



United States Department of Agriculture

Inyo National Forest

Owens River Headwaters

Wild and Scenic River

Comprehensive River Management Plan



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Background

This comprehensive river management plan (CRMP) establishes programmatic management direction for the Owens River Headwaters Wild and Scenic River (WSR) on the Mono Lake Ranger District of the Inyo National Forest (the Forest). It has been developed to implement the direction of the Wild and Scenic Rivers Act of 1968 (Public Law 90-542) (Act) as amended in the 2009 Omnibus Public Land Management Act (2009 Omnibus Act). The 2009 Omnibus Act added 19.1 miles of Owens River Headwaters to the National Wild and Scenic Rivers System. The Wild and Scenic Rivers Act established a system for preserving outstanding free-flowing rivers. Section 1(b) of the Act directs that:

“...certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreations, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.”

Role of a CRMP

The Act requires the agency responsible for administration of designated rivers to develop a CRMP that provides for the protection and enhancement of the river’s water quality, free-flowing condition and “outstandingly remarkable values,” collectively referred to as “river values,” for the benefit and enjoyment of present and future generations. The Forest Service, under the direction of the Secretary of Agriculture is the agency responsible for the administration of Owens River Headwaters.

The purpose of this CRMP for the Owens River Headwaters WSR is to protect and enhance river values by providing desired conditions, management direction, and a monitoring plan that will be applied to the designated river corridor. The CRMP also addresses resource protection, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the purposes of the Act.

This CRMP does not withdraw or invalidate valid existing rights within the corridor. Existing land uses in the Owens River Headwaters WSR corridor are discussed in the “Land Uses and Access in River Corridors” section below

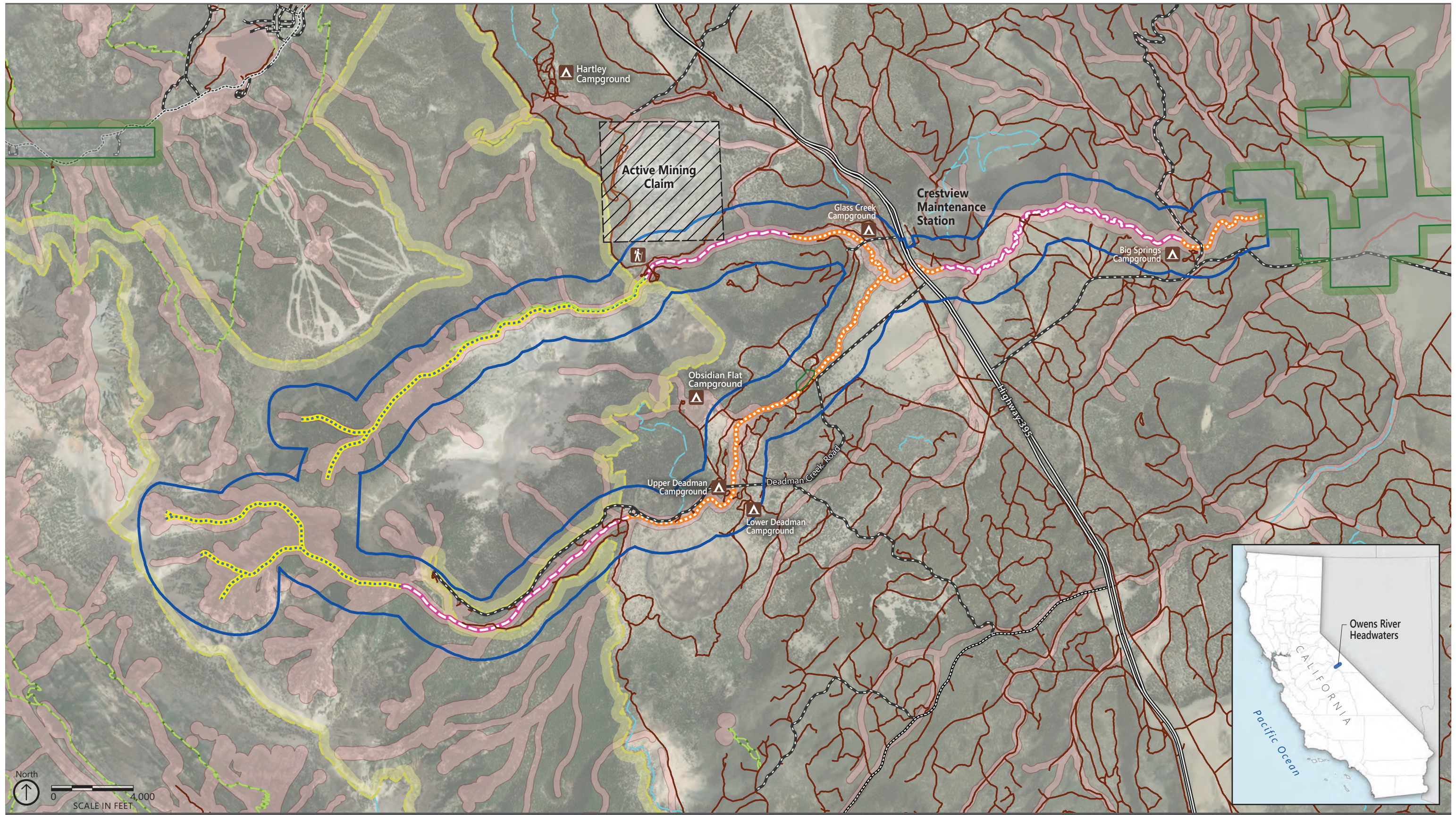
Owens River Headwaters and its boundaries are shown in figure 1, below. The river’s outstandingly remarkable values (ORVs) include the following, which are further discussed in the Baseline Conditions section.

