

# *Great Rivers of the West:* **ARIZONA**

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TIM PALMER



**WESTERN RIVERS**  
CONSERVANCY

Report prepared by Tim Palmer and Ann Vileisis





*Colorado River at Mile 50. Cover: Salt 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](http://www.westernrivers.org), or you may contact me at [sdoroff@westernrivers.org](mailto: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 large, flowing loops.

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



*Salt River, Apache Trail*

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.





*Little Colorado River*

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**

**W**estern 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 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.”



*Verde River*

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, seven 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 Arizona's Great Rivers

Lying squarely in the dry latitudes of the Southwest, Arizona is unequivocally a desert state. Although it lacks high mountain peaks that can rake a lot of moisture from passing clouds (the way the Sangre de Cristo do in New Mexico, or the way the Independence, Ruby, and Snake Ranges do even in Nevada), Arizona has much terrain that can be considered mountainous. Its northern half lies within the redrock-sandstone empire of the Colorado Plateau, and its southern half and western edge are an extension of the Basin and Range province, with small mountains separated by dry valleys. Arizona's ecoregions reflect the underlying pattern of these landforms. A wide range of desert plant communities thrive, including those of the Colorado Plateau in the north and central areas, those of the Sonoran Desert—a drier habitat of the American Semi-Desert in the southwest—and those of the Chihuahuan Desert in the southeast. In addition, a belt of rugged mountains through much of the center and east-central parts of the state manage to coax some measure of rain and snow out of passing clouds and support a diverse woodland community of pines and oaks.

Most of the “waterways” here are intermittent—dry most of the time, but raging when intense monsoon rains move up from the Gulf of California and flash floods hit. Arizona's rivers were not always this way. Historic accounts describe life-filled streams where we now typically have dry and sharply eroded washes. Profound environmental changes have occurred since settlers first brought cattle and sheep that overgrazed the native plantlife, exposing and compacting fragile desert soils. But, some rivers still run, and a handful of these are exceptional.

Like other desert states, Arizona's greatest river arteries (the Colorado and the Gila) flow from high mountains lying upstream beyond the state boundary. The Colorado, which flows here in the Grand Canyon, is in a class by itself—nothing compares nationwide, or for that matter, on the globe. Even the exceptional, long, wild, canyon reaches of the Colorado and Green Rivers in Utah seem small

next to the Colorado in the Grand Canyon, with its 5,000-foot-deep chasm, its thunderous flows, and its epic 250-mile length without dams, roads, or bridges.

With myriad intermittent tributaries fingering across Arizona, the Colorado collects any and all the runoff that might flow from the state's drylands and mountains. However, runoff is sparse, and almost all the Colorado's smaller tributaries are dry arroyos, sun-baked riverbeds, and calcified rocky washes for much of the year. The big river also gets water from parts of western New Mexico (via the Gila) and a minor node of northern Mexico that tilts north into Arizona via the San Juan River.

Arizona's other major artery, the Gila, flows from mountains in New Mexico, traverses the entire state east-to-west, and joins the Colorado at its very lower limits in the U.S., at the town of Yuma. With a watershed covering about half of the state's area, the Gila enjoys more runoff than the northerly and westerly watersheds that drain into the Colorado. Arizona's central and eastern mountains



Colorado River

give rise to the Black, White, Salt, Verde, and other streams that all join the Gila during the spring or summer seasons of snowmelt or rain. However, nearly all but the largest streams—and often they as well—dry up after the runoff stops or when the meager flows are dammed and diverted for agriculture and booming Sunbelt growth. As a consequence, despite its length and tributaries, the Gila is dry most of the time in its lower half. Even though flows drop low in the headwaters as well, the Gila in its upper reaches remains one of the Southwest's most remarkable streams.

Diversions for agriculture and booming suburban growth are typical not only in the Gila basin, but they strain and stress rivers throughout the state. In addition, extensive logging of most of the dryland forest—sparse and stunted as it often is—has significantly degraded rivers by diminishing the capacity of their watersheds to absorb water during rainstorms. In the past, forests held water and then slowly released it later in a way that benefited both the life of the streams and the people living along them. Now, water runs off rapidly and erratically, causing damaging erosion and sedimentation. Mining has also affected Arizona's rivers with massive watershed disturbances and leachate from tailings.

