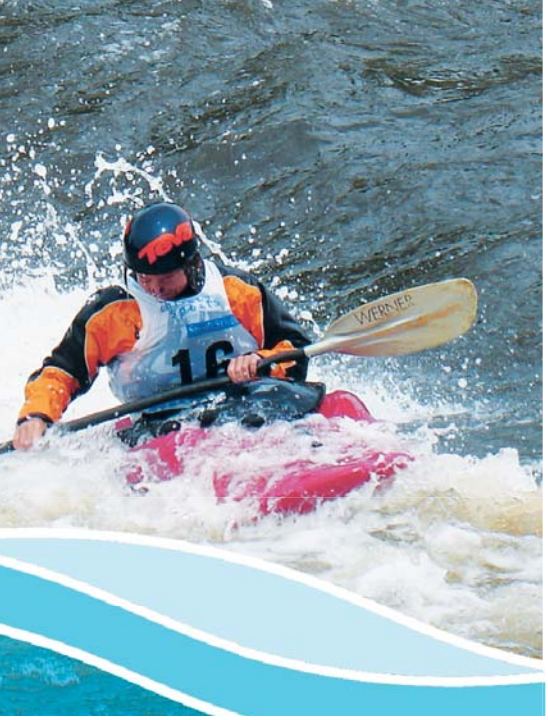

HEALTHY FLOWS FOR THE COLORADO RIVER BASIN

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The Colorado River is the economic and environmental lifeline for a vast area of the American West. The hard-working waters of this seven-state, binational basin sustain ranching and irrigated agriculture, big cities and small towns, and a variety of industries. The river and its tributaries, large and small, also attract tens of millions of visitors every year for fishing, rafting, bird-watching, hiking, and other outdoor recreation, generating billions of dollars in economic activity and thousands of jobs. Indeed, the financial contribution of recreation now significantly adds to that of agriculture in many of the basin's rural communities. Sparkling headwaters in the mountains and meandering streams in the lower desert altitudes also contribute to a quality of life that supports strong land values in rural areas, a vital attribute as the basin transitions from its historical roots in resource extraction to a dynamic information-age economy. The economic vitality across the basin's working landscapes — where a high percentage of farmers and ranchers and their family members earn a portion of their income off-farm — is intimately linked to healthy flowing streams and rivers.

The Colorado River, its tributaries, and its headwaters support an incredible variety of fish and wildlife, including native trout, warm water fish found nowhere else in the world, hundreds of species of birds, and a wide variety of mammals, from bats to bears. In many parts of the basin, however, historical and current water development activities, including dams, diversions, and exports that, while critical to the regional and national economy, have significantly reduced or altered river flows, threatening fish, wildlife, and river recreation.

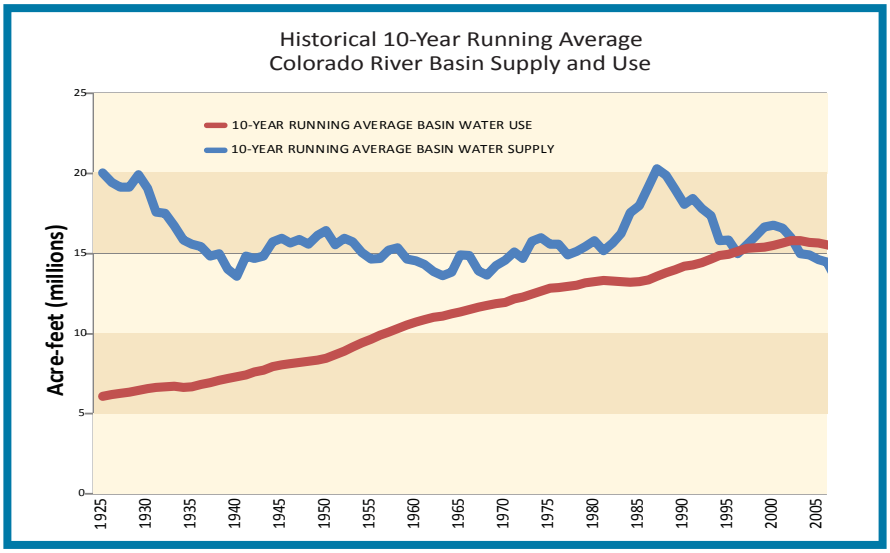
For example, between Yuma, Arizona, and the Colorado Delta in Mexico, the riverbed is dry most of the year. In the Upper Basin, more than 60% of the headwaters in Grand County, Colorado, are delivered to cities on the Front Range through the mountains, too often leaving some world-class trout fisheries in less than world-class condition. Large dams upstream of national parks, like Black Canyon of the Gunnison and the Grand Canyon, have altered river flows in ways that have damaged fish habitat, resulting in some fish being listed as endangered or threatened. Non-native trees, like tamarisk, have taken over the native vegetation so important to birds and wildlife. In the lower Colorado, less than 10% of native riverside habitat remains, with many areas covered instead in thick forests of tamarisk that interfere with riverside recreation and can be inhospitable to wildlife and people.

