at one point, though there are several isolated private parcels along this reach. The next 7 miles run through private land, and the Piney's final 2 miles flow through BLM land to its confluence with the Colorado River at State Bridge.

Upper reaches offer good habitat for Colorado River cutthroat trout. The entire river is an undeveloped and mostly wild west-slope basin of the upper Colorado. While the Piney is likely the longest entirely dam-and nearly road-free river in the state, it is the sixth longest when individual reaches of larger rivers are included, ranking only behind two sections of the much larger Dolores, Yampa, Grape Creek (which has a dam at its headwaters), and Gunnison. In the

1970s a trans-mountain diversion was proposed to take the water from the Piney and divert it under the Continental Divide to Denver. The plan was halted owing to opposition by river conservationists and others.

The small amount of private land along this remote stream may present an unusual opportunity to secure an outstanding stream



Piney River

TIM PALMER

that remains wild but not fully protected.

St. Vrain Creek, North

With an upper watershed that is undisturbed, North St. Vrain Creek supports greenback cutthroat trout, and its basin is known for a diverse array of native plants and wildlife.

The creek begins with several highcountry tributaries flowing off 13,000-foot peaks of the Front Range northeast of Boulder. The North Fork flows for about 8 miles with some trail access for 3 miles with a road alongside. Then 12 miles are road-free again to Button Rock Reservoir. Below there, the creek joins with Middle and South St. Vrain Creeks, but the stream is heavily diverted as it enters the Great Plans and flows across the rapidly urbanizing outskirts of the Denver metropolitan area before joining with the South Platte northeast of Longmont.

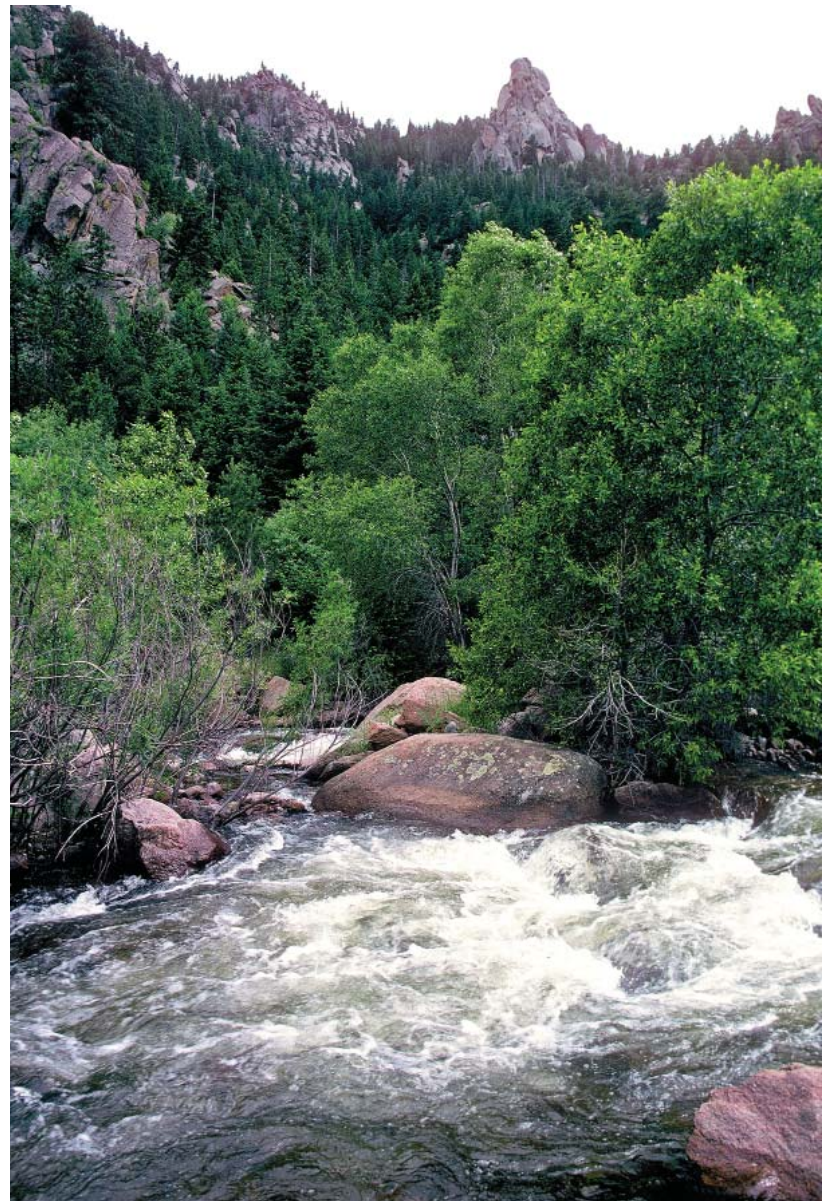
A designated wild trout stream, North St. Vrain Creek is one of few waterways that support greenback cutthroat trout. Its pristine upper basin has old-growth ponderosa pine forests, bighorn sheep, winter concentration areas for elk, golden eagle nesting sites, and habitat for mountain lions and black bears. The basin is home to rare aquatic insects, imperiled plant communities of foothills grasses and shrubs that have been degraded in most places elsewhere, and a sizeable population of the rare plant Larimer aletes.

Boulder County has purchased land or easements to a number of critical ranches and tracts along North and South St. Vrain Creeks, and some of the upper basin area was designated as a Research Natural Area by the Arapaho and Roosevelt National Forest.

Though this stream is small and its intact reach is short, it appears to be the best remaining section of natural stream in the heavily developed Front Range region north of Denver.

White River and South Fork White

With wild mountain headwaters, many miles of fine cottonwood



White River

TIM PALMER



White River

corridor through an extremely harsh desert, long stretches of roadless and rarely visited riverfront, and prime habitat for imperiled warm-water fishes of the Colorado basin, the White River is one of Colorado's most varied and valuable semi-natural rivers.

