

VIRGIN WILD AND SCENIC RIVER

UTAH

National Park Service

U.S. Department of the Interior



OUTSTANDINGLY REMARKABLE VALUES



Dear Friends of the Virgin Wild and Scenic River,

What comes to mind when you think about the Virgin River and its tributaries within and adjacent to Zion National Park? A wild river and its tributaries flowing through a rugged landscape of spectacular sandstone canyons? The thrill of a demanding canyoneering experience? A family-friendly place to explore the magnificent scenery of Zion National Park? A place that compels us to learn about the abundant diversity of a fragile ecosystem or to better understand the history of those who thrived on this land before us?

The Virgin Wild and Scenic River and its tributaries is all of this, and much more. To help us protect this river system for the benefit and enjoyment of future generations, we have contemplated this very question to determine what makes it truly outstandingly remarkable.

Based on the hard work of staff and others within the National Park Service and the Bureau of Land Management, we are pleased to present to you the outstandingly remarkable values of the Virgin Wild and Scenic River. The statements that follow have been developed to provide a strong foundation for the future management and protection of this nationally significant river system—to help us focus our daily attention on the river’s most important aspects.

We urge you to read these statements and to share your thoughts with us about what makes the Virgin River and its tributaries outstandingly remarkable to you. Thank you for sharing your passion for the Virgin Wild and Scenic River by helping to shape its future.

*Zion National Park, National Park Service
St. George Field Office, Bureau of Land Management*



BACKGROUND

The Omnibus Public Land Management Act of 2009, signed by President Obama (Public Law 111-11), designated approximately 165.5 miles of the Virgin River and tributaries of the Virgin River across federal land within Zion National Park and adjacent Bureau of Land Management Wilderness as part of the National Wild and Scenic River System. Federal agencies administering wild and scenic rivers are required to prepare a Comprehensive River Management Plan (CRMP) for the protection of the river values, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the purposes of the act. Developing an outstandingly remarkable values (ORV) statement is the first step in developing a CRMP. Outstandingly remarkable values are river-related, contribute to the function of the ecosystem and/or owe their location or existence to the river; they are the reason the river rises to the level of national significance and protection. This project will build on the supporting work in the *Wild and Scenic River Evaluation – Eligibility, Classification and Suitability Report* which was completed as part of the 2001 Zion General Management Plan and the Summary of Eligibility and Tentative Classification and the Wild and Scenic River Suitability Overview which were completed as part of the St. George Field Office Resource Management Plan in 1999. These ORV statements, along with water quality and free flow condition from the basis for the CRMP.

OVERVIEW

The designation includes 39 river segments and/or tributaries within National Park Service (NPS) and BLM lands, including the major segments: North Fork Virgin River above the Temple of Sinawava (wild segments), North Fork Virgin River below Temple of Sinawava (recreational segments, wild segments), East Fork of the Virgin River (wild segments), North Creek (wild segments, scenic segments), La Verkin Creek (wild segments), and Taylor Creek (wild segments, scenic segments).

A workshop was held in June 2010 to define the ORVs. It included NPS and Bureau Land Management staff. In a spirit of collaboration, and per guidance in Section 10(e) of the Wild and Scenic Rivers Act, staffs from the Utah Governor's Office, Five County Association of Governments and the Town of Springdale also participated in the workshop. Representatives from the traditionally associated tribes, U.S. Forest Service, US Fish and Wildlife Service, Utah Division on Wildlife Resources, Utah Division of Water Quality, and the Virgin River Recovery Program were also invited, but were unable to attend the workshop. The results of this workshop will provide a foundation for developing a comprehensive river management plan for these river segments and tributaries.

NEXT STEPS

A consolidated set of ORV statements are now being presented to the public during scoping for the CRMP. Public comments on these draft statements will be used to further refine them. They will not be finalized until the river management plan is complete.

VIRGIN RIVER AND TRIBUTARIES DRAFT ORV STATEMENTS

Free-flowing condition, water quality, and outstandingly remarkable values (ORVs) form the three pillars of protection under the Wild and Scenic River Act. Free-flowing condition and water quality support the integrity of the ORVs and are key components of the comprehensive river management plan. Because of their importance to the overall protection and enhancement of a designated wild and scenic river, free-flowing condition and water quality are included as part of this ORV statement. These fundamental characteristics of the Virgin River and its tributaries are described below.