Though native fish in all the West's desert states face serious challenges to survival, Arizona has the dubious distinction of having the highest percentage of its native freshwater fishes at risk of extinction—63 percent. For comparison, in Utah, 58 percent of native fish are at risk; in Nevada, 52 percent; and in New Mexico, 30 percent. (TNC, *Rivers of Life*, 1998). In Arizona, twenty-four native fishes are at risk. Throughout the Southwest, 11 fish species have already gone extinct, mostly victims of dewatering and exotic species. The Southwest Center for Biodiversity has estimated that, unless major changes are made regarding land and water management, most of the region's native ichthyofauna will face extinction in the coming decades. None of Arizona's rivers have truly viable populations of native fish. Almost all have been extirpated by diversions, dams, over-grazing, and especially the introduction of exotic fish, including popular game fish. The native fish have been eliminated from virtually all the sizable rivers, and survive only in smaller tributaries that are remote, undiverted, and

seldom visited. Efforts to reinstate natives into larger streams are without exception met with resistance from sport anglers because the introduced gamefish or catfish need to be eliminated for the natives to survive.

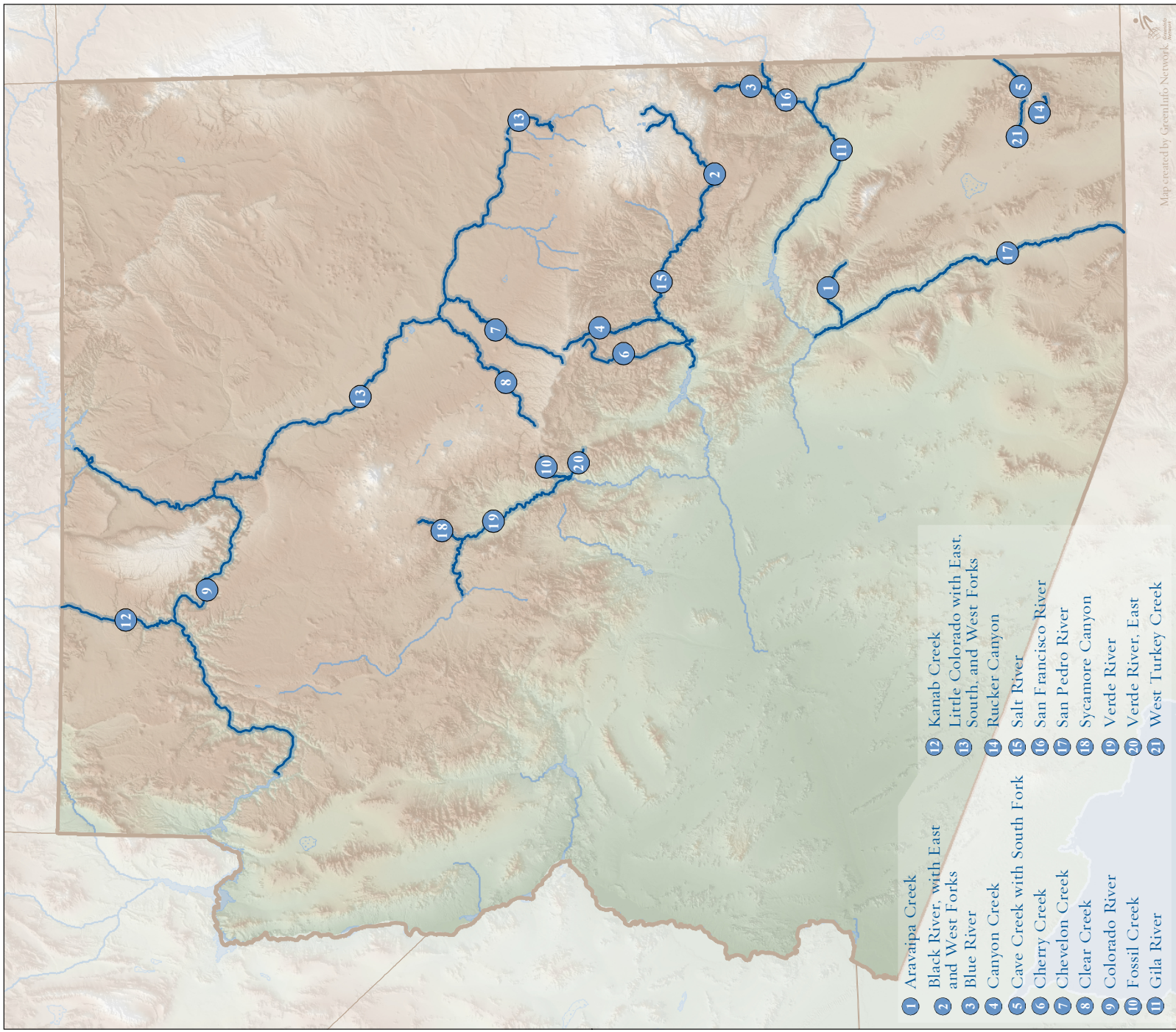
Remnant native populations make streams such as Arqavaipa Creek, the Little Colorado, Rucker Canyon, and tributaries to the upper Gila, Verde, and a few others all the more valuable for conserving biodiversity. The native Apache trout, which was extirpated from all its original range, has been reintroduced into a few streams in the upper Salt and upper Little Colorado basins, but hope for restoring this species and other native species will depend on restoring and conserving their habitat.