It is increasingly obvious that the current course of water development and use is not sustainable. On an annual basis, demand on the waters of the Colorado River already exceeds supply (Figure 1). Looking to the future, population growth — inside and outside the basin — will create intense pressure to use more river water. Scientists are predicting that long-term climate changes may reduce the quantity of and/or accelerate the timing of runoff, further constraining water availability. And while water management in the Colorado Basin has not reached the polarizing levels of conflict seen in some other western river systems, we find ourselves at a crucial crossroads. The time is now to change course and achieve a balance between healthy river flows and water supplies for irrigation, industry, and new housing developments. The economy, especially in rural areas, depends on achieving this balance. While meeting the many water needs in the basin presents real challenges, creativity and cooperation among all stakeholders can yield solutions. The intent of this document is to propose an approach for meeting the ecological and river recreation needs in the basin, recognizing that we cannot protect or restore every water body, in a way that integrates these needs with those of cities, agriculture, and industry. Our goal is to find mutually beneficial solutions.

In general, there are two categories of activities necessary to achieve and sustain healthy river flows in the basin:

- **Protection** of the current ecological function of river flows that have not already been highly altered
- **Restoration** of flows (and habitat) in selected degraded stretches of tributaries and the mainstem.

These approaches must, of course, be combined with ongoing efforts to increase the efficiency of water use in cities, industries, and agriculture to meet 21st century conditions. Such efforts often do not consist of one approach but rather a customized mix of strategies at varying scales. Achieving the desired outcomes in many areas may require operating existing water supply reservoirs and delivery systems with increased flexibility and efficiency to maximize flow benefits while continuing to satisfy water supply and hydropower needs. Voluntary leases and purchases of water rights, with appropriate protections for rural communities and the environment, will also play an



Source: U.S. Department of Interior, Bureau of Reclamation, *Colorado River Basin Water Supply and Demand Study,* Interim Report No. 1, June 2011.

FIGURE 1

> "It is increasingly obvious that the current course of water development and use is not sustainable. On an annual basis, demand on the waters of the Colorado River already exceed supply."

Gila River, NM. Photo courtesy of Tim Palmer.

important role. Finally, in some cases, appropriately scaled expansions of existing storage or development of new off-channel storage may be the most environmentally and economically sound option to meet new demands.