ORV STATEMENTS

The foundation for preparing a comprehensive wild and scenic river management plan is to clearly and succinctly articulate a designated river's outstandingly remarkable values based on criteria. These criteria are based on the Interagency Wild and Scenic Rivers Coordinating Council guidance for determining ORVs, which states

- An ORV must be river related or dependent. This means that a value must
 - be located in the river or on its immediate shorelands (generally within $\frac{1}{4}$ mile on either side of the river);
 - contribute substantially to the functioning of the river ecosystem; and/or
 - owe its location or existence to the presence of the river.
- An ORV must be rare, unique, or exemplary at a comparative regional or national scale. Such a value would be one that is a conspicuous example from among a number of similar values that are themselves uncommon or extraordinary.

So that their protection and enhancement can be assured, the National Park Service also determined that ORVs for the Virgin River and its tributaries must be specifically evaluated and defined for individually designated river segments.

The Virgin River contains the following set of outstandingly remarkable values: cultural, geologic, recreational, scenic, ecological processes, wildlife, and fish. A set of broad statements has been developed that articulates each ORV for the entire Virgin River and its tributaries. An evaluation process based on a clearly defined set of criteria for each ORV was used to determine which river segments and tributaries contain the different ORVs. The results from this evaluation were used to develop ORV statements for those individual river segments, which provide evidence and support for the broader ORV statements. The following matrix summarizes the evaluation results and provides an organization to the broad ORV statements described below.