- Scenery
- Wildlife
- Botany
- Recreation
- Geologic/Hydrologic
- Prehistoric/Tribal Cultural Values

As established in the 2009 Omnibus Act, portions of the designated stretch of the Owens River Headwaters are administered in the following classifications: 6.3 miles as a wild segment; 6.6 miles as a scenic segment;

and 6.2 miles as a recreational segment, totaling 19.1 miles of designated stretches. Further discussion of the river's classifications is detailed in the "Wild and Scenic River Corridor Classification" section, below.

This management plan will guide all development, management, and restoration activities in the wild and scenic river corridor.



- | | | | |
|--|-----------------------------------|-----------------|------------|
| Inyo National Forest (US Forest Service) | Owens River Headwaters Wilderness | Federal Highway | Trailhead |
| Private Land | Riparian Conservation Areas | State Road | Campground |
| Owens River Headwaters WSR Corridor | Forest Service Roads | County Road | |
| Scenic River | Forest Service Motorized Trails | Town Road | |
| Wild River | Forest Service Standard Trails | | |
| Recreation River | | | |



FIGURE 1. PROPOSED FINAL BOUNDARY
Owens River Headwaters Wild and Scenic River
Comprehensive River Management Plan

River Corridor Locations and Boundaries

The Owens River Headwaters are an area of forested mountains and alpine meadows on the east side of the crest of the Sierra Nevada Mountains in Mono County, California, within the Inyo National Forest. The Owens River and its tributaries, Glass and Deadman Creeks, are headwaters for the Owens River System in the Eastern Sierra. “With its headwaters beginning at the 11,600-foot summit of San Joaquin Mountain, the eastward draining waters contain over 100 seeps and springs that sustain some of the most abundant riparian habitat in the Eastern Sierra.” (National WSR System 2020)

The final boundaries of the river approximate a quarter-mile distance on each side of the river (referred to as the river corridor), with the exception of a small variation around the California Department of Transportation Crestview Maintenance Station along US Highway 395.

Wild and Scenic River Corridor Classifications

The Act states rivers should be classified, designated, and administered as wild, scenic, or recreational. The three classes (wild, scenic, or recreational) represent a development scale and serve as a framework for future management; they are not synonymous with the river’s outstandingly remarkable values. Designating river segments in classifications neither prohibits development nor gives the federal government control over private property. According to the 2009 Omnibus Act, wild rivers are “those rivers or sections of river that are free of impoundments and generally inaccessible except by trail, with watershed or shorelines essentially primitive and water unpolluted.” Scenic rivers are “those rivers or sections of rivers that are free of impoundments, with shorelines or watershed still largely primitive and shorelines largely undeveloped, but accessible in places by road.” Recreational rivers are “those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.”