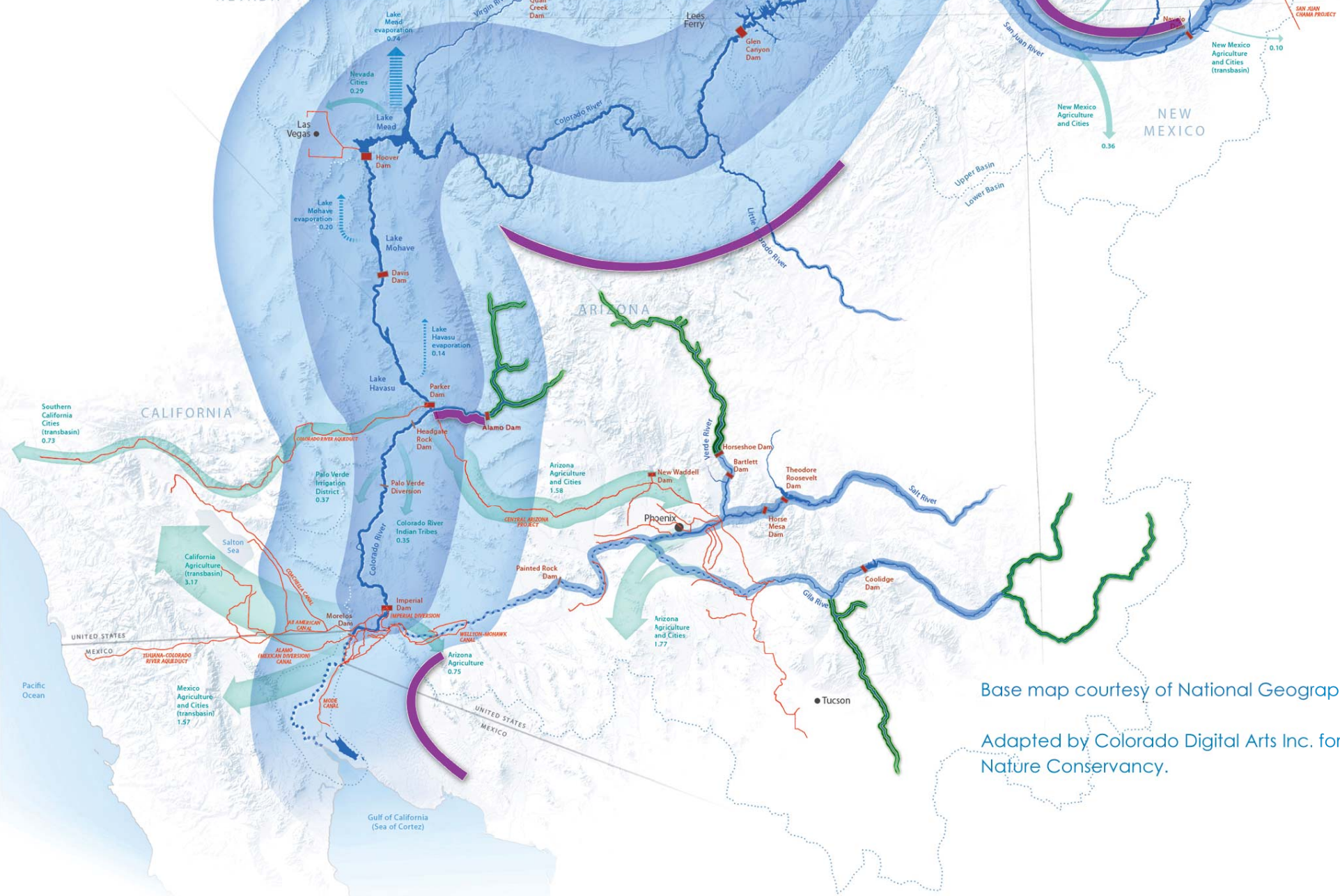
FLOW PROTECTION

Some headwaters and tributaries in the basin today have healthy flow regimes that support sound ecology and provide an important base for recreation and tourism-based economic development. For these reaches, new depletions should be limited to ensure that the flows necessary to protect current ecological integrity remain instream. In addition to many small headwaters reaches, the larger of these tributaries, roughly from north to south, include these rivers:

- Green above Flaming Gorge (Wyoming)
- Little Snake (Wyoming/Colorado)
- Yampa, White, Gunnison above Aspinall Unit, San Miguel (Colorado)
- Upper Virgin (Utah)
- Upper Gila (New Mexico)
- San Pedro (Arizona)
- Bill Williams above Alamo Reservoir (Arizona)
- Verde above Horseshoe Reservoir (Arizona)

Protecting flows in these and other tributaries and headwaters will require a combination of strategies. First, their protection means finding conservation and other alternatives to proposed large new diversions for out-of-basin use. Of major concern are out-of-basin diversions proposed from currently free-flowing and healthy tributaries in the Upper Basin and the Upper Gila. For example, the proposed pipeline from Flaming Gorge Reservoir to the Front Range in Colorado would have adverse effects on healthy flows on the Green River and Colorado River mainstem.