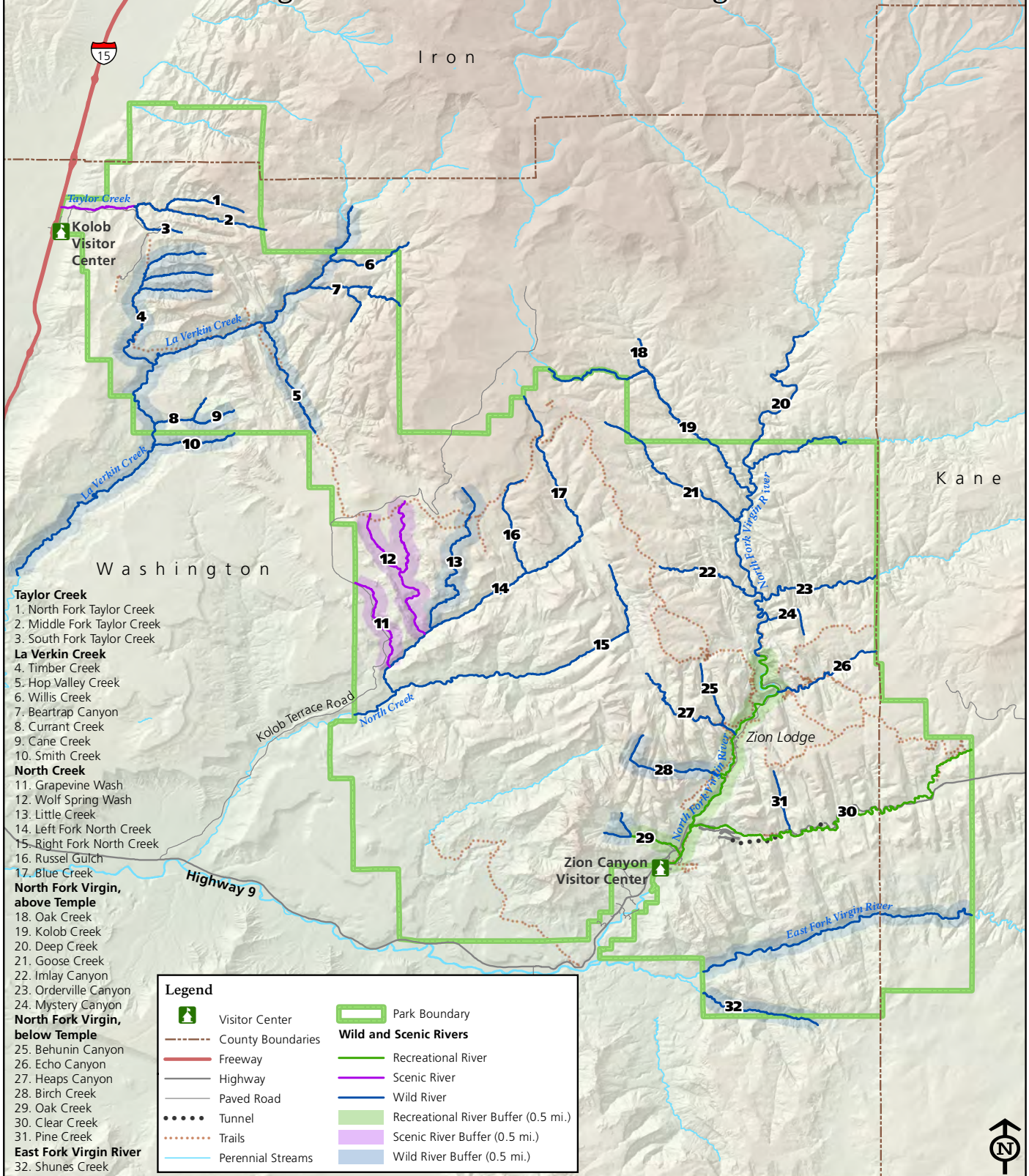


TABLE 1: ORV MATRIX

River Segment Main Segment or Tributary Segment	ORV Category						
	Cultural	Geologic	Recreational	Scenic	Ecological Processes	Wildlife	Fish
North Fork Virgin River above Temple (wild)		•	•	•	•	•	•
Kolob /Oak Creek (BLM) (wild)		•				•	
Goose Creek (wild)		•				•	
Imlay Canyon (wild)		•	•			•	
Orderville Canyon (wild)		•	•	•	•	•	
Deep Creek (wild)		•	•	•		•	•
Mystery Canyon (wild)		•	•	•		•	
North Fork Virgin River below Temple (recreational)	•	•	•	•		•	•
Birch Creek (wild)		•		•		•	
Pine Creek (wild and recreational)		•	•	•		•	
Oak Creek (wild and recreational)				•		•	
Heaps Canyon (wild)		•				•	
Behunin Canyon (wild)		•				•	
Echo Canyon (wild)		•				•	
Clear Creek (recreational)		•				•	
East Fork Virgin River (wild)	•	•			•	•	•
Shunes Creek (wild)					•	•	•
North Creek (wild)		•	•	•	•	•	•
Wildcat Canyon / Blue Creek (wild)						•	
Right Fork North Creek (wild)		•		•		•	
Left Fork North Creek (wild)		•	•	•		•	
Grapevine Wash (scenic)						•	
Wolf Springs Wash (scenic)						•	
Pine Springs Wash (scenic)						•	
Little Creek (wild)		•				•	
Russell Gulch (wild)		•		•		•	
La Verkin Creek (wild)		•	•			•	
Willis Creek (wild)		•				•	
Beartrap Canyon (wild)		•				•	
Timber Creek (wild)		•				•	
Current Creek (wild)		•				•	
Cane Creek (wild)		•				•	
Hop Valley Creek (wild)		•				•	
Smith Creek - BLM (wild)		•				•	
Taylor Creek (scenic)		•		•		•	
North Fork Taylor Creek (wild)		•		•		•	
Middle Fork Taylor Creek (wild)		•		•		•	
South Fork Taylor Creek (wild)		•		•		•	



Virgin Wild and Scenic River ORV: Designated Wild and Scenic River Segments



- Taylor Creek**
- 1. North Fork Taylor Creek
- 2. Middle Fork Taylor Creek
- 3. South Fork Taylor Creek
- La Verkin Creek**
- 4. Timber Creek
- 5. Hop Valley Creek
- 6. Willis Creek
- 7. Beartrap Canyon
- 8. Currant Creek
- 9. Cane Creek
- 10. Smith Creek
- North Creek**
- 11. Grapevine Wash
- 12. Wolf Spring Wash
- 13. Little Creek
- 14. Left Fork North Creek
- 15. Right Fork North Creek
- 16. Russel Gulch
- 17. Blue Creek
- North Fork Virgin, above Temple**
- 18. Oak Creek
- 19. Kolob Creek
- 20. Deep Creek
- 21. Goose Creek
- 22. Imlay Canyon
- 23. Orderville Canyon
- 24. Mystery Canyon
- North Fork Virgin, below Temple**
- 25. Behunin Canyon
- 26. Echo Canyon
- 27. Heaps Canyon
- 28. Birch Creek
- 29. Oak Creek
- 30. Clear Creek
- 31. Pine Creek
- East Fork Virgin River**
- 32. Shunes Creek

Legend

	Visitor Center		Park Boundary
	County Boundaries		Wild and Scenic Rivers
	Freeway		Recreational River
	Highway		Scenic River
	Paved Road		Wild River
	Tunnel		Recreational River Buffer (0.5 mi.)
	Trails		Scenic River Buffer (0.5 mi.)
	Perennial Streams		Wild River Buffer (0.5 mi.)

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CULTURAL VALUES

The continuum of human occupation along the Virgin River and its tributaries encompasses thousands of years and diverse people, cultures, and uses. In the arid southwest landscape, the occurrence of plentiful water, accompanying vegetation, animal diversity, arable land, and other resources found along the Virgin River and its tributaries provided ideal conditions for communities to flourish. Not surprisingly, the Virgin River system contains some of the best examples in the region of prehistoric American Indian sites that provide a tangible connection between culturally associated tribes and their ancestors. Furthermore, the Virgin River corridor contains places and resources important to the cultural traditions of contemporary American Indian tribes.