In the course of the Arizona survey, we counted about 20 perennial streams having roadless reaches of 10 miles or more. With few listings of high-quality rivers available here, this accounting of wildness became an especially important part of our Arizona analysis. Unlike many roadless reaches of rivers in the wetter regions of the Rocky Mountains and the West Coast, most of the roadless canyons here do not have trail access either. The state's longest roadless reach, by far, is the 250 miles of Colorado in the Grand Canyon. The Little Colorado appears to run for 56 miles without roads, the Black River for 48 miles, Clear Creek for 40 miles, and the Verde River and Navajo Creek each for 38 wild miles.

Only one river—the Verde for 41 miles—is designated in the National Wild and Scenic Rivers system. Some others have comparable values; 13 rivers, for example, have reaches of 20 miles or more that are dam-free, nearly roadless, and in a relatively natural condition. These and other streams are worthy of protection through federal, state, or local programs, or through the work of land trusts and local watershed associations. ■



# Arizona's Great Rivers: List



# Arizona's Great Rivers:

## River Narratives

### ARIZONA'S "A" RIVERS

#### Aravaipa Creek

This small waterway is considered by The Nature Conservancy and others to be the most important stream in Arizona for native fish.

From a high valley between the Pinaleno Mountains and the Galiuro Mountains, Aravaipa Creek flows northwest for nearly 50 miles to its confluence with the San Pedro River northeast of Tucson.

The creek dries-up in many sections, yet it has remained an isolated stronghold of native fishes that have been extirpated elsewhere. Much of the river's upper 25 miles run through a thin belt of private land with state-owned land on the slopes above, rising to higher mountains in the Coronado National Forest. In its lower reaches, the river turns west and drops steeply through the Aravaipa Canyon Wilderness for several miles while the road veers away to the east. The creek then joins the San Pedro River, which continues north to the Gila River, though major sections are often dried-up.

The creek supports seven native species: the desert sucker, Sonora sucker, longfin dace, speckled dace roundtail chub, loach minnow, and spikedace. The spikedace occurs in no other stream. Lacking dams or large diversions, the Aravaipa's hydrologic complexity of pools and riffles is largely intact, as is its natural hydrograph, and native fishes tend to compete better than introduced fishes when confronted with the hazards of peak floods alternating with extremely low flows.

Increasing development and resulting water consumption in the



*Gila River*

upper basin may pose problems to the native fish.

#### Gila River

As it flows through wild canyons of eastern Arizona, the Gila continues downstream from its wild headwaters east of the state line (see the New Mexico section of this report).

After the Gila enters Arizona, it winds for eight miles through a broad valley with roads, railroad tracks and several small towns, including Duncan. The valley narrows as the river continues to run for about 24 miles through private land along the waterfront with





*Kanab Creek*

state and BLM land on the hillsides. Then the roads and track leave the river again, and the Gila enters its first wild section in Arizona. This 26-mile reach—beginning upstream from the mouth of the San Francisco River (see New Mexico section of this report) and extending beyond Bonita Creek—is largely wild and unroaded, and 23 miles of it is designated as the Gila Box Riparian National Conservation Area, managed by the BLM. A 10-mile section here through the Conservation Area is completely roadless. This “Gila Box,” section is known for its steep cliffs, colorful bluffs, deep canyons, and healthy riparian vegetation. According to the Nationwide Rivers Inventory, the canyon provides habitat for birds of prey that is “unexcelled” in Arizona. The reach is also considered excellent for paddling. The river is dominated by non-native fishes; natives are typically found only in tributary refugia.

Beyond this canyon, the Gila enters the Safford urban area and soon becomes heavily encroached upon by roads and highways, agriculture, and land development. Farther downstream, the river is impounded by Coolidge Dam.

Immediately below Coolidge, the Gila enters its second wild

canyon in Arizona. For 10 miles the river runs through a gorge without roads or trails, but flows are heavily affected by the dam upstream.