Including its South Fork headwaters, the White flows for 225 miles from the Flat Tops Wilderness to the Green River in Utah. The South Fork gathers headwaters atop the aspen-clad Flat Tops massif and flows for 8 miles with no roads or trails through wilderness. It flows another 15 miles followed by a trail through the Routt National Forest and fronted by a few small private mining claims. The spectacular mountain stream then plunges through a 2,000-foot-deep canyon incised into the massive White River Plateau. This upper reach ranks eighth in length statewide for road-and dam-free reaches of river. The South Fork's final 13 miles are paralleled by a dirt road through a narrow corridor of private land surrounded by national forest.

The North Fork is similar, but shorter and road accessible. It flows off the north side of the Flat Tops for 5 miles (with a trail) down to

Trappers Lake, and then heads west and runs for 23 miles, paralleled by a road with several recreation sites, down to the South Fork confluence.

The main stem runs for about 21 miles through a roaded valley of mostly private land, with diversions for pasture, to the town of Meeker. From Meeker to Rangely the river meanders for about 85 miles through quiet water and pastureland, with several low weirs for diversions and a small reservoir located just off-stream at Rio Blanco Lake, above the mouth of Piceance Creek. Just upstream from Rangely, the White hits the backwater of Taylor Draw Dam, built only recently in the mid-1990s for hydroelectric power.

From Rangely to the Green River, the White flows another 83 miles (60 of them in Utah) through a stark sagebrush desert. A lush but thin band of cottonwoods and willows line much of the riverfront in this reach, though exotic tamarisk has taken over many floodplains, as it has on most desert rivers throughout the Southwest and in the Green River system. Occasional dirt roads meet or cross the river, but no major roads come near and none parallel the river's wild course in this section. Sagebrush hills give way to sandstone and shale cliffs and bluffs as the river carves into the spare canyon terrain of the Colorado Plateau before joining the Green River at a remote confluence.

From its mouth at the Green River to Taylor Draw Dam at Rangely, the White offers habitat for the endangered Colorado River pikeminnow, humpback chub, bonytail chub, and razorback sucker. In its upper basin, the White's North and South Forks both have multiple small tributaries that support the rare Colorado River cutthroat trout. With the exception of Taylor Draw Dam, the White River system offers the most length and the best quality of connectivity between aquatic habitats in wild Rocky Mountain headwaters and the desert canyons of the Green and Colorado Rivers systems.

The stresses on the White River are, however, severe. Riprap and diversions for pasture affect upper reaches of the main stem, and energy development including oil and gas drilling and oil shale exploration are common throughout the lower basin. In the heart of the oil-shale zone of western Colorado and eastern Utah, the

riverfront has natural oil seeps that leak out of the ground along the waterfront. Massive amounts of oil and gas drilling have occurred, and extraction is likely to intensify here in the future.

The BLM owns about 40 miles of the riverfront in the eastern portion of Utah, and some of this frontage includes thin parcels of private land. The lower 20 miles of the river flow through the Uintah and Ouray Indian Reservation.

Protection and restoration possibilities might be considered here for the thin strip of private land along the lower South Fork, the BLM land in eastern Utah, and other private land throughout the main stem's length.

Yampa River



Confluence of the Green and Yampa Rivers

The least-dammed of the major Colorado River tributaries, the Yampa flows for 170 miles from the Flat Tops Wilderness to the Colorado in Dinosaur National Monument, coursing through magnificent redrock canyons and some of the West's finest cottonwood-box elder forests. This is one of the most important of all streams for endangered warm-water fishes in the Colorado River basin.

From headwaters in the Flat Tops Wilderness, the river flows east and then northwest through private ranchland to the town of Steamboat Springs, where it offers a popular paddling reach. For 73 miles from there westward to the town of Maybell, the Yampa nourishes one of the finest riparian corridors in the West—a nearly continuous riverfront band of narrowleaf and Fremont cottonwoods mixed with box elder, red osier dogwood, and willows offering prime habitat for a plethora of songbird species, beavers, elk, and other wildlife. Most of this is privately owned ranchland. The Nature Conservancy has a major preserve along the river downstream from Steamboat and a field office dedicated to the Yampa River. Only about 7 percent of the river's plentiful runoff is diverted by ranchers and other users along its route—rare for a major western river flowing through drylands.

Below Maybell, the Yampa enters canyon country of the Colorado Plateau. First, at Cross Mountain Canyon, the river pounds through heavy whitewater in a narrow, vertical-walled gorge. Then below Deerlodge Park the river enters one of the West's classic river-routes, rushing through sinuous canyons with thousand-foot sandstone walls, lush cottonwood groves at the mouths of tributaries, and wildness beyond the reach of roads. For 46 miles the river flows within Dinosaur National Monument—one of the longer reaches of a river protected within the national park system. This is the state's longest reach of river lacking dams or roads.

All four species of imperiled Colorado basin warm water fish are still present here: the Colorado pike minnow, which can reach 6-foot lengths and 80 pounds, the humpback chub, bonytail chub, and razorback sucker. These fish need many miles of free-flowing river; some migrate hundreds of miles from the White River up the Green River and then into the Yampa to spawn. In the upper basin, small

tributaries of Elkhead and Fortification Creeks—flowing in from the north—offer a significant assemblage of high-quality habitat for Colorado River cutthroat trout.