In addition, water-intensive energy development projects, such as the proposed nuclear plant in Green River, Utah, and oil shale development in the White-Green-Yampa rivers region, could put unsustainable

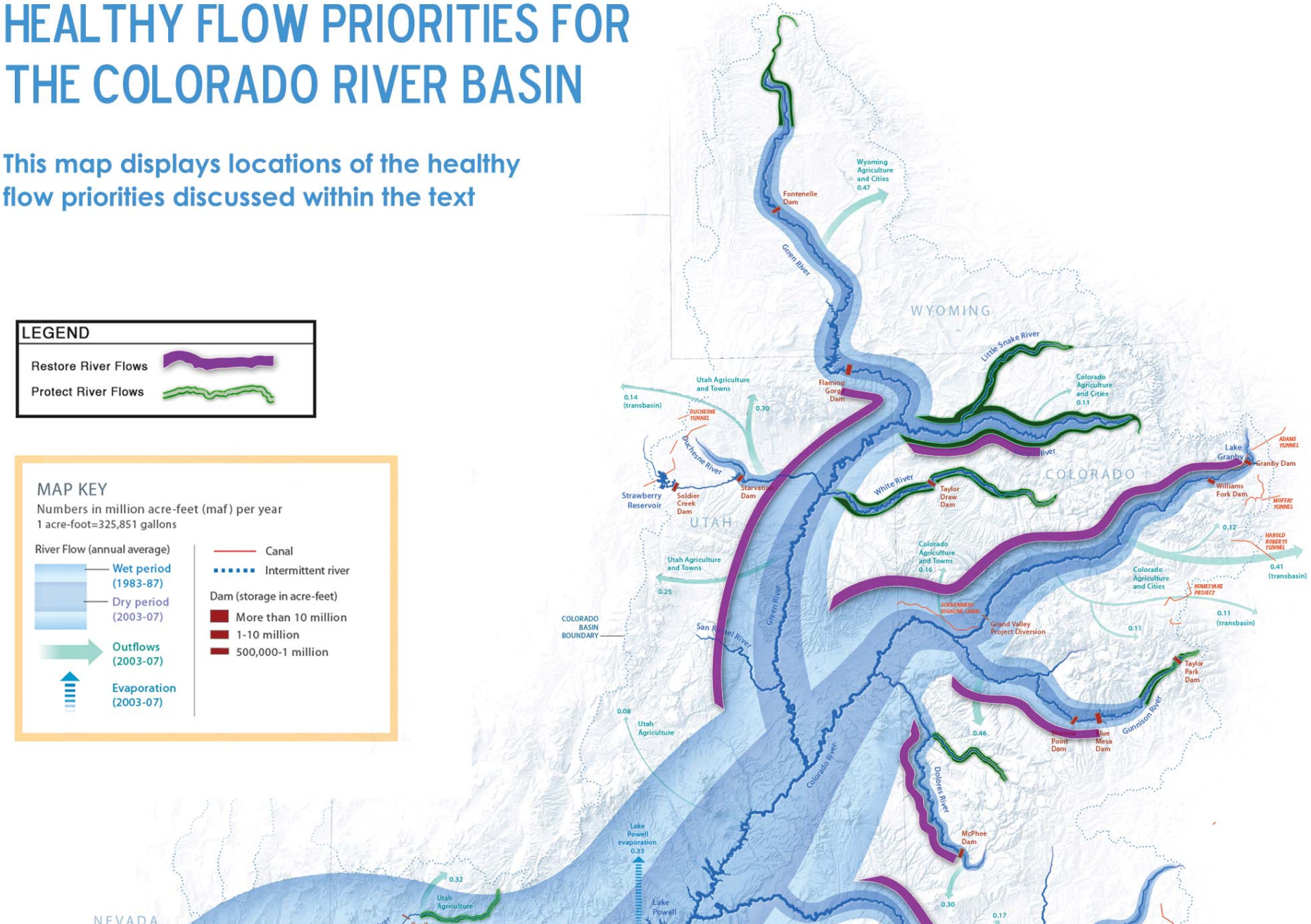


Base map courtesy of National Geographic.

Adapted by Colorado Digital Arts Inc. for the Nature Conservancy.