When combined with the outstanding 130 miles of the Gila in New Mexico, the 58 miles of the upper Gila in Arizona make a 182-mile-long corridor of dam-free river. With the exception of the lightly developed eight miles in far eastern Arizona, most of the river’s route to San Carlos Reservoir behind Coolidge Dam is wild, semi-wild, or lightly developed.

In its entirety, the Gila basin covers half the state. The river and its tributaries historically supported 18 native fish species. One of these is extinct, 10 are listed as endangered or threatened, and most others are imperiled but not officially listed.

## **Kanab Creek**

With excellent water quality, Kanab Creek flows through remote and roadless country, starting in aspen-forest uplands and dropping to the redrock depths of the Grand Canyon. This is the second-largest tributary entering the Colorado River within the Grand Canyon. (The Little Colorado is the largest.)

The stream begins in Utah, on the Paunsaugunt Plateau in Dixie National Forest, and flows south for 40 miles—with a 10-mile roadless reach—to the town of Kanab. Crossing into Arizona, it runs for 5 miles through the Kaibab-Paiute Indian Reservation and then enters a magnificent 56-mile roadless reach plunging downward through canyon country, ultimately dropping 5,000 feet to its confluence with the Colorado River in the bottom of the Grand Canyon. The creek passes through BLM land and then through the Kanab Creek Wilderness of Grand Canyon National Park. The Nationwide Rivers Inventory states that native fish spawn in the creek.

## **Verde River and East Verde River, Fossil Creek, and Sycamore Canyon**

The Verde River flows through headwater reaches that still

harbor native fish, a wild canyon with spectacular scenery, a forest of saguaro cactus, and a riparian belt with excellent habitat for birds and other wildlife.

Roughly 160 miles long, the river begins at a minor impoundment, Sullivan Lake, near Paulden (southwest of Flagstaff), and flows east and south as a small stream for about 20 miles through private, state, and national forest land with only occasional unimproved roads near the stream. A 64-mile stretch follows through rugged canyons and then a broad valley, with a railroad track alongside and with roads and communities peppered enroute, as well. Then, below the town of Camp Verde, the river enters an exquisite 38-mile roadless reach. Below there, the lower Verde has two major reservoirs in a span of 26 miles, followed by a final eight miles of flowing river through the Fort McDowell Indian Reservation before meeting with the Salt River east of Phoenix.

Small tributaries upstream from Camp Verde are known for their surviving native fish species. Twelve fishes historically occurred here; owing in part to reintroduction efforts, nine native species can be found today. The Nature Conservancy considers this to be the second-most important native fishery in the state (after Aravaipa Creek). The Verde is a rare sizable stream that still harbors some native fish, and a reintroduction program aims to reestablish 12 native species in the basin.

For recreation, wildlife, and desert plantlife, the Verde's middle, roadless reach is premier. Nearly 41 miles here were designated in the National Wild and Scenic Rivers system in 1984—Arizona's only stream in the national system. This reach is known for its beautiful landscape and habitat, and flows through what may be the finest saguaro cactus forest anywhere that is accessible by river travel. Bald eagles nest in cottonwoods, though the trees ceased regenerating about 100 years ago, presumably owing to effects of heavy grazing. The Forest Service is now attempting to protect critical areas for regrowth. Almost all of the designated corridor is public land, but only about half of the Verde's mileage eligible for the National Wild and Scenic Rivers system was designated.

The East Verde River is the least disturbed part of the Verde River watershed. This stream flows into the main stem from the

east. Its upper 10 miles include road access to popular recreation sites and a beautiful canyon and valley with sycamores and other riparian plantlife. The middle river is a 12-mile roadless canyon to the Highway 87 crossing, followed by a 15-mile roadless reach through the Mazatzal Wilderness to the main stem Verde River. The East Verde still has some of its native fish.

Fossil Creek enters the main stem Verde three miles upstream from the East Verde after flowing southward for about 16 miles. Its steep upper pitch, called Sandrock Canyon, flows through the Fossil Springs Wilderness. Throughout its length this small stream drops through a deep canyon with nominal road access. Diverted for decades by a hydropower project, water has recently been returned to Fossil Creek. The native leopard frog has survived, and is thriving again. In 2004 the U.S. Forest Service stocked the newly restored stream with native fishes, including the desert sucker, Sonora sucker, headwater chub, roundtail chub, longfin dace, and speckled dace. These are all propagating well, with the potential of making Fossil Creek an outstanding reclaimed river and a criterion



*Verde River below Camp Verde*

TIM PALMER



stream with native fishes. Ironically, the fact that all streamlife had been obliterated by the hydroelectric project made it possible to reintroduce the native species without competition from introduced game fishes

Sycamore Canyon is a major upper Verde tributary of about 30 miles, entering from the northeast. Its spectacular, steep canyon sides with colorful rock strata and tributary gorges are reached by a popular hiking trail through the 21-mile-long Sycamore Canyon Wilderness.