Waters flowing from tributaries of the Yampa—and then in the subsequent, continuous path down the Yampa, Green, and Colorado to the backwaters behind Glen Canyon Dam—constitute the longest completely free-flowing river mileage in the West. Leading this list of tributary configurations, Trail Creek flows into the North Fork Elk, then the Elk, Yampa, Green, and Colorado for a continuous dam-free length of 587 miles, exceeding even the Salmon of Idaho. The combined Silver City Creek, Middle Fork Little Snake, Little Snake, Yampa, Green, and Colorado flow for 554 miles, though low diversion dams are present on the Little Snake. A combination that begins with the mainstem Yampa (below Stagecoach Dam), through the Green and Colorado offers 547 miles of excellent boatable mileage without impoundment (though the whitewater of Cross Mountain Canyon is for experts only). This is the longest continuously boatable river mileage in America outside Alaska, with the exception of the lower Mississippi (entirely bordered by levees) and several rivers of the Great Plains (usually too low for floating, and with many small diversion dams). Almost equal to the main-stem Yampa route, the combination of Bunker Creek, East Fork Williams Fork (of the Yampa), Williams Fork, Yampa, Green, and Colorado flows for 541 miles. The Green and Colorado River portions of these dam-free corridors are covered in the Utah section of this report.

COLORADO'S "B" RIVERS

Cache la Poudre with its North and South Forks

With two reaches of restored greenback cutthroat trout habitat, wild sections beyond the reach of roads, and undammed mileage except for two small reservoirs on the North Fork, the Cache la Poudre flows from the Front Range to the plains in northern Colorado.

The main stem runs for about 21 roadless miles from wild, trail-accessible headwaters in Rocky Mountain National Park and



Cache la Poudre River

the Comanche Peak Wilderness, and then for 62 more miles with Highway 14 paralleling the river to the eastern base of the Front Range. (Many more heavily diverted, dammed, and developed miles continue through the Great Plains to the South Platte River, for a total river length of 126 miles).

The South Fork flows for about 32 mostly-road-free miles in the national park, the Cache la Poudre Wilderness, and Roosevelt National Forest. The North Fork flows for about 70 miles, first with no roads alongside, then with road access, two significant reservoirs and diversions, and with one reach that is important to greenback cutthroat trout.

The main stem "Poudre" (pronounced POO-der) rushes through steep-walled granite canyons 1,000 feet deep and narrow valleys, and then flows into a broader, U-shaped, glacial valley with slower water and a more rolling landscape. Wildlife in the corridor include elk, bighorn sheep, and mountain lions.

The river's flow is augmented by trans-basin diversions from the west- to east-side of the Rockies, and later by diversions

from the river, and has roads throughout much of its length, and so the Poudre is far from natural. But without dams and major developments in its mountain reaches, it is less developed than other sizable streams on the eastern front of the Rockies. The South Fork is one of only two streams—and by far the largest—where the greenback cutthroat trout survived near-extinction. These fish have been reintroduced into the main stem and the North Fork. The main stem is popular among anglers, and it is also considered one of the state's whitewater highlights for advanced paddlers.

Green River

For about 42 miles the Green River arcs through the far northwestern corner of Colorado after it flows out of Flaming Gorge Dam in Utah. In Colorado, it flows through Browns Park National Wildlife Refuge and then through the stunning Lodore Canyon in Dinosaur National Monument. The Green then flows back into Utah, where it runs for most of its epic length to the confluence with the Colorado River in Canyonlands National Park. See the Utah section of this report for coverage of this entire reach.

Gunnison River

Though severely dammed in its upper reaches, the Gunnison is the largest tributary to the Colorado River above the Green and the second-largest river in Colorado. Below the dams, it carves one of the most exceptional canyons in the West at Black Canyon of the Gunnison National Monument. Immediately below there, it flows through a stellar section for whitewater paddlers and anglers of introduced trout, and then continues to run for many dam-free miles through undeveloped drylands in a reach that provides important habitat to imperiled warm-water fish of the Colorado basin.

The 159-mile-long river begins at the confluence of the East and Taylor Rivers. The 38-mile-long East drops from high mountains around Crested Butte and flows south through an excellent cottonwood corridor with high-elevation wetlands and meadows.



Gunnison River in Black Canyon

East of the East River, the Taylor drops for about 18 miles to Taylor Park reservoir and then flows in a remarkably beautiful granite canyon with a popular and boulder-studded whitewater run. Below the confluence, the main stem Gunnison flows through a broad

valley for about 15 miles to the town of Gunnison.

Downstream from town, the river meets the slackwater of the first in a chain of three enormous back-to-back reservoirs—Blue Mesa, Morrow Point, and Crystal—built as the Bureau of Reclamation’s sprawling Gunnison River Project. The dams impound the main stem Gunnison for 45 miles, including the upper 40 miles of the famous Black Canyon (only 11 miles are left undammed). They also divert 300,000 acre feet of water a year westward to the Uncompahgre Valley for farming, leaving the Gunnison’s flows depleted.

For the first 11 miles below Crystal Reservoir Dam, the river churns in a narrow gorge through Black Canyon of the Gunnison National Monument. In its combined deepness and narrowness, this canyon might be the ultimate in the West—reaching a depth of 2,800 feet with a width at the bottom of only 40 feet in some places. Gradient reaches 240 feet per mile, making this one of the most extreme whitewater runs anywhere. Below the Monument, the canyon continues in a less-dramatic but still remote and beautiful 16-mile-long reach that can be accessed only by trail. Hearty boaters (who must pack boats in) and anglers are drawn to excellent rapids, scenery, and fishing for introduced rainbow trout in this section, which is in BLM jurisdiction. From there, the Gunnison flows gently for about 50 miles through irrigated farmland and publicly owned drylands—gathering tributaries (North Fork and Uncompahgre) that replenish some of its flows. The river encounters the Redlands Diversion Dam and its fish-passage facility just a few miles upstream from the confluence with the Colorado River in Grand Junction.

In its long lower section, which includes Dominguez Canyon, the Gunnison sweeps past rocky bluffs, desert slopes, and riparian thickets of cottonwoods as it winds at the edge of the Colorado Plateau. This reach is one of few places where the four species of Colorado basin warm-water fish still survive, and the corridor has been designated as critical habitat by the U.S. Fish and Wildlife Service. This section is also one of few in the southern Rockies available for an extended trip of mostly gentle-water canoeing.