Owens River Headwaters was classified as a combination of wild, scenic, and recreational segments based on a 1991 eligibility study in which the eligible segments were classified as scenic and recreational. After the 2009 Omnibus Act created the Owens River Headwaters Wilderness in the corridor, however, classification of the river segment in the wilderness area became wild. Classification of each segment of river is further described below. Once designated in the 2009 Omnibus Act, segment classifications cannot be changed. The purpose of this CRMP planning process is not intended to modify classifications, but to provide programmatic management direction for the WSR as it was originally designated.

A total of 19.1 miles of Owens River Headwaters is designated as a wild, scenic, or recreational river (see figure 1). The wild portions comprise a 2.3-mile segment located in Deadman Creek from the two-forked source east of San Joaquin Peak to the confluence with the unnamed tributary flowing north into Deadman Creek from sec. 12, T. 3 S., R. 26 E. and a 4-mile segment of Glass Creek from its two-forked source to 100 feet upstream of the Glass Creek Meadow Trailhead parking area in sec. 29, T. 2 S., R.27 E. The scenic portions comprise a 2.3-mile segment of Deadman Creek from the unnamed tributary confluence in sec. 12, T. 3 S., R. 26 E., to the Road 3S22 crossing; a 3-mile segment of Deadman Creek from .25 miles downstream of the US Highway 395 crossing to 100 feet upstream of Big Springs; and a 1.3-mile segment of Glass Creek from 100 feet upstream of the trailhead parking area in sec. 29 to the end of Glass Creek Road in sec. 21, T. 2 S., R. 27 E. The recreational portions comprise a 4.1-mile segment of

Deadman Creek from the Road 3S22 crossing to .25 miles downstream of the US Highway 395 crossing; a 1-mile segment of the Upper Owens River from 100 feet upstream of Big Springs to the private property boundary in sec. 19, T. 2 S., R. 28 E.; and a 1.1-mile segment of Glass Creek from the end of Glass Creek Road in sec. 21, T. 2 S., R. 27 E., to the confluence with Deadman Creek (US Congress 2009).

Regional River Setting

The Forest was established in 1907 for the purposes of protecting lands needed to build the Los Angeles Aqueduct. The headwaters and tributaries into Mono Lake, the Owens River, and Owens Lake are important for the supply of water to the City of Los Angeles. At a regional level, water runoff from the Forest also flows into the Upper San Joaquin River to the west and the Upper Kern River to the south. About 93% of the perennial streams on the Inyo are free flowing and stream flows are functioning within their range of natural variation. An average of 34% of the runoff produced into the Owens Lake and Mono Lake watersheds is exported to the City of Los Angeles, a critical component supporting social and economic sustainability in that area. Water on the Forest is used for development of hydroelectricity that powers homes and businesses in the region. Water from the Forest is also important to local communities and tribes, providing drinking water, recreational amenities, and economic and cultural opportunities (USDA Forest Service 2019).

The Forest has diverse ecosystems including portions of the Great Basin, Mojave Desert, and Sierra Nevada Bioregions. Elevations range from 3,800 feet in Owens Valley to 14,495 feet at the peak of Mount Whitney, the highest point in the contiguous United States. Geographically, the Forest is split in two by Owens Valley and Long Valley caldera. Toward the east, the Glass and White-Inyo Mountain Ranges fall within the Great Basin and Intermountain Desert Bioregions. The changing elevation across the Forest, combined with the variability in aspect and slope, variety of geology and soils, and amount and timing of precipitation creates high diversity in ecosystems inhabited by at least 1,300 plant species, and approximately 300 terrestrial wildlife species. The Forest's contribution to social and economic sustainability depends on resilient ecosystems, with terrestrial and aquatic biodiversity (USDA Forest Service 2019).