North Fork of the Virgin River below of Temple of Sinawava

Zion National Park and the Virgin River lie within the traditional homeland of the Southern Paiute. The Virgin River corridor has a rich history in Southern Paiute life. The primary life element for the Paiute is water and this area serves as a place that was continually inhabited because of the availability of water. The abundant water supported farming, attracted animals, promoted plant growth, and contributed to day to day living. Researchers have documented numerous accounts of the special importance of the Virgin River to Paiute people. Many of the names of prominent features in Zion come from the Paiute language such as the Temple of Sinawava – the beginning of the Narrows on the Virgin River. Zion Canyon was a meeting place with abundant food, both vegetal and animal. Other resources were plentiful as well, such as specific minerals for color pigments and willow for basketry.

The canyon, the river, and the overall river ecoscape retains its cultural significance to Paiute people and, therefore, its integrity as a place of special meaning and continues to be used for the gathering of plant resources for traditional cultural and religious purposes. Given the long-standing and ongoing relationship of the Southern Paiute people to this area, an outstandingly remarkable cultural value was found for the North Fork of the Virgin River below of Temple of Sinawava.



East Fork of the Virgin River

The importance of cultural resource sites in the East Fork of the Virgin River is tied to the uniqueness of Parunuweap Canyon itself. It is one of the few remaining locations in the area occupied by the Virgin Branch Ancestral Puebloan culture where a geographically discrete body of sites representative of a long-term community has remained mostly undisturbed. This river canyon exists in a nearly unaltered state, as compared to other areas of the region that have experienced significant historic era developments. Prehistoric sites along the East Fork of the Virgin River are among the “type” sites through which the Virgin Branch was initially recognized as a distinctive regional manifestation of Formative Period Ancestral Puebloan cultures. In addition, Southern Paiute and Mormon Pioneer historic sites also occur within this canyon. Most of these sites are contributing features to the Parunuweap Canyon Archeological District, listed in the National Register of Historic Places in 1996 with significance at the national level. Parunuweap Canyon was legislatively included in Zion National Park in 1918 in specific recognition of the nationally significant archaeological resources present.

Because of the relatively undisturbed condition of this river canyon, the setting is ideal for future research where the interrelationships of geographically, culturally, and temporally related sites can be studied. In other words, the river canyon contains a series of distinct communities across multiple time periods and all of the sites represent activities of those communities using riverine resources over a long period of time. The East Fork of the Virgin River perfectly embodies a natural classroom and is an exemplary site for research on the Ancestral Puebloan culture; therefore, an outstandingly remarkable cultural value was found on this segment of the Virgin River.

GEOLOGICAL VALUES

The Virgin River and its tributaries are uniquely situated along the western margin of the Colorado Plateau where the recent history of tectonic activity and erosional downcutting has resulted in a labyrinth of deep sandstone canyons, volcanic phenomena, and widespread exposures of brilliantly colored sedimentary deposits. Unique geologic features include Navajo sandstone exposures, a remnant of the world’s largest sand dune desert, river-carved canyons forming the world’s tallest sandstone cliffs, narrow slot canyons, hanging waterfalls, springs and seeps, and accelerated erosion processes. This dynamic geologic system creates a diverse landscape of channels, canyons, and springs that support a variety of ecological communities, including hanging gardens, desert fish, and other aquatic species. The geology of Virgin River and its tributaries offer world-class opportunities for canyoneering, rock climbing, hiking, and wilderness experiences.

A number of factors were used in determining whether a river segment had an outstandingly remarkable geologic value. The factors included high cliffs of Navajo sandstone, known to be the world’s highest sandstone cliffs; slot canyons, which are deep and exceptionally narrow vertical walled canyons; springs discharging from the Navajo sandstone aquifer which are extensive in these canyons, are unusual in this arid setting, and are known to support a large number of rare and endemic species. Other features include the landforms that indicate an exceptional rate of erosion, including deep canyons, cliffs, expanses of exposed bedrock, and extensive landslide deposits; high waterfalls and hanging valleys, resulting from the exceptionally high