HEALTHY FLOW PRIORITIES FOR THE COLORADO RIVER BASIN

This map displays locations of the healthy flow priorities discussed within the text

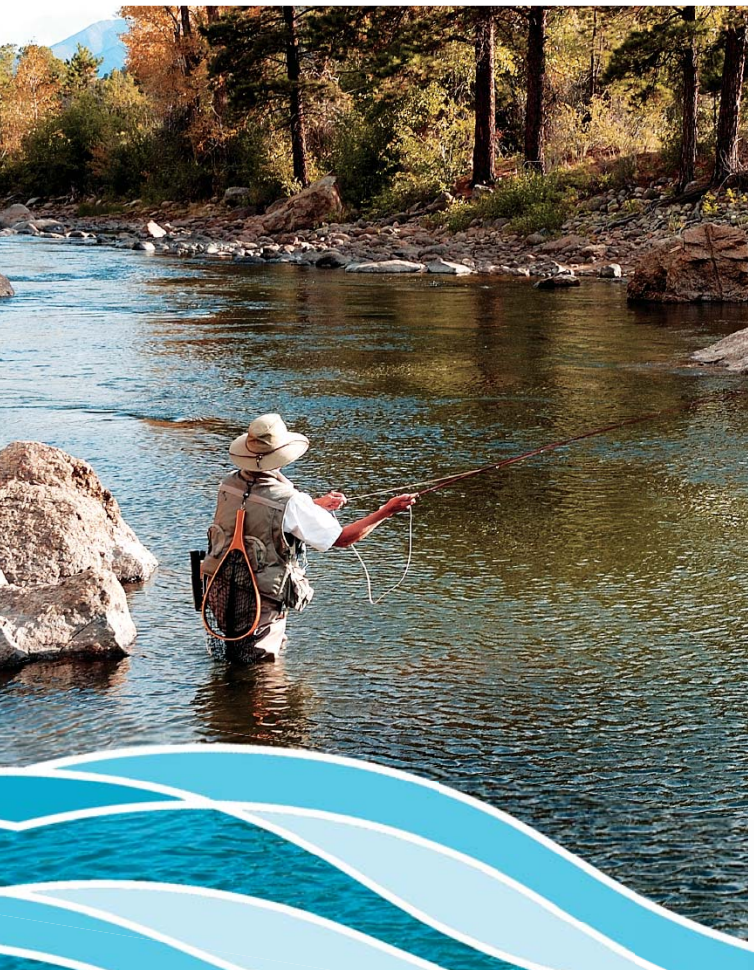


demands on key river segments. In some key upper Colorado headwaters, smaller diversions for in- and out-of-basin use might require mitigation. In the Bill Williams, Verde, and San Pedro rivers, it will be important to find alternatives to increased groundwater pumping in order to protect flows.

Second, sustained protection of certain now-healthy reaches would greatly benefit from the use of such state programs as Colorado's instream flow water rights or Utah's native fishery water leasing. In other areas, discussions are underway regarding how to employ federal programs to benefit flows and tourism.

MAINTAINING EXISTING FLOW RESTORATION ARRANGEMENTS

There are also places where flows currently are healthier, in part, because of intelligent management of existing dams and diversions. For example, agricultural operations often maintain late summer flows and wetlands. Also, some reservoir operations support irrigators and native fish. Maintaining healthy flows in these reaches will require continued oversight and active management. Priority river reaches for maintaining flow restoration include:



- Colorado River mainstem from its confluence with the Eagle to Cisco, Utah (including the continued allocation and delivery of stored water through the use of Green Mountain, Wolford, and Ruedi reservoirs)
- Yampa River flows that benefit from Elkhead Reservoir releases
- Operation of Colorado River Storage Project reservoirs to benefit fish and habitat in the Green River below Flaming Gorge, the Gunnison River below the Aspinall unit, and the San Juan River below Navajo Dam
- Operation of the Alamo Dam on the Bill Williams
- Implementation of the near-term and long-term flow experiments under the Grand Canyon Protection Act

NEW FLOW RESTORATION

Some highly altered, degraded reaches of the Colorado River, its major tributaries, and important headwaters need to be restored to achieve the goal of a healthy basin overall. While restoration is neither technically nor financially feasible in some places, others present the possibility for reviving lost river flows and habitat, adding resiliency to the basin as a whole and creating new assets for local communities around which to build recreation and tourism business.