Planning Context: Laws, Regulations, Directives, and the Forest Plan

The Forest's responsibilities and requirement to comply with other federal laws remains unchanged by direction in this plan. Management direction in the 2019 Land Management Plan (LMP) including Forest-wide standards and guidelines for various resources, such as wilderness areas, still apply to lands within the WSR corridors. Where the WSR corridors overlap with wilderness, the most restrictive policies apply. Management direction in the 2009 *Final Environmental Impact Statement Record of Decision for the Inyo National Forest Motorized Travel Management* (Travel Management Rule ROD) also applies to lands within WSR corridors.

Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act of 1968 preserves selected rivers and their immediate environments in free-flowing conditions to protect them for the benefit and enjoyment of present and future generations. These rivers may possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or similar values. The Act states rivers should be classified, designated, and

administered as wild, scenic, or recreational. The Act also requires the administering agency to establish a detailed river corridor boundary of an average not more than 320 acres per river mile and to prepare a CRMP for those areas.

Section 7 of the Wild and Scenic Rivers Act directs federal agencies to protect the free-flowing condition and other values of wild and scenic rivers. A Section 7 determination is required for any water resources project proposed within or below, above, or on a stream tributary to Owens River Headwaters WSR. These projects may include dams; water diversion projects; fisheries habitat and watershed restoration/enhancement projects; bridges and other roadway construction/reconstruction projects; bank stabilization projects; channelization projects; levee construction; and recreation facilities. The Section 7 analysis will determine whether a proposed water resources project within bed or banks of the WSR would have a “direct and adverse” effect, or whether a proposed water resource project below, above, or on a stream tributary would “invade” the WSR or “unreasonably diminish” its river values. More guidance on the Section 7 process can be found in the IWSRCC technical report, *Wild & Scenic Rivers Act: Section 7* (IWSRCC 2004).

2009 Omnibus Public Land Management Act (Public Law 111-11)

Section 1805 of the 2009 Omnibus Public Lands Management Act added three segments of Owens River Headwaters to the National Wild and Scenic Rivers System through amendment to the Wild and Scenic Rivers Act.

Forest Plan

The 2019 LMP for the Inyo National Forest is the guiding direction for the Forest and became effective on November 24, 2019. It replaces the 1988 Land Management Plan and its amendments. The 2019 LMP includes desired conditions and management direction for the three (either in whole or in part) designated WSRs on the Forest.

Within the 2019 LMP, management direction was specifically developed to preserve the free-flowing condition and water quality and to protect the ORVs for which Owens River Headwaters was congressionally designated. Management activities that are inconsistent with these objectives will not be permitted.

Forest Service Manual–Comprehensive River Management Plan

Forest Service Manual 2350 provides additional information on the requirements for completing a CRMP. Additional guidance on the suggested contents of a CRMP is found in the *Wild and Scenic River Management Responsibilities*, a technical report of the Interagency Wild and Scenic Rivers Coordinating Council (2002). The suggested contents include a description of the river setting and resource values, planning context, coordination with others, management direction, management actions, and monitoring strategies.

Federal Reserved Water Rights

Owens River Headwaters WSR is protected by a federal reserved water right that was created when Congress designated the river. The federal reserved water right only protects the portion of the Owens River that is in the WSR corridor and does not extend to downstream locations. The federal reserved water right protects the flows necessary to support the ORVs, which include wildlife and riparian vegetation.

The federal reserved water right is a non-consumptive instream flow water right, so any water protected by the federal right is available for other uses once the creek leaves the WSR-designated portion of the river. Given that the federal reserved water right is non-consumptive and limited to the designated stream corridor, exercising and protecting this right will not affect existing water uses located downstream.

Migratory Bird Treaty Act and other Migratory Bird Protections

The Migratory Bird Treaty Act (MBTA) prohibits the take of protected migratory bird species without prior authorization by the U.S. Fish and Wildlife Service. Other legal protections for migratory birds include Executive Order (EO) 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds.” Specific to this CRMP and accompanying National Environmental Policy Act (NEPA) process, EO 13186 requires that FS evaluate the effects of its actions and agency plans on migratory birds, with emphasis on species of concern.