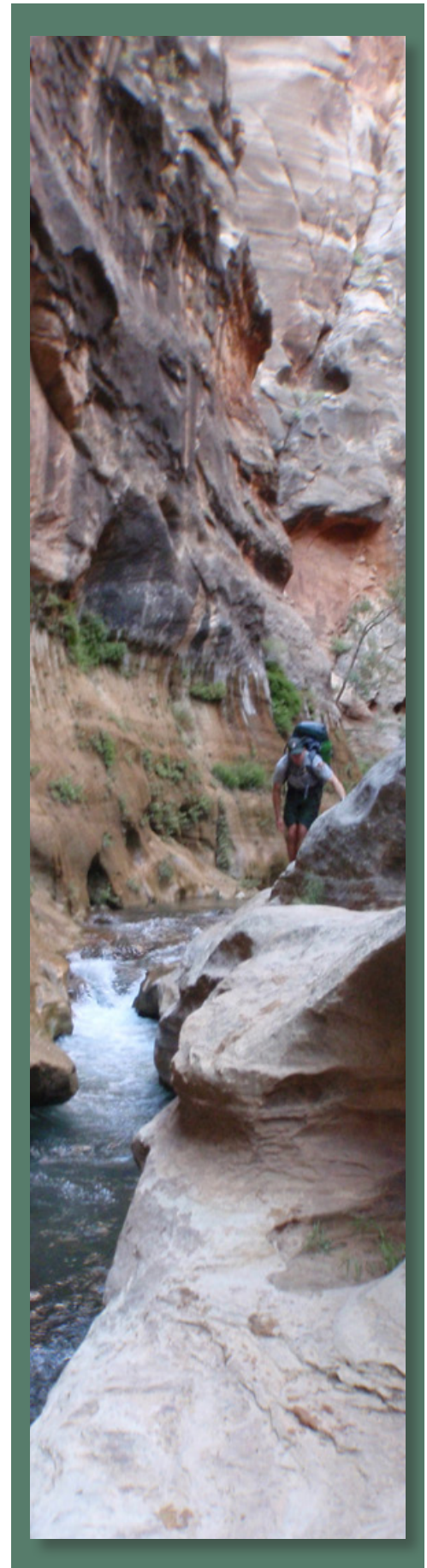


runoff from slickrock and differential rates of erosion that leaves channels with large vertical drops; river channels that have been dammed by landslides or lava dams in the recent geologic past; and inverted valleys, resulting from lava flowing down canyon bottoms followed by the rapid erosion of the surrounding rock layers that leaves the lava flow as an elevated sinuous ridgeline. Each of these factors contributes to the unique and exemplary geologic values of the Virgin River and its tributaries. See the matrix of ORVs for the segments with geologic ORVs.

RECREATIONAL VALUES

Exceptional recreational opportunities exist along the Virgin River and its tributaries, providing visitors from around the world with a chance to develop personal and lasting connections with the river within some of the most unique water-carved desert canyons in the region. The dramatic setting dominated by scenic grandeur contribute to a spectrum of river-related experiences—from the self-reliant adventure of canyoneering or hiking and backpacking through narrow river and creek channels, to enjoying photography and other artistic pursuits, viewing scenery, or camping along the river. For generations, the striking contrast of heat and water, stone and gardens have drawn people to this unique desert river and its tributaries. In order to qualify as having an outstandingly remarkable recreational value, a segment must have river related or river dependent recreational activities. The activity must occur within the river or immediate shore lands within the corridor or owe its existence to the river and the river's various characteristics. Also, the recreational experience must be rare, unique, or exemplary. The region of comparison for the Recreation ORV is the portion of the Colorado Plateau which lies in southwestern Utah west of the Green and Colorado Rivers.

The following segments were found to have an ORV for recreation: North Fork of the Virgin River above the Temple of Sinawava, Imlay Canyon, Orderville Canyon, Deep Creek, Mystery Canyon, North Fork of the Virgin River below the Temple of Sinawava, Pine Creek, Left Fork North Creek and La Verkin Creek (within BLM segment of river).



SCENIC VALUES

The Virgin River and its tributaries create diverse opportunities for views of the river's unparalleled scenery, which can be both dramatic and subtle. The river creates a landscape of cross-bedded sandstone cliffs, towering thousands of feet above the canyon floor. The geologic tapestry of contrasting colors and textures—red, white, and pink cliffs; slivers of blue sky; and lush green ribbons of riparian vegetation and hanging gardens—encompass the sculpted and undulating canyons. Seasonal waterfalls flow over slickrock from hanging canyons over 100 feet above the canyon floor.



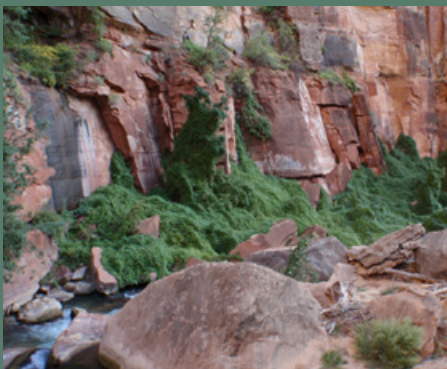
River and tributary canyons offer a pleasing contrast in soil, rock, vegetation, and water; and views that greatly enhance the visual quality, with still or cascading water dominating the landscape. Light changes in the canyon depending on the time of day and the season. Rocks can appear fiery red, golden, bright white, grey, or black. Even the absence of water in some “phantom channels” creates drama and visual interest.