Though heavily dammed, depleted of flows, and ecologically altered, the Gunnison is still a remarkable river with a unique canyon, a long length of free-flowing water, a fine riparian zone, and habitat

for endangered warm-water fish in its lower reaches.

North Platte River

See the Wyoming section of this report for this river that begins in Colorado but flows north into Wyoming.

COLORADO’S “C” RIVERS

Animas River

This largest tributary to the San Juan River flows through an extraordinary canyon that is 5,000 feet deep—nearly as deep as the Grand Canyon of the Colorado. Peaks rise up to 14,000 feet above sea level. Thus, it is one of the deepest, high-elevation canyons on the continent. Lower reaches include excellent cottonwood corridors and one the best riparian zones in New Mexico.

Among the highest-elevation major rivers in the Rockies, the



Animas River

TIM PALMER



Arkansas River

Animas begins at 9,230 feet at the confluence of the West and North Forks and flows through one of the Colorado's most intensively mined regions near Silverton. Below there the river enters its truly awesome canyon with frothing Class V rapids and wild scenes of incomparably rugged terrain. No road passes through the canyon but a narrow-gauge railroad remaining from the mining boom now carries tourists from Durango to Silverton. Near the lower end of this canyon, the river roars through an impassable, unrunnable cleft riddled with boulders and logs. Emerging from the canyon, the river glides through a gentle 10-mile section above Durango and then flows through a moderate whitewater reach, followed by a 24-mile-long extended cottonwood corridor in the Southern Ute Reservation, eventually reaching the New Mexico border. After about 45 more miles, the Animas meets the San Juan in the city of Farmington, where a low diversion dam spans the river. With a total length of about 110 miles, this is the longest, nearly undammed river in Colorado.

From its headwaters to the mouth of its canyon, the Animas flows through San Juan National Forest lands. The frontage upstream from Durango is mostly in private ownership. In Colorado, much

of the lower river's cottonwood corridor lies in the Southern Ute Indian Reservation. The cottonwoods continue into New Mexico, where the river lies mostly in private ownership.

The wild canyon and the lower cottonwood corridor are both exceptional natural features of this river. The canyon reportedly has some wild cutthroat trout, and the lower river has native flannelmouth suckers and bluehead suckers.

In terms of recreation, the canyon offers one of the ultimate wildland whitewater experiences for expert kayakers, and the Durango reach offers some of the most accessible and heavily-used urban whitewater in the West; a popular racing course has been established in the town.

The problems of the Animas are, however, formidable. Headwaters flow from an area intensively mined before there were any regulations regarding runoff. Zinc, copper, and other pollutants degrade the water, with impacts on invertebrate life and fish in the river's upper reaches. Water quality begins to recover in the canyon.

Near Durango, one of the last heavily subsidized, uneconomic, environmentally damaging, controversial water projects of the federal Bureau of Reclamation is currently being built after thirty years of debate. It will siphon water from the Animas and transfer it to the La Plata basin to the west, in the process, depleting important flows for the downstream riparian corridor. The lower Animas in New Mexico faces increasing development pressure and has a low, private hydroelectric dam and a pumping station operated by the city of Farmington that halts the upstream migration of native flannelmouth and bluehead suckers. Finally, the lower river is thoroughly infested with the exotic Russian olive tree, which has displaced native cottonwoods and willows.

In spite of all these problems, the river remains a valuable stream for its upper canyon, its recreational reach through Durango, and its lower-river cottonwood corridor—still one of the finest in the Southwest, though its fate is uncertain owing to the Animas-La Plata water project.

Arkansas River

The upper end of this major Mississippi tributary flows with only minor low dams through the southern Rockies for 150 miles and offers some of the most popular rafting and kayaking reaches in the West.

The Arkansas gathers its headwaters from a ring of high wilderness peaks in the Sawatch and Mosquito Ranges in the heavily mined Leadville area. The river flows south along the base of Colorado's largest peaks— including the state's highest summit, 14,422-foot Mount Elbert—and gathers more mountain tributaries. Near Salida, the Sangre de Cristo Mountains deflect the river to the east, where it cuts through the narrow and awesome chasm of Royal Gorge, 1,200 feet deep. After emerging from the gorge at Canon City, the river is heavily dammed, diverted, and entirely dried up in places as it flows across the Great Plains of southern Colorado. Additional tributaries enter, and the river ultimately runs a total of 1,460 miles, accumulating big flows in its eastern reaches before joining the lower Mississippi with a plentiful 40,290 cfs.

While the river has a sport fishery and long corridors of cottonwoods, its principal value is recreational. The Arkansas is one the three most popular paddling rivers in the West, attracting 200,000 boaters a year (the other two are the Snake near Jackson and the South Fork American near Sacramento). The river offers many outstanding reaches of whitewater, including the class III-IV Browns Canyon between Buena Vista and Salida, and the class V Royal Gorge.

The river's corridor is mostly in public ownership but also includes many private tracts and several towns; four small diversion dams create minor obstructions. The upper river receives augmented flows via trans-basin diversions from the Fryingpan and Eagle Rivers, for withdrawal downstream by cities and irrigators.

However, the upper reaches are polluted by abandoned hard-rock mines with zinc, lead, cadmium, and other toxins emanating from Superfund waste sites. At California Gulch, near Leadville, aquatic insects cannot live and the streambed is orange with mining waste. Other tributaries, including Cripple Creek, are contaminated

as well. The pollution becomes quickly diluted, but is still detected at Salida, 70 miles downstream. Trout productivity is relatively unaffected, though fish lifespans are reduced, and many live no more than three years.

While several reaches of the Arkansas— such as Browns Canyon—are isolated from roads, much of the river's corridor is shared with highways, small roads, and railroads. A railroad even passes through the narrow depths of Royal Gorge.