Land Use and Access in River Corridor

Land use in the corridor consists of various recreational sites including National Forest System campgrounds and picnic sites, as well as dispersed recreation use and the Glass Creek recreation residences which are occupied and maintained by permit holders. A few trailheads also exist within the river corridor. Other popular recreational uses of this area include fishing (especially from Big Springs downstream to the terminus of the corridor), auto touring, and winter recreational activities. Motorized trails within the corridor total approximately a half mile. Forest system roads within the corridor total a little over 33 miles, while there are approximately 8.3 miles of other road types (including county and federal routes) within the corridor.

Within the National Forest System lands, the river flows through the Owens River Headwaters Wilderness as well as multiple riparian conservation areas. US Highway 395 is the primary infrastructure feature crossing the corridor (at Mono US Highway 395 postmile 33.9), which is maintained by the California Department of Transportation.

There are also a number of special uses in the river corridor. Special Use Authorizations are legal documents such as permits or easements which allow occupancy, use, rights, or privileges of National Forest land. Special use authorizations are granted for a specific use of the land for a specific period of time. Furthermore, this CRMP does not withdraw or invalidate valid existing rights within the corridor.

Southern California Edison operates distribution and transmission electric facilities located within the WSR corridor, which were in existence at the time the river was designated. This CRMP does not withdraw or invalidate these utility rights-of-way and does not affect operation and maintenance of the existing utility facilities.

A number of permits have been issued for various outfitter/guide operations and events along the Owens River Headwaters corridor. Adventures in Camping is a vacation trailer rental service that rents trailers to visitors and places the trailers in National Forest System campgrounds (USDA Forest Service 2021). Ground Up Climbing Guides, LLC, which conducts guided rock-climbing tours, also operates within the corridor (USDA Forest Service 2020d). The McGee Creek Pack Station also holds a special use permit for its guided trail rides and other recreational equine activities in the area. Mountain guiding companies

lead backcountry ski trips in the river corridor: these include Sierra Mountaineering International, Sierra Mountain Guides, International Alpine Guides, and Sierra Mountain Center. The Mammoth to June Traverse is a popular ski tour; depending on the route taken, it can intersect the river corridor.

Permitted events along the river corridor include archery and campout events hosted by the Eastern Sierra Bowmen (authorized locations are Sherwin Grade, Chidago Canyon, and Big Springs), as well as an overnight gun club event hosted by the Eastern Sierra Muzzle Stuffers (location authorized along Owens River Road) (USDA Forest Service 2020a, 2020b).

Cattle grazing overlap in the Owens River Headwaters is minimal. Livestock may pass through the corridor as they rotate through the range allotments. This may occur between US Highway 395 and Big Springs. This CRMP does not include any changes to grazing operations in this area and does not include the potential for removing livestock from grazing allotments.

With respect to locatable, leasable, and salable minerals, WSR segments classified as scenic or recreational are not withdrawn under the Act from mining or mineral leasing laws. Per the National Wild and Scenic Rivers System website (2022):

“Existing valid claims or leases within the river boundary remain in effect, and activities may be allowed subject to regulations that minimize surface disturbance, water sedimentation, pollution, and visual impairment. Reasonable access to mining claims and mineral leases will be permitted...For river segments classified as wild, no new mining claims or mineral leases can be granted; however, existing valid claims or leases within the river boundary remain in effect, and activities may be allowed subject to regulations that minimize surface disturbance, water sedimentation, pollution and visual impairment.”

Baseline Conditions

Management emphasis in the designated WSR corridor is to protect and preserve the free-flowing conditions, water quality, and ORVs. The Act specifies that designated rivers, and the outstandingly remarkable values they possess, will be “protected for the benefit and enjoyment of the present and future generations.”