The tools for achieving restoration vary with location but include re-operations of existing dams; voluntary, compensated water rights transactions; and water banking and downstream water exchanges. These tools have been proven effective in other parts of the West, but have not yet been fully deployed in the Colorado River Basin. Full restoration of some areas will also require tamarisk removal, re-vegetation with native species, removal of outdated barriers to fish passage, and other in-channel and riparian habitat improvements. Strategies that consist of increasing the scale or effectiveness of flow restoration in the places where it is already underway include:

- Encourage use of voluntary, compensated water rights transactions, increased agricultural efficiency, and other mechanisms to establish "water banks" in the Upper Basin. This will protect critical water rights in the event of a Colorado River Compact call

Virgin River near Zion National Park, UT. Photo courtesy of Tim Palmer.

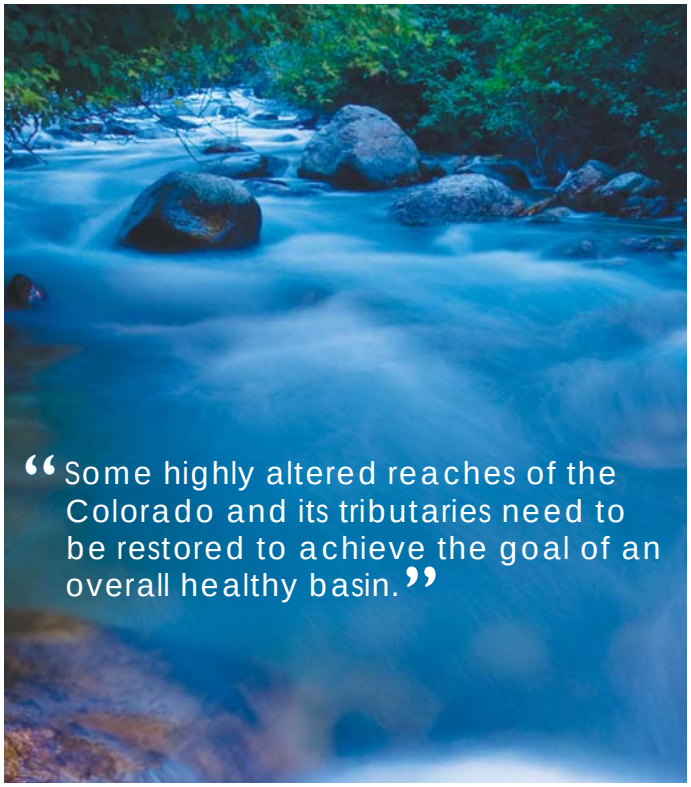
by the Lower Basin states, reducing the probability of such a call and potentially providing flow benefits for fish and wildlife, recreation, and tourism.

- Encourage flow transactions, operational flexibility and efficiency within irrigation districts (including infrastructure repair), and barrier removal and other actions to restore aquatic and riparian habitat in key headwater streams, as well as the Upper Colorado mainstem from Granby to its confluence with the Eagle River.

Priorities for flow restoration in new places include:

- Reservoir re-operation, instream flow transactions, and delivery system improvements on the Dolores River to benefit sportfishing, rafting, tourism, and native fish and riverside habitat.