The Verde watershed is seeing rapid growth; its population is predicted to increase by 143 percent between 1994 and 2040. Increasing demands for water—even when obtained from underground aquifers—will likely continue to deplete instream river flows to critically low levels.

## ARIZONA'S "B" RIVERS

### Black River

Deep in the mountains of the Fort Apache and San Carlos Indian Reservations, the Black River has the third-longest roadless mileage among all rivers in Arizona and is centerpiece to some of the best river-wildness in the state. The Black and White Rivers join to form the Salt. At the confluence, the Black is the largest of the two, and thus, it is the upriver extension of the Salt River—the major riparian artery of central Arizona north of the Gila and ultimately the major tributary to that river.

Beginning in east-central Arizona with the North Fork of its East Fork, the Black River flows from a popular forest and lake recreation area of Apache National Forest in east-central Arizona and soon plunges down the face of the Mogollon Rim—a dramatic escarpment separating the Colorado Plateau from the Arizona mountains to its south. After this upper reach of about 36 miles, the main stem cuts into a lower plateau and runs for about 64 more miles through a maze of rugged and nearly roadless country. This

entire lower reach is within the Fort Apache and San Carlos Indian Reservations.

Riparian forests can be found along much of the river's length, and pinyon and juniper forests cover the slopes rising beyond. The Nationwide Rivers Inventory calls this a "high quality trout fishery." Native fish, however, have largely been extirpated. Native Apache trout have been reintroduced into a number of the tributaries by the White Mountain Apache Tribe, which has a growing interest in managing the watershed for native fish. Bear Wallow is one of the more intact and beautiful small tributaries with reintroduced native trout.

### Blue River

The major Arizona tributary to the San Francisco River, the Blue flows dam-free and undeveloped with major springflows, wild canyon country, and habitat for raptors and other wildlife.

Counting its headwaters of Campbell Blue Creek, the Blue River flows for about 62 miles through the rugged mountains of east-central Arizona. Upper reaches are accessible by recreation roads in Apache National Forest. Then the river drops into wilder canyons, running 24 miles with almost no road access. With its flow and habitat, the river is a critical part of the San Francisco and upper Gila River complex of outstanding wild rivers of western New Mexico and eastern Arizona.

Non-native trout have been stocked in this river, but a barrier to their migration may be put into the river and the native Gila trout reintroduced.

### Little Colorado with East, South, and West Forks, and Chevelon and Clear Creeks

As the largest tributary to the Colorado River within the Grand Canyon, the Little Colorado runs for 290 free-flowing miles. Much of its length has no roads, and its lower reaches are important habitat for the endangered humpback chub. Two tributaries, Chevelon and

Clear Creeks, also flow for long, wild distances.

The Little Colorado begins in the same highlands of Apache National Forest that feed the Black and San Francisco Rivers but flows in the opposite direction. From a dozen tributaries, including its West Fork, the Little Colorado starts its long, desert-bound journey north and westward, sharing its valley with Highway 180. Native Apache trout are being returned to portions of the West Fork and other tributaries. After about 20 miles, the main stem pools into Lyman Lake behind a small storage dam. Below there, the river flows dam-free for the rest of its length.

The wildest section of the river lies downstream from the town of Winslow, where the essentially roadless river flows through the Navajo Indian Reservation and past the multicolored rocks and hills of the Painted Desert. Highway 89 crosses the river just above the beginning of the Little Colorado Gorge, which continues for 56 miles in a deepening canyon through the Little Colorado River Gorge Navajo Tribal Park. Very much like a “little Grand Canyon,” the stream meets the Colorado River in the depths of the stunning Marble Canyon section of the Grand Canyon.

The endangered humpback chub, which cannot survive in the Colorado’s cold, dam-released water, persists in lower reaches of the Little Colorado much like it did throughout the Grand Canyon before Glen Canyon Dam was built upstream. Near the Little Colorado’s mouth, water that is milky-blue from calcium creates spectacular travertine terraces, pools, and riffles before the river’s modest average flow of 244 cubic feet per second joins the mighty main stem.

Headwaters of the Little Colorado are the East, West, and South Forks, which rise high on the northwest side of Baldy Peak, 11,403 feet, in the Sitgreaves National Forest—a popular recreation area with scattered lakes. Native Apache trout have been reintroduced to these streams.