Big Blue Creek

This little-known stream may be the second-longest in Colorado without dams and with only nominal road encroachment (Piney River appears to be the longest).

Big Blue flows from the north face of Uncompahgre Peak; at 14,309 feet, it is among the highest mountains in the United States. The creek runs 12 miles through the Big Blue Wilderness, with a trail along its highcountry route. An unimproved road reaches the stream at only one point, and then the creek flows another 10 miles through the Uncompahgre National Forest and BLM land, with a few private inholdings. An additional 5 miles through private land lead to Highway 50, and a final 4 miles of national forest and national recreation area to terminate in Morrow Point Reservoir. For 25 miles—most of its length—the stream has no roads along its shores.

The wild creek is a rare, essentially road-free, undammed river flowing from some of the highest country in the Rockies to a relatively low elevation of 7,200 feet.

Colorado River

Owing to a dam and to massive headwater diversions that take water out of the basin, and also to roads or railroads along nearly all its length, the Colorado is not considered one of the state's premier waterways in this study, except for the reach downstream

from Grand Junction. Here the river flows through Ruby-Horsethief Canyon and provides habitat for endangered warm-water fish. Because this reach flows into Utah, where the river continues to be an exceptional stream, the Colorado River is covered in the Utah section of this report.

Dolores River

With a length of 250 miles, the Dolores is the Colorado River's longest (but not largest) tributary in the state, and it flows through two of the three longest dam-free and relatively road-free reaches of stream. About 187 miles of unimpounded (but heavily diverted) river run from McPhee Dam to the Colorado confluence. The Dolores' red-rock canyon from Slick Rock to Bedrock is among the most beautiful of America's wild desert canyons.

The river begins at Bolam Pass at the height of the San Juan Mountains south of Telluride. It flows for 6 miles with only trail access and then is paralleled by Highway 145 through the abandoned mining district of Rico and west for about 38 miles to the confluence with the West Fork—itsself a fine, 32-mile-long river with an unimproved road along its entire length.

After another 15 miles, the main stem hits the backwater of McPhee Reservoir. Built only in 1984, after great controversy, this is the only dam on the entire river. Water is diverted out of the Dolores basin to the south, and, downriver flows are severely diminished from their historic levels, and at times, very little water is left for in-stream flow.

Below McPhee Dam, the Dolores flows 12-miles with Highway 504 alongside, and then drops into its first great wilderness canyon. For 48 miles, to Slick Rock, the river winds through a narrow valley with groves of stately ponderosa pines, lush riparian willows, and whitewater rapids including the infamous Snaggle Tooth. One unimproved road meets the river within this reach.

From Slick Rock to Bedrock, the Dolores enters the Colorado Plateau and flows for another 45 miles with few roads except for a bridge crossing and a small amount of road frontage where the

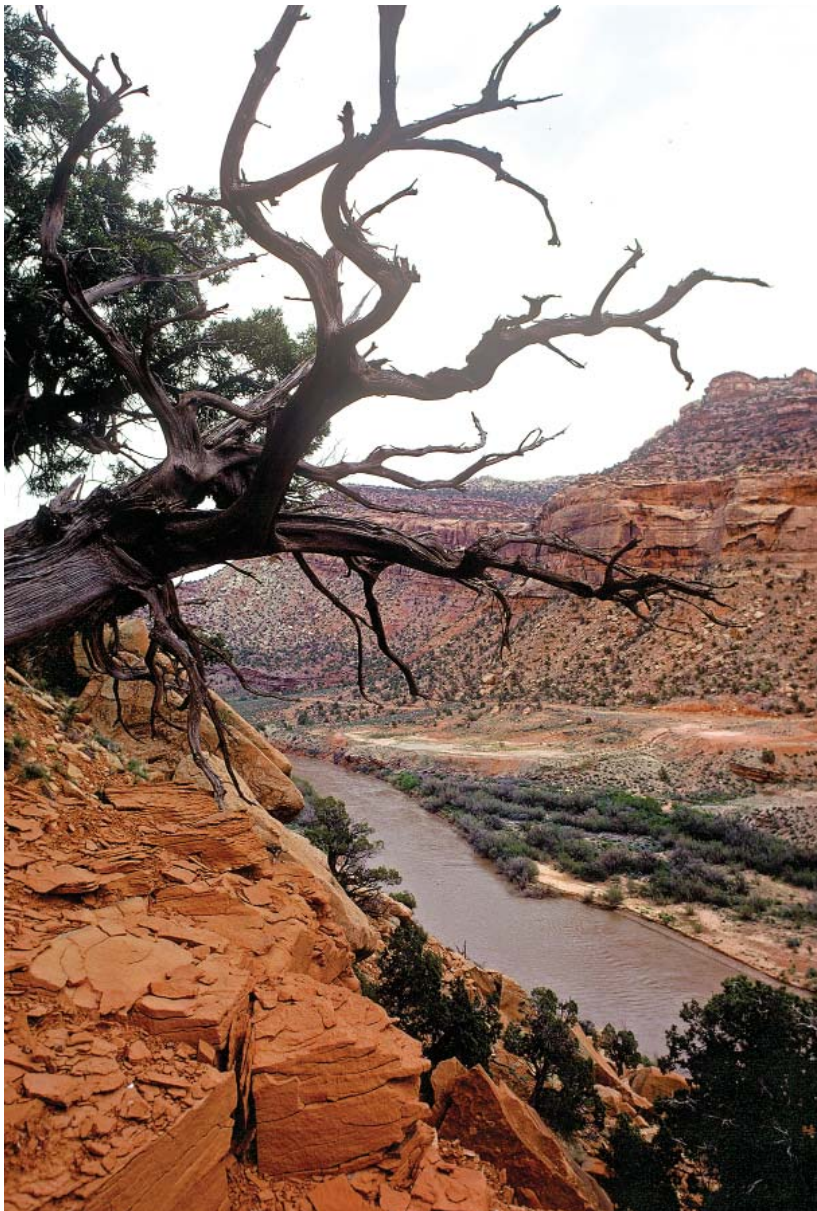


Source of the Dolores River in the San Juan Mountains

river cuts across of the agricultural Big Gypsum Valley. The wild and winding desert canyon that follows this valley has vertical sandstone walls, overhanging cliffs, ancient juniper trees, and moderate whitewater. This reach remains one of the classic desert canyon float trips in the West when adequate water is released from the Bureau of Reclamation dam upstream.