These elements combine to offer a landscape character that is unique and unforgettable on a scale that draws visitors from all over the world. To qualify as having an outstandingly remarkable scenic value, a segment must contain river related or river dependent scenery, be one of the most significant areas in the region for diversity of views, and have special features. The following segments have outstandingly remarkable scenic value: North Fork of the Virgin River above Temple of Sinawava, Orderville Canyon, Deep Creek, Mystery Canyon, North Fork of Virgin River below Temple of Sinawava, Birch Creek, Oak Creek, Pine Creek, North Creek, and Taylor Creek

ECOLOGICAL PROCESSES VALUES

Ecological processes supporting vegetation is an outstandingly remarkable value in some of the Virgin River designated segments due to the presence of exemplary riparian corridors and rare plant communities. The region of comparison for ecological processes is the Colorado Plateau physiographic region.

The cottonwood galleries along the East Fork of the Virgin River and Shunes Creek provide rare examples of relatively intact, properly functioning, riparian systems. Natural river processes proceed unimpeded, allowing for seasonal flooding and meander migration, vegetative recruitment, and plant succession. Riparian vegetation is abundant and diverse. The Virgin River and its tributaries have created unique habitats for rare plant communities in a desert southwest ecosystem. Steep-walled canyons, carved over



time by the rivers, create cool, moist microclimates that support hanging gardens that are rare and exemplary in the region. These gardens, occurring on steep vertical sandstone walls, support a complex biotic community including several plant and animal species found only in the Virgin River system. The hanging gardens in Zion are more numerous and larger than gardens found elsewhere, and are sought out by researchers due to their rareness in the region.

Experts included rare species and communities, riparian habitat quality, and scientific importance in the outstandingly remarkable ecological processes value.

North Fork of the Virgin River above Temple of Sinawava

The North Fork of the Virgin River above the Temple of Sinawava, along with Orderville Canyon, support the most exceptional examples of hanging gardens in the region. The gardens are home to seven species of plants that grow nowhere else in the world. The moist microclimate provided by the river adds to the diversity of plant species in these gardens, which in some cases includes up to 26 species. These gardens also provide habitat for the endemic Zion snail (or wet-rock physa, *Physella zionis*).

East Fork of the Virgin River and Shunes Creek

The East Fork of the Virgin River has regionally outstanding examples of hanging gardens, with riverside microclimates supporting endemic plants like maidenhair fern, Zion shooting star, and yellow columbine. Further, the cottonwood gallery forests along the East Fork of the Virgin River and Shunes Creek provide rare examples of relatively intact, properly functioning riparian corridors. Natural river processes proceed unimpeded, allowing for seasonal flooding and meander migration, vegetative recruitment, and plant succession. Riparian vegetation is abundant and diverse. Thick grasses and sedges along the banks form stable undercuts for fish habitat, woody species provide habitat for numerous species of wildlife, and invasive riparian woody species are very limited. These communities provide a regionally significant reference reach for restoration of degraded systems throughout the region.

Note: In all other designated segments, hanging gardens are not regionally significant or river-related, or do not exist.

WILDLIFE VALUES

Wildlife is an outstandingly remarkable value in the Virgin River and its tributaries due to the habitat for, and populations of desert bighorn sheep, Mexican spotted owl, and the endemic Zion snail. The region of comparison for this ORV was generally southwestern Utah, northwestern Arizona and southeastern Nevada. The criteria for the wildlife ORV included river related and river dependent, current population, habitat needs, and scientific importance.

East Fork of the Virgin River and Shunes Creek

Desert bighorn sheep are listed as a sensitive species across the multistate region. In the East Fork of the Virgin River and Shunes Creek, the convergence of river-carved cliffs, near-stream vegetation for forage, and proximity of year round water provides one of the few known locations for bighorn sheep lambing in the region. Lambing grounds are concentrated along this river segment, and are exceptionally productive. The productivity of these lambing grounds are



Photo credit: John Farrington





Photo credit: Ken Kingsly

critical for the long-term reproductive success of the species, since Virgin River sheep disperse throughout the area and are the source for bighorn populations in much of the region. Research opportunities due to this population's success are regionally significant. Due to the critical lambing grounds, sustainable population, and long-term research opportunities for desert bighorn sheep, an ORV for wildlife was found in the East Fork of the Virgin River and Shunes Creek, wildlife were determined to be an outstanding remarkable value for this river segment.