Outstanding tributaries are Chevelon Creek, joining the Little Colorado just above Winslow, and Clear Creek, which flows in at Winslow. Without the highway and road intrusions, these nearly roadless streams might be considered wilder “sources” of the Little



TINA PALMER

### *Little Colorado River*

Colorado than its own upper main stem.

Chevelon begins on the Mogollon Rim and flows for 12 miles through an upper canyon thick with conifers and other trees in Sitgreaves National Forest. The unusual plains-grassland here has been identified by the Department of the Interior as a potential national natural landmark. A recreational fishery has been stocked with non-native fish, but the creek still supports the Little Colorado spinedace—a native whose range is now very limited. The creek is then impounded in Chevelon Canyon Lake. Five miles downstream at Mormon Crossing Road, the creek begins its nearly roadless course north for 52 more miles toward the Little Colorado, passing through private land that is mixed with state parcels and some BLM acreage.

A twin to Chevelon, Clear Creek takes a parallel course just to the northwest and flows for 40 roadless miles before Highway 99 crosses just above the confluence with the Little Colorado in Winslow.

### *Salt River with Canyon and Cherry Creeks*

This spectacular section of the Salt is sometimes called a “mini-





*Salt River in Salt Canyon*

Grand Canyon.” It is habitat to three federally listed endangered species and is a one of the Southwest’s best whitewater paddling runs.

The Salt River begins at the confluence of the White and Black Rivers. It immediately drops into a deep canyon of layered, sedimentary rocks, with large rapids and no road or trail access for about 28 miles to the Highway 60 bridge. Then an unroaded canyon continues for another 45 miles to the backwater of Roosevelt Dam. This entire reach of about 73 miles is nearly roadless and flows swiftly through a spectacular canyon. Three endangered species are found here: the bald eagle, Mexican spotted owl, and Colorado River pikeminnow.

Four fine tributaries also enter from the north within this reach. First, Carrizo Creek flows south from the base of the Mogollan Rim, and its lower 25 miles are essentially roadless. Downstream from Highway 60, Cibique Creek similarly flows southward from its source near Carrizo Creek, and its lower 20 miles are nearly roadless. In another 10 miles downstream, Canyon Creek also flows from the north with 34 miles that are nearly roadless. All three creeks run for most of their lengths through the Fort Apache Indian Reservation. Farther west, Cherry Creek flows from the north with unimproved roads nearby but not along the stream. Both Cherry and Clear Creeks are listed in the Nationwide Rivers Inventory as valuable natural streams.

Below the massive reservoir formed by Roosevelt Dam—the first dam built by the Bureau of Reclamation and recently reconstructed—the Salt River is repeatedly dammed and depleted. It picks up the nourishing flow of the Verde River, and then is completely diverted as it approaches the Phoenix urban area. The normally-dry channels of the Salt and Gila meet in Phoenix, and run only when storms and high runoff flood these two streams that were once the freshwater arteries of central Arizona.

### **San Francisco River**

See the New Mexico section of this report for coverage of this im-

portant Gila River tributary.

## ARIZONA'S "C" RIVERS

### Cave Creek and its South Fork, Rucker Canyon, and West Turkey Creek

These four streams of the Chiricahua Mountains in far southeastern Arizona are beautiful desert waterways, and some are habitat to rare endemic fishes. Cave Creek flows through a fabulous cottonwood forest and is an internationally recognized birding location.

Flowing from the northeast side of the high Chiricahua Mountains, the South Fork of Cave Creek meets the main stem and both flow for a few miles to the community of Portal before they sieve out across alluvium of the San Simon Valley and disappear. These streams are considered showcases of the Chiricahua Mountains. Flowing from conifer-clad peaks with clear water into a valley with lush cottonwoods, Cave Creek is a premier site for birds in the spring. Because of its strong flows, lush riparian belt, and far southern location, large numbers of bird species can be seen here. Sonoita Creek, farther west and near the Mexico border, is likewise an excellent location for migrating birds of many species, but that short stream lacks the diversity of habitat found along Cave Creek as it flows from its high mountain headwaters.

Flowing off the west side of the Chiricahuas, Rucker Canyon and West Turkey Creek are very small streams but support rare native fishes including the Mexican stoneroller, found more commonly in the Rio Yaqui system of northern Mexico.