Below Bedrock, the Dolores picks up the San Miguel River's substantial volume and flows for 44 miles to Gateway through ranchland and canyons with Highway 141 alongside. The Dolores enters Utah 9 miles downstream from Gateway and flows another 23 miles to its mouth at the Colorado River, mostly through the wild, remote, narrow Gateway Canyon, with challenging rapids at State Line.

The Dolores does not support the humpback chub and other imperiled warm-water fish of the Colorado basin, but it is an important stream for the bluehead sucker, flannelmouth sucker, and roundtail chub, which are other species of special concern owing to their increasing scarcity and to the destruction of their habitat.



Dolores River

The wilderness and remoteness of the Dolores' sandstone canyons are exceptional. If adequate releases were made from McPhee Dam, this would once again be one of the truly great desert rivers of Colorado and the Southwest.

Purgatoire River

All rivers of the Great Plains in Colorado are seriously degraded by diversions, grazing, riparian forest elimination, and the introduction of exotic species. The Purgatoire is the least affected of the major streams and, while far from pristine, is included here as the best representative of the Great Plains ecoregion of Colorado.

Collecting nearly all its flow from the east face of the Sangre de Cristo Mountains in southern Colorado, the South, Middle, and North Forks of the Purgatoire, plus other tributaries come together to form the main stem, which runs about 22 miles across Park Plateau to a reservoir just west of the city of Trinidad. Below Trinidad, the river flows about 25 miles across rolling terrain and then enters Purgatoire Canyon and winds northeast through this unusual cleft in the plains for about 70 miles.

Much of Purgatoire Canyon is now national forest, resulting from a land exchange with the Pinon Canyon Military Reservation. Lower reaches of the canyon are privately owned. Beyond the canyon, the lower 65 miles wind through rolling, road-accessible ranchland, with gravel pits and diversions, until the river finally reaches the Arkansas at John Martin Reservoir in the southeast corner of the state.

Exotic tamarisk has invaded much of the floodplain, and introduced brown trout ply upper reaches, but this Great Plains river also hosts a unique array of native fish including longnose dace, white suckers, and others—11 native species in all. Native mud turtles and snapping turtles are also present. Bighorn sheep and elk graze on the hillsides, and long-billed curlews and burrowing owls survive here, though they are in declining populations generally. Small side canyons form interesting and beautiful alcoves within the prairie. Colorado State University biologists say that the Purgatoire is one of few comparatively undisturbed streams in the region.

The Forest Service is attempting to manage its portion of canyon to protect native species. Much of the private land is held in a few very large ranches. The Colorado Nature Conservancy regards the Purgatoire River as one of the most intact rivers on the plains, and the organization has several on-going projects in the area.

San Miguel River

One of the longest essentially undammed rivers in Colorado, the 90-mile-long San Miguel flows into the lower Dolores and then the Colorado to create a continuous free-flowing reach of about 275 miles. Fine cottonwood groves line much of the river. The San Miguel and the Yampa are the most-natural of the major streams flowing from western Colorado.

The San Miguel begins with the high mountain waters of Bridal Veil Creek as it plunges hundreds of feet down from headwalls of the San Juan Mountain crest into the narrow alpine valley of Telluride—an old mining town that's boomed into an upscale ski resort. Abandoned mines scattered around the river's headwaters remain a legacy of the town's history. Downstream from the heavily developing town, the San Miguel drops precipitously 400 feet in half a mile over a terminal glacial moraine. Below there, it picks up substantial flows from its South Fork and then rushes rapidly northwest, paralleled by Highway 145 for 25 miles to the Norwood Bridge. From there, the river runs for another 29 miles—including a 14-mile reach of roadless wild canyon—to the small town of Naturita. After passing two diversion dams and a powerplant, the San Miguel flows for its final 22 miles to the Dolores River, paralleled by Highway 141 the whole way.

The Colorado Nature Conservancy, which has three preserves along the river, regards the San Miguel's riparian habitat as some of the very best in the upper Colorado Basin. The group's South Fork preserve features a globally rare plant community of narrowleaf cottonwood, Colorado blue spruce, and black twinberry.

Both the main stem and the South Fork offer fine whitewater paddling in early summer.



San Miguel River

Though the river has development, abandoned mines, roads paralleling much of its length, and two diversion dams, it is the only major Colorado tributary in the state with no major storage reservoir. ■

Conclusion

Owing to the lack of large wilderness networks, a plethora of roads and railroads, a surfeit of dams and diversions, mining damage from the past, and a pervasive pattern of most mountain streams quickly reaching developed or ranchland valleys, Colorado has fewer outstanding natural rivers than other states to the north and on the West Coast. Yet it does have some excellent streams, an abundance of small, wild creeks of good quality, and many rivers where recreation is important.

Using 17 lists of rivers compiled by other organizations and agencies, plus several interviews with biologists and experts familiar with Colorado's rivers, we have assembled a table of 155 rivers and streams identified as having notable natural values. From that group we selected an "A" list of 8 rivers, a "B" list of 6 rivers, and a "C" list of 7 rivers.

Through this survey, several groupings of fine natural rivers became evident.