North Fork of the Virgin River above the Temple, North Fork of the Virgin River below the Temple, East Fork of the Virgin River, North Creek, Taylor Creek, and La Verkin Creek

The federally threatened Mexican spotted owl breeds in all of the designated river corridors at the highest density in the state and region. Breeding occurs in the cool microclimates provided by the narrow canyons along the designated stream courses. As primary nesting habitat, the river corridors provide the core of the designated critical habitat identified in the recovery plan for this species. After more than 20 years of monitoring, a storehouse of data on Zion's owl population provides the best opportunity for owl research regionwide. Occupied habitat with successful breeding occurs in each of the designated river segments and tributaries including North Fork of the Virgin River above the Temple, North Fork of the Virgin River below the Temple, East Fork of the Virgin River, North Creek, Taylor Creek, and La Verkin Creek. Due to the critical habitat, sustainable population and long-term research studies for Mexican spotted owl, an ORV for wildlife was found for all major segments of the Virgin River.

North Fork of the Virgin River above Temple of Sinawava

The North Fork of the Virgin River above the Temple of Sinawava and Orderville Canyon are home to the endemic Zion snail (*Physella zionis*). This snail, also known as wet rock physa, is found in some of the most exceptional hanging gardens in the region. This rare snail, identified in 1926, is of national significance because it is found only in Zion National Park along the Virgin River and its tributaries; therefore an ORV for wildlife was found for this segment.

FISH VALUES

The Virgin River and its tributaries provide a unique and intact habitat for four native species including the Virgin spinedace, flannelmouth sucker, desert sucker, and speckled dace. The Virgin spinedace is nationally significant and only exists in the Virgin River system. Both the Virgin River spinedace and the flannelmouth sucker are managed under conservation agreements. The Virgin River and several of its tributaries support regionally significant levels of natural and sustainable reproduction for all four native fish species. The North and East Forks of the Virgin River provide the most productive habitat for these fish in the Virgin River basin. The geologic setting and flow regime provide high flows and large sediment loads, unique water quality, and frequent disturbance which are effective deterrents to exotic species. Other factors contributing to the productivity for native fish are connectivity to tributary systems and habitat diversity for spawning, rearing, and supporting adult fish. Additionally, the Zion stonefly (*Isogenoides zionensis*), an important component of the food web, is found along the Virgin River and its tributaries. The type specimen for this species was identified in Zion in 1949.

In order to determine if fish contributed to the outstandingly remarkable



value of a stream segment, the following criteria were used. The first criteria included the presence of native species and species of concern. The second criteria included natural and sustaining populations and habitat quality and diversity. Habitat quality and diversity included such elements as connectivity, water quality (including sediment), food availability (including Zion stonefly), cover, stream diversity (pools, riffles, runs), spring inflows/nurseries, and natural hydrology.

The area of comparison for this ORV included the remainder of the Virgin River watershed, the Colorado River Basin, and the nation. The remainder of the Virgin River watershed was included because native fish abundance is greatest in the Zion portion of the watershed. The Colorado River Basin was included because some of the fish are more widely distributed within its streams. Since the native fish in the Virgin River system are unique to this system, they reach the level of national significance.

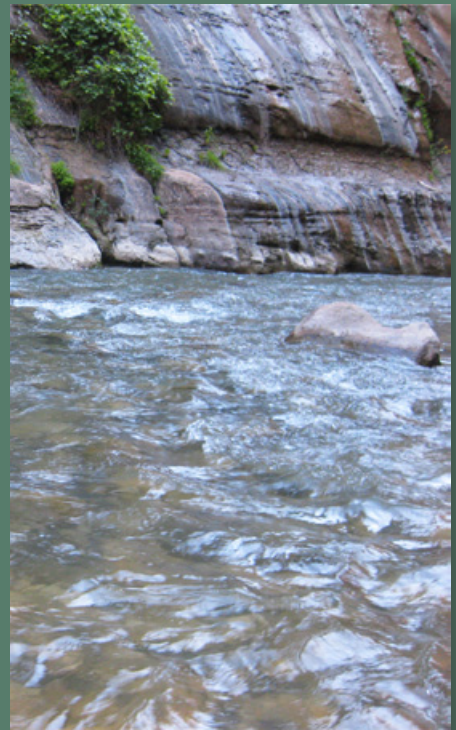
Fish is an ORV for the following segments: North Fork of the Virgin River above the Temple of Sinawava, Deep Creek – BLM, North Fork of the Virgin River below the Temple of Sinawava, East Fork of the Virgin River, Shunes Creek and North Creek, Right and Left Forks of North Creek.