Free-Flowing Condition and Water Quality

The Upper Owens River headwaters comprises two streams, Deadman Creek and Glass Creek. Deadman Creek and Glass Creek join west of US Highway 395, and flow underneath the highway to Big Springs where it becomes the Owens River. About two miles of the WSR segment is downstream of Big Springs. Both Deadman and Glass Creeks are fed by numerous springs issuing from the east side of the Deadman Ridge, primarily supported from groundwater within the Long Valley caldera fed primarily by snowmelt. Big Springs is recharged by runoff and snowmelt that infiltrates into permeable pumice deposits and migrates along a hydraulic gradient through fractured andesite to the springs primarily from the west and southwest watersheds of Deadman Creek and Dry Creek up to the Deadman (San Joaquin) Ridge. Groundwater flow from Mammoth Mountain, via Dry Creek, specifically to Big Springs has never been proven, but using available data on hydraulic head gradient, transmissivities, volcanic stratigraphy, and some chemical and isotopic data, scientists estimated that about 10% of the water discharge at Big

Springs could result from precipitation on Mammoth Mountain. Big Springs discharge has been relatively constant from year to year, indicating that the aquifer feeding Big Springs is large enough that discharge was little affected by historical variations in precipitation or groundwater withdrawals. However, regional climate change projections expect more frequent drought conditions resulting in increased groundwater withdrawals, and more extreme precipitation variation, including reduced snowpack resulting in less groundwater recharge. Tables 1a and 1b provide discharge measurements from 1991 and more recently, since 2018, when the US Geological Survey (USGS) installed a stream gage on Deadman Creek at Big Springs. The Upper Owens and Big Springs discharge is relatively constant throughout the year as demonstrated in the USGS stream gage data, with flows peaking annually during the snowmelt season in late spring to early summer.

Table 1a. Discharge Measurements (1991)

Date (1991)	Deadman Creek above confluence	Glass Creek above confluence	Upper Owens River below Big Springs
June 10	17	2.3	42
July 9	0.17	1.2	33
September	0	0.7	32

Note: All values in cubic feet per second.

Source: Inyo National Forest, unpublished data

Table 1b. Discharge Statistics (2018-2021) USGS Gage 10265100 (Deadman Creek at Big Springs)

Monthly Mean Data for 2018-2021 (measured in cfs)												
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	25.6	25.1	24.6	23.5	21.6	20.8	23.6	33.0	43.6	34.7	25.3	23.6
Max	27.4	29.2	28.1	26.8	25.1	25.2	31.0	43.4	91.4	66.7	32.2	28.7
Year	2020	2018	2018	2018	2018	2020	2018	2019	2019	2019	2019	2019
Min	22.0	19.3	20.4	19.4	18.1	16.6	16.8	17.1	17.9	18.5	16.4	16.8
Year	2021	2021	2021	2021	2021	2021	2021	2021	2021	2021	2021	2021

Source: USGS 2022

There are several possible sources for the springs in the upper Owens River, including Big Springs. The springs within the watershed receive groundwater recharge from a broad footprint that may extend outside the caldera that contains the headwaters. Flows may come from one or a combination of sources (USDA Forest Service 1994). Precipitation distribution estimates suggest that 75% of the discharge at Big Springs is groundwater from the Deadman and Dry Creek drainages (including the Mammoth Mountain component), and 25% from the Glass Creek drainage. Those estimates were supported by geochemical tracing that identified ski-run salts in well samples located in the Dry Creek drainage area (Evans 2002).

Runoff from Deadman ridge collects in numerous unnamed streams that flow from the ridge onto the floor of the pumice flats. Infiltration losses in these upper reaches are high and following snowmelt recession, the entire stream flow in both creeks is lost to infiltration in dry years. The infiltrating water may recharge Big Springs and possibly other springs.

Groundwater demand is high regionally, with the largest withdrawals occurring at Mammoth Mountain Ski Area (MMSA) for snow production and the Town of Mammoth Lakes for residential use. Groundwater wells on the eastern base of MMSA and in the Town of Mammoth Lakes are within the Mammoth Creek watershed that drains to Hot Creek and the Owens River more than 9 miles downstream of the designated

WSR reach. Groundwater wells at the northern base of MMSA are within the headwaters of the Dry Creek watershed that drains northeast to the Upper Owens immediately below the designated WSR reach. Hydrologic studies conducted for these groundwater wells predicted that groundwater supply exceeds demand based on historical precipitation and model calibration using historical well data (Wildermuth Environmental 2003, 2009; Mammoth Community Water District 2005; Team 2007; Partner Engineering and Science, Inc. 2020). Many of these studies noted an assumed connection to the larger groundwater system that underlies the region and supports flow at Big Springs, however, none specifically quantified the groundwater connection or predicted the effects of climate change.