### Colorado River

The Grand Canyon of the Colorado is in a class all by itself—probably the most photographed place in the American desert and a symbol of the national park system. It is the premier extended big-whitewater journey of the continent and perhaps the world, running

through massive rapids with vigorous flows, typically 30,000 cubic feet per second but peaking much higher. The combined depth, length, width, and roadless wilderness of the Colorado River through its greatest canyon is unrivaled anywhere, and hundreds of side streams—usually with intermittent flows—offer amazing enclaves and enchanting additions to the massive canyon itself.

Entirely within Grand Canyon National Park, the 275-mile river corridor from Glen Canyon Dam to the backwater of Hoover Dam is all public land and protected from development, however, the upriver dam has had highly disruptive and degrading effects on the biology and habitat of the river and its floodplain. Silt that once flowed continuously downriver is now trapped in Lake Powell, and the water that is released from the dam is cold, creating an aquatic environment inhospitable and fatal to native life that evolved with silty, warmer flows. Furthermore, the erratic rhythm of releases for hydroelectric power (even though they are now moderated compared to what they were in the 1980s) combined with water that is “hungry” for lack of silt, causes erosion of beaches and



South Fork Cave Creek

TIM PALMER





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### San Pedro River

floodplains without the matching deposition of silt that had been present with the natural river. Thus, the habitat of the canyon floor has been greatly reduced or eliminated. Experimental flood flows have done little to change the long-term prospects for the riparian health of this great river.

The Grand Canyon remains one of the more spectacular river sights in America, and the journey down its length is a highlight of almost any river runner's lifetime experience, but the nature and native biology of the canyon is being severely degraded, with little chance to curtail losses, given the presence of Glen Canyon Dam.

### San Pedro River

With its headwaters in Mexico, this is the southernmost stream highlighted in this survey of western rivers. For about 42 miles it flows through the San Pedro Riparian National Conservation Area

and is known for its excellent cottonwood and willow corridor, its native fish in small tributaries, and its diversity of birds.

Just east of the Huachuca Mountains, the small stream enters the United States. With intermittent flows, it winds north in a wide valley with the Fort Huachuca Military Reservation and the booming town of Sierra Vista to the west and the Tombstone Hills to the east. In spite of a railroad that runs parallel to the river, and some road access, the river still has an excellent riparian corridor. The BLM manages a narrow strip, half a mile or so wide and 35 miles long, as a Riparian National Conservation Area, with an emphasis on restoring riparian vegetation. The Nature Conservancy also has a preserve in this corridor.

Tributary streams including Hotsprings Canyon, Cherry Springs Canyon Creek, and Redfield Creek are refugia for endangered native fishes. Hotsprings alone has five native species and another four are planned for reintroduction.

Unfortunately, increasing water demand from the rapidly growing Fort Huachuca area has been drawing down the local aquifer, which, in turn, has led to depleted streamflows and desiccated sections of riverbed. ■

# Conclusion

Using 12 lists compiled by other groups or by agencies and the WRC, and several interviews with biologists and local experts, we found 99 rivers with high natural qualities. We sorted these streams into an A list of seven rivers, streams, including tributaries, a B list of 14, and a C list of six.

The following clusters of high-ranking natural rivers became evident in the survey.

## Little Colorado River system

The Little Colorado with its headwaters of the East, South, and West Forks, and its major tributaries of Clear Creek and Chevelon Creek together make an important system of relatively natural waterways. These offer habitat for surviving and reintroduced native fishes, long reaches of stream that are dam-free and roadless or nearly so, and remote river frontage that is undeveloped.

## Upper Salt River system

The Salt River above Theodore Roosevelt Reservoir has wild, unroaded mileage in rugged whitewater canyons and undeveloped and nearly roadless tributaries including Cherry, Canyon, and Cibecue Creeks. The extensive and wild Black River is the upriver extension of the Salt, with headwaters where native trout are reintroduced.

## Verde River system

The Verde system is one of the finest remaining basins for native fish, and the river passes through a spectacular landscape of mountain and desert scenery and diverse plantlife, including the finest saguaro cactus forest reachable by river. The headwaters

are one of the state's best areas for native fishes, the East Fork is a wild and remote tributary, Fossil Creek is a premier example of river restoration with native fishes thriving, and Sycamore Canyon is a magnificent recreation area and premier hiking destination. ■



East Fork Verde River

TIM PALMER



## Sources for the Arizona Survey

Arizona 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

- Heidi Blasius, Bureau of Land Management, fisheries biologist
- Amy Unthank, U.S. Forest Service, regional fisheries program manager

3. Arizona Nature Conservancy, high priority for conserving natural diversity. These are streams that were identified by the Nature Conservancy in 1985 as high priority for conserving natural diversity, as listed in American Rivers' Outstanding Rivers List, 1991.