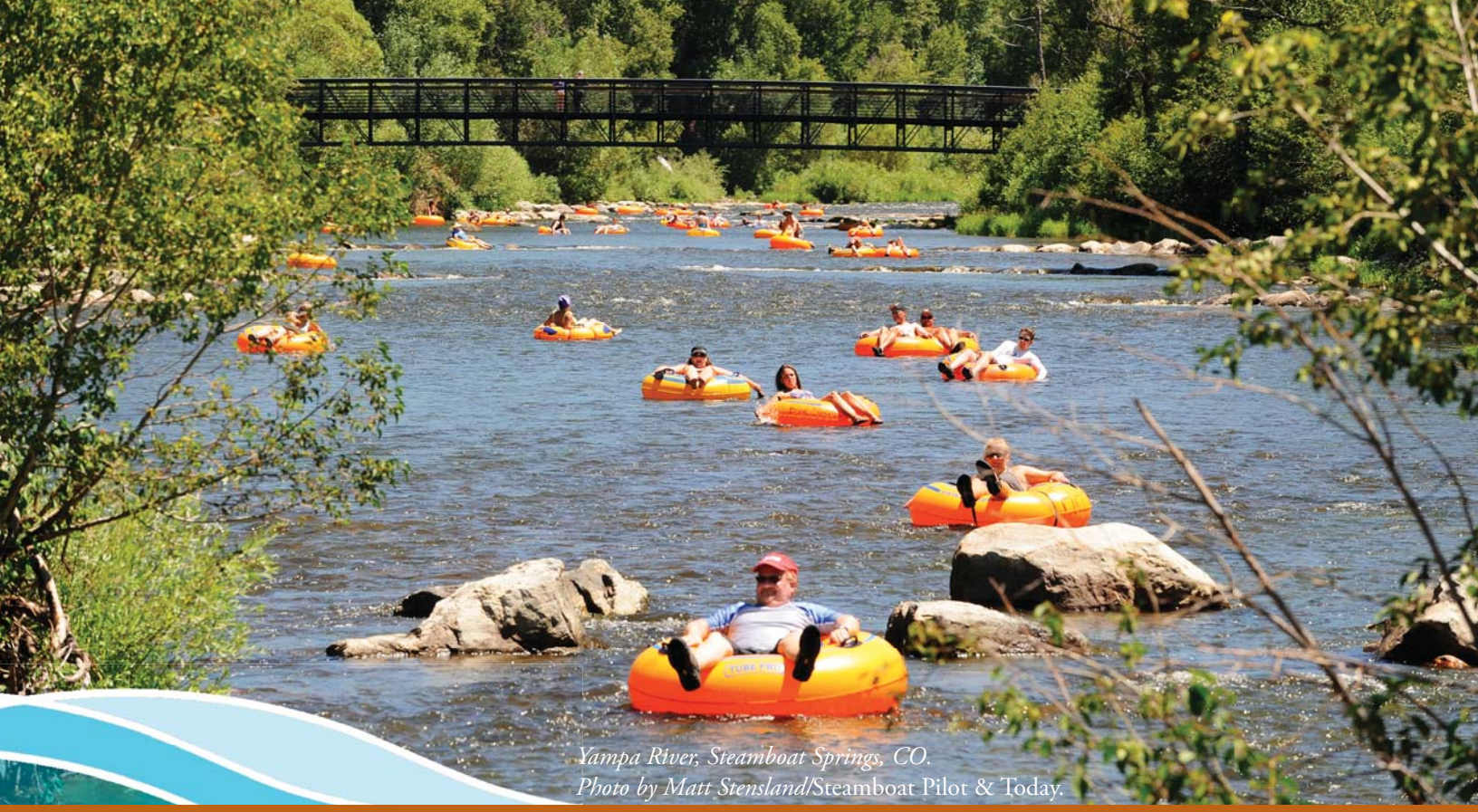
- Restoration of the binational "limitrophe" reach of the river between Yuma and San Luis and of the Colorado Delta below that reach, using a combination of changes in groundwater pumping and pulse flows stored in a water account in Lake Mead (with the stored water derived from conservation improvements in the Mexicali Irrigation District).



"Some highly altered reaches of the Colorado and its tributaries need to be restored to achieve the goal of an overall healthy basin."

THE BIGGER PICTURE

The economic and environmental health of the Colorado River Basin is fast approaching a critical crossroads. Down one path lies controversy and litigation; winner-takes-all claims to water; degradation of currently healthy rivers and streams; economic losses to rural areas, cities, states, and taxpayers; and a diminished quality of life. Down the other path lies cooperation and collaboration; flexibility and shortage sharing; improving river and stream health; and economic gains for rural communities, cities, states, and taxpayers. The law of the Colorado River is flexible enough to lead us down the rosier path, with the cooperation of all interests to balance protection and restoration of healthy flows with current and future water needs.



Yampa River, Steamboat Springs, CO.
Photo by Matt Stensland/Steamboat Pilot & Today.

Environmental Defense Fund, The Nature Conservancy, Trout Unlimited, Pronatura, and Western Resource Advocates, have collaborated in the production of this brochure to communicate generally about flow protection and restoration across the Colorado River Basin, but are not making joint, specific, or up to the minute recommendations with this brochure. More information on specific protection and restoration priorities, including more detail on the many headwater streams that need protection and restoration, is available from a variety of public and private organizations working in the basin, as well as from these organizations.

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