Yampa, Elk, and Little Snake

The Yampa with its Elk and Little Snake tributaries boast the least developed and least degraded long reaches of river in Colorado. Nearly dam-free, these streams have escaped many of the problems of past mining that are so prevalent elsewhere in the state. Geographically, the Elk and Yampa also lie mostly beyond the threats of new energy development.

At least some native fish survive here: Colorado cutthroat trout populate the upper Elk and upper Little Snake basins, and the endangered warm-water fishes of the Colorado basin do their best in the lower Yampa and appear at least occasionally in the Little Snake. The cottonwood riparian corridors along these rivers are among the best in the state, and in the West.



PAT CLAYTON/FISH EYE PHOTOGRAPHY

Colorado cutthroat trout

Large expanses of public open space along the rivers and throughout their watersheds have protected some natural values. Large amounts of private land are found here as well.

White River system

The main stem White, with its North and South Forks, is one of the least developed basins in the state and in the southern Rocky Mountain/drylands region. Headwaters flow from superb wild country, and only one small dam blocks the flow of the main stem. Excellent riparian corridors are found along most of the length of the river. Much of the river frontage is publicly owned by the Forest Service and BLM, though much of it is also in private ownership, as

well.

Oil and gas drilling is prevalent in the middle and lower river basin and may expand, but it need not preclude the protection of an extended and semi-continuous riverfront corridor. Indeed, river corridor protection might well be regarded as reasonable mitigation for unavoidable damage resulting from energy development on public land in the basin.

This is one of few large river systems in the southern Rockies and drylands that is still relatively intact, and where critical areas could still be protected and other important natural features restored.

Cache la Poudre and its forks

Flowing on the east side of the Rockies at the northern end of the Front Range, the Cache la Poudre and its South Fork are currently the only rivers in the state protected in the National Wild and Scenic Rivers system. They and the North Fork have important surviving populations of the rare greenback cutthroat trout. All three streams flow steeply off the face of the Rockies and are hotspots of recreation activity, within easy reach of Denver and its nearby Front Range cities.

Most of the basins are publicly owned, but substantial tracts of private land are also located along the streams, especially along the North Fork. As sizeable streams largely without dams, past mining waste, and major diversions, this set appears to be the best cluster of rivers flowing from the Front Range. ■



Cache La Poudre River

Sources For The Colorado Survey

Colorado Rivers were evaluated using the following sources. Please see Appendix 1 for criteria.

1. Existing Inventories Of High-Quality Rivers

- National Wild and Scenic Rivers
- National Wild and Scenic Study Rivers
- National Wild and Scenic Study Rivers
- State-designated wild and scenic rivers
- Nationwide Rivers Inventory (National Wild and Scenic Rivers Act)
- U.S. Forest Service rivers recommended for protection
- Bureau of Land Management rivers recommended for protection
- Bureau of Outdoor Recreation, Western U.S. Water Plan
- Columbia Interior Basin Ecosystem Management Plan

2. Interviews with biologists and local experts

- Colbert Cushing, Colorado State University, aquatic ecologist
- Tom Iseman, Colorado Nature Conservancy
- Dave Winters, U.S. Forest Service, regional aquatic ecologist
- Renée Rondeau, Colorado Natural Heritage Program, director

3. Colorado Division of Wildlife, Wild Trout Rivers. These are short reaches identified for their habitat value for wild trout, as listed in *The Rivers of Colorado*, by Jeff Rennie (Falcon Press, 1985), p. 158.

4. Colorado Division of Parks and Recreation. These are streams that have been prioritized for natural diversity conservation by the state parks and recreation agency, as listed in *American Rivers, Outstanding Rivers List*, 1991.

5. U.S. Fish and Wildlife Service, critical habitat. These are reaches that have been designated as critical habitat for endangered fish, including the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub, as listed on the Upper Colorado River Endangered Fish Recovery Program website, August 2007.

6. Colorado Nature Conservancy, river project sites. These are rivers where the Colorado Nature Conservancy has active projects, as listed in *Colorado: Rivers of the Rockies*, by John Fielder and Mark Pearson (Westcliffe Publishers/CO TNC, 1993), p. 11.

7. Trout Unlimited, high-priority native trout streams. These are streams that Trout Unlimited has identified as providing crucial habitat for greenback cutthroat trout, Colorado River cutthroat, and Rio Grande cutthroat, in its report, *Where the Wild Lands Are: Colorado* (ca. 2007). Many of the stream segments identified in this excellent report were too small to be recorded in this survey.

8. Western Rivers Conservancy, essentially roadless and dam-free reaches. These are nearly roadless reaches of 20 miles or more, as identified on DeLorme atlas of Colorado.

Appendix 1: Assessing the Quality of Rivers

To assess the qualities of rivers, the WRC survey used two sets of criteria. The first set were minimum requirements to be considered for a base-list of the best natural rivers. The second set addressed quality indicators—the specific values that indicated which rivers were the very best.

MINIMUM CRITERIA

Five minimum criteria were considered:

1. Free-flowing current. Free-flowing reaches of rivers are those that remain with their currents, riverbeds, shorelines, valleys, and canyons unblocked by dams. These reaches continue to benefit from floods' scouring and replenishment, they lack dams as barriers to fish migration, and they are more likely to retain ecological functions. Dams are so ubiquitous throughout the West that in many states only limited free-flowing reaches of rivers remain.

2. Reasonably natural flow regime. Natural flow regimes permit the full complement of native flora and fauna to thrive. Reaches that are de-watered or heavily diverted usually lack much of their native fish and wildlife and were not included in this survey, though rivers with minor diversions were considered. The more-natural the flow regime, the better.

3. Good water quality. High water quality is a foundation for much of the life in rivers. Heavily polluted reaches were not considered.