WATER QUALITY

Water quality conditions of the North and East Forks of the Virgin River and its tributaries are generally considered natural and high quality. They are reflective of the largely unaltered geohydrologic setting and are generally within state water quality standards. This is due to the relatively light level of development on the watershed, and to the fact that most, and for some of the tributary streams all, of the flow is from groundwater discharge from the Navajo sandstone. The Navajo sandstone is made up of over 99% pure quartz sand and provides a near perfect sandstone filter. Major cations in the water are calcium, magnesium, and sodium, while anions are dominated by bicarbonate, sulfate, and chloride. The dissolved minerals are present at levels that would be expected in an arid watershed of sedimentary rock and increase in a downstream direction as the river contacts geologic layers with a greater amount of soluble minerals. Water temperatures are marginal for cold water fish, but are well suited for the native fish species.

Two water quality characteristics that could be considered problematic are suspended sediment and fecal bacteria. The sediment loading in these streams is spectacular during floods, and while it might be influenced to some degree by upstream land use practices, it is generally considered to be a reflection of the extreme rate of natural erosion of this watershed. This level of sediment loading and turbidity during floods would be considered a major deficiency elsewhere, but in these rivers it is an attribute of natural conditions rather than a concern and sediment levels appear to be a major factor preventing the invasion of exotic fish species. The level of fecal bacteria has proven to be a chronic problem on the North Fork of the Virgin River upstream of the Temple of Sinawava. The State of Utah has included this reach on the list of rivers not meeting water quality standards and the park advises extra caution for visitors hiking the Zion Narrows. The source of the contamination is under investigation. Occasional spikes of bacteria concentrations also occur on other rivers usually during flood events when such occurrences would be expected.

Protection from water quality degradation is provided under the Clean Water Act by state-designated protected uses. All segments are protected as a source of irrigation water. The North and East Forks of the Virgin River





and North Creek are protected as sources of domestic drinking water. All of the segments except the North Fork of the Virgin River are protected for secondary contact recreation, while the North Fork of the Virgin River is designated for primary contact recreation in recognition of the large number of people engaging in water play and swimming. To protect fish and aquatic life, the North Fork of the Virgin River, Kolob Creek and Taylor Creek carry a designation for cold water fisheries; La Verkin Creek has a designation for warm water fisheries; and the East Fork of the Virgin River and North Creek are designated for nongame fish. In addition, the North and East Forks of the Virgin River and Kolob Creek have a High Quality Category 1 designation that precludes new point-source discharges. A stream-specific standard for total dissolved solids is established for North Creek at 2,035 mg/l, though this has little bearing on park waters in a different geologic setting.

FREE FLOWING CONDITION

The Virgin River and its tributaries in Zion National Park have carved spectacular vertical-walled canyons through the Navajo sandstone and surrounding sedimentary strata, and continue to carve them today. The erosive force is provided by frequent flood events that occur most numerous from sudden summer monsoon storms, but also from spring snowmelt, and rarely but significantly, from very large winter rain-on-snow flood events. Annual flow is highly variable and large runoff years are more likely during El Niño climate events.

Sediment transport from this rapidly eroding landscape is exceptional: annual sediment loads in the North Fork of the Virgin River are estimated at 800,000–1,000,000 tons per year and yield from other tributaries is of similar magnitude.

Streamflow in the large rivers and almost all tributaries is essentially natural and free-flowing. There are no large reservoirs on the watershed that would reduce flood flows, augment base flows, cause daily hydropower fluctuations, or modify stream temperatures. Therefore, discharge patterns show the full range of natural conditions. Water flow in this reach is protected by federal reserved and appropriative water rights held by the National Park Service and recognized in the Zion National Park Water Rights Settlement Agreement. Additionally, the Utah state engineer manages the Virgin River Basin as if it is fully appropriated, so no new diversions of water are permitted. Consumptive use of water upstream of the park amounts to about 6% - 10% of the average annual discharge. Kolob Reservoir located on Kolob Creek 2 miles upstream of the park has the capacity to substantially alter flows on Kolob Creek capturing much of the spring runoff and augmenting summer and fall flows, typically by releasing 5-10 cfs in the summer or fall. Releases will probably increase with the Crystal Creek Project coming on-line in 2010, so spring runoff and summer base flows will be altered in Kolob Creek, while the changes in the North Fork of the Virgin River will be insignificant. The Crystal Creek project provides for the diversion of an average of 4,000 acre-feet per year from the upper reaches of Crystal Creek, piping that water to Kolob Reservoir, and then releasing it down Kolob Creek to meet the Washington County Water Conservancy District's water needs downstream near St. George. Controlled Reservoir releases are limited to 35 cfs under the Zion National Park Water Rights Settlement Agreement.

VIRGIN WILD AND SCENIC RIVER
OUTSTANDINGLY REMARKABLE VALUES



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