4. Arizona Nature Conservancy, Freshwater Assessment summary.

These streams were identified in 2006 as some of the most important streams for native fish.

5. Western Rivers Conservancy, roadless reaches. Roadless reaches of 10 miles or longer, identified on DeLorme atlas of Arizona.

6. Western Rivers Conservancy, nearly roadless reaches. Nearly roadless reaches of 20 miles or more.

## 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. Wildness 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 wildness), 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

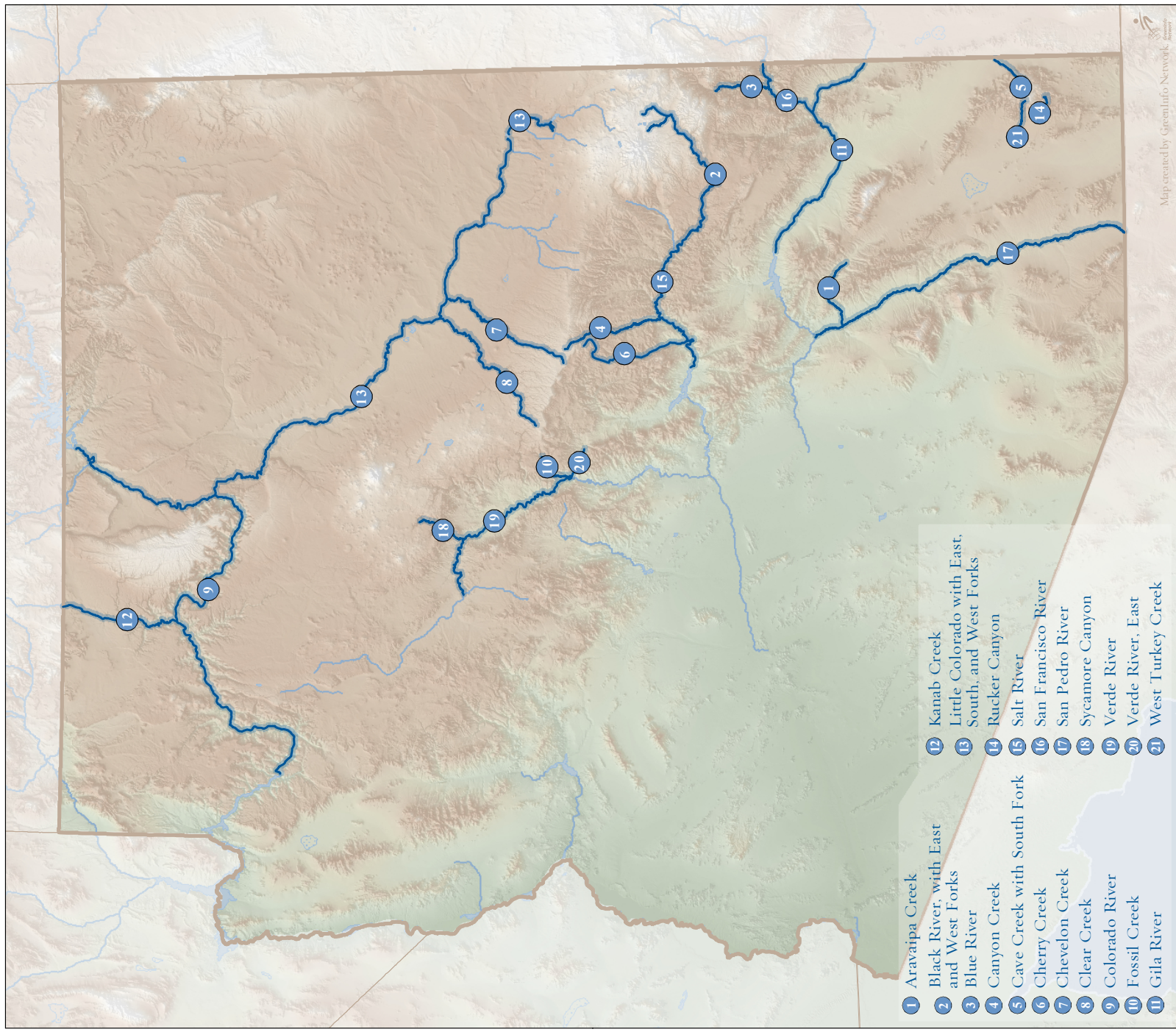
of the rivers.

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.



# Arizona's Great Rivers: List



WESTERN RIVERS  
CONSERVANCY