4. Non-urbanized shorelines. Most urban riverfronts no longer have intact corridors of riparian plant life; rather they are encased by impervious surfaces that contribute to extreme flow fluctuations and tend to aggravate problems of sedimentation and pollution. Conversely, undeveloped and undisturbed shorelines with their green band of riparian vegetation provide shade, temper flow and temperature, filter sediments, and offer habitat for wildlife. For this reason, urban rivers—though extremely important to society—were not included in this survey of the best natural streams. But occasional small towns and rural development did not bar a river from inclusion.

5. Outstanding natural features. One or more of these should be present. These include superlative scenic, geologic, hydrologic, fish, and wildlife qualities. (Historic and cultural values were excluded because they are an indicator of human activity and do not necessarily represent natural values.)

QUALITY CRITERIA

Beyond the minimum requirements (which yielded a very long list of rivers), the following four quality criteria were used to determine which rivers best retain their natural values:

1. Biological health. In keeping with the strategic plan of the WRC, this was the most important criterion. The best rivers should have intact and functioning ecosystems, with most of the native fish and wildlife species present. This survey identified rivers with exceptional biological diversity, healthy fisheries, and natural riparian corridors.

To date, no uniform or comprehensive evaluation of the biologically healthiest rivers has ever been compiled for the West, though the Environmental Protection Agency is currently working on this goal, and some states have inventoried at least small (wadeable) streams for biological integrity. Even at state or regional levels, there is little information that indicates cumulative biological values of all rivers. To make determinations in this regard, the survey consulted with biologists working for state fish and wildlife departments, state natural

heritage programs, and federal agencies including the U.S. Geological Survey, Fish and Wildlife Service, and Forest Service. We also consulted some of the Nature Conservancy's ongoing ecoregion planning programs. These local experts often provided the best judgments available regarding biological values.

In evaluating rivers' biological health, the survey considered high value fisheries as ranked by state agencies and the American Fisheries Society, valuable fisheries listed by the organization Trout Unlimited, inventories of riparian conditions, and other biological data. Rivers with intact native assemblages of fish were favored over rivers where introduced species, such as pike, brown trout, and rainbow trout have become dominant (even though these fish may be popular with many anglers).

Wildlife and plantlife are also important indicators for biological health. The survey considered keystone species such as cottonwoods, healthy populations of rare species otherwise in danger throughout much of their ranges, and other fauna and flora of special interest. Federal and state endangered and threatened species and species of special concern were also considered.

2. Wilderness and roadless areas. Rivers with the least development generally rank highest in natural quality. For this reason, the survey noted rivers flowing through designated wilderness, through roadless areas, and through publicly owned land. For some states, the survey consulted comprehensive proposals for wildland protection that identified large blocks of undeveloped and roadless terrain. For some states (generally those lacking other lists indicative of wilderness), we conducted our own survey of roadless conditions by consulting with DeLorme atlases.

3. Recreation suitability. Though not necessarily an indicator of natural quality, river-based recreation often depends on high natural values. Thus the survey includes recreation as an additional and related category of interest and consideration. Three river-based recreation activities that depend on natural qualities were noted: fishing, river running, and backpacking.

4. Length. Though short rivers or river segments may have great natural values, rivers and tributaries with long free-flowing reaches provide the greatest range of interconnected aquatic habitat. Connectivity is especially important for migratory fishes that depend on a range of habitat conditions for different phases of their life history. In some cases, connectivity is also important for the transfer of nutrients within river systems and from oceans to rivers. For these reasons, the survey considered longer free-flowing reaches better and focused on rivers 25-miles or more in length but did not necessarily exclude short streams.

Threats to the qualities of a river were not considered criteria for selection. This is not a list of the "most endangered" rivers. The survey, however, does note some threats to specific rivers. Consideration of these problems may be important in conservation strategies that will follow.

In addition to these specific criteria, the survey set out to include rivers that represented the full diversity of the West's biology and terrain. Recognizing the importance of biological and natural diversity, we included at least one river from each ecoregion, based on vegetation and shown on the U.S. Forest Service's map, Ecoregions of North America.

RATING THE RIVERS

To analyze these criteria for rivers West-wide, data were obtained and tabulated for hundreds of rivers on a state-by-state basis. The resulting state-by-state tables became the integral

foundation for evaluating and ranking waterways for the WRC survey. Each table lists a large number of high-quality rivers considered for the survey (100-300 for each state), the sources that have identified the river for its exemplary natural qualities, the types of qualities that are recognized, and the ecoregion that the river flows through.

Sources consulted include the National Wild and Scenic Rivers system, National Wild and Scenic study rivers, state-designated wild and scenic rivers, the Nationwide Rivers Inventory conducted by the National Park Service, rivers recommended for protection by the U.S. Forest Service and Bureau of Land Management, and streams identified in other regional planning efforts, such as the Columbia Interior Basin Ecosystem Management Plan. Additional sources were used for specific states, ranging from articles in the American Fisheries Society journal to state lists of the best water quality, top fisheries, and other natural features. Of comparable importance, the survey consulted on-the-ground experts from natural resource agencies and western universities to supplement and corroborate information about the biological values of the rivers.

The tables also list the final rankings given to streams on the basis of comparative analysis. In these rankings, A represents the most valuable natural rivers. B applies to rivers of very high value but that might occur in the same region as an A river and that have somewhat less quality or significance. C rivers lack the superlative qualities of A and B rivers or represent the second- or third-highest ranking stream in their particular region, or they have valuable qualities but also one or more significant problems.

In the main body of this report, state-by-state chapters include narrative sections that begin with an overview of the state's river system, one-page profiles of each A-, B, and C-listed river, and a description of notable river "regions" where clusters of high-quality streams are found. In this regard, advantages can be gained by protecting identifiable clusters of streams in order to safeguard continuous aquatic habitat, to conserve landscape-scale wildlife habitat in adjoining basins, and to minimize "edge" effects that can damage rivers even when the source of degradation might be distant.

Colorado's Great Rivers: List