There are some indications of greater variability in streamflow during recent decades as compared to most of the past century (Kattelman 2000). For example, nine of the largest 10 to 13 (depending on which stream) volumes of snowmelt runoff since the 1920s have occurred since 1978 (Kattelman 2000). Some climatologists believe such observations are a signal of climate change.

Climate change projections for the southwest region of the United States indicate that snowpack levels lowered by 25% during the 2011 to 2016 drought, and average springtime snowfall is expected to drop 64% by 2100. Also, in the past 50 years, there have been four major statewide droughts plus smaller regional droughts. Scientists expect that climate change will lead to more frequent and more intense droughts statewide. Overall precipitation levels are expected to increase slightly with more frequent years of extreme levels of precipitation, both high and low. As a result, this is expected to cause more droughts that are more intense and last longer compared to historical norms (PlaceWorks et al. 2021). Reduced snowpack and more intense rainfall events may result in reductions in flow at Big Springs and other local springs, along with greater variation in channel free-flowing conditions leading to greater potential for flooding and channel instability and erosion.

Most of the surface water for Glass Creek enters through springs and seeps surrounding the meadow, and the stream gains discharge downstream. As the stream continues down the canyon, it reaches the granite bedrock, which acts as a groundwater barrier. Groundwater is forced upward, increasing stream discharge locally. Downstream of the granite, the stream loses water until it crosses the lower basalts where discharge again increases. Discharge then decreases as Glass Creek flows through alluvium before entering Deadman Creek. Streamflow was measured in Glass Creek just above the confluence with Deadman Creek on three occasions in 1991: 2.3 cfs on June 10, 1.2 cfs on July 9, and 0.7 cfs in September.

The Forest has documented 58 spring/seep systems in the headwaters of Deadman Creek, and 95% of these appear to be perennial. A fish habitat study reported the mean annual discharge of Deadman Creek as 6 cfs, the minimum monthly discharge as 2 cfs, and the maximum monthly discharge as 20 cfs. This measurement location is not known. The average annual flow for Big Springs is 41,345 acre-feet/year (59.6 cfs) (USDA Forest Service 1992: Appendix D). The Owens River below Big Springs, but above East Portal, where water diverted from the Mono Basin was added until 1990, had a mean flow of 42,000 acre-feet per year (58 cfs) from 1935 through 1987. Snowmelt runoff from the higher elevation areas near the Sierra Nevada crest does not begin until April and peaks between late May and early July (Kattelman 1997).

There are relatively few structures that may affect the free-flowing nature of stream channels. Glass Creek and Deadman Creek have multiple road crossings with culverts that affect condition and flows to varying

degrees. Due to the nature of the flat terrain, and an undersized culvert, water often flows through Upper Deadman Campground above the road crossing flooding out campsites located near the channel. This condition was present at the time of designation. Although it has been in this condition for decades, and therefore is not affecting the free flow relative to the time of designation, the Forest does identify altering the culvert and removing camp sites as a possible future action in order to prevent erosion and allow the stream to flow more naturally than at the time of designation. Recently, work was completed at Glass Creek Campground to move campsites away from the Creek to facilitate free-flowing conditions and improve riparian vegetation habitat.

Upper Owens River is listed as a proposed addition to the Clean Water Act's Section 303(d) listing for impaired waters, starting just downstream of the wild and scenic segment. Specifically, it is proposed to be listed for indicator bacteria, per the Lahontan Water Quality Control Board. Big Springs and Deadman Creek provide natural sources of phosphorus, which encourages abundant growth of aquatic plants in the upper Owens River and in Crowley Lake. Big Springs was found to be the primary source of phosphorus for Crowley Lake. Bacterial contamination was noted downstream of the campground on Glass Creek in late summer and autumn (USDA Forest Service 1998). Since that time, there has been little water quality data collected in Glass Creek. The State CEDEN database reported 12 samples for *E. coli* or fecal coliform in 2011 and 2012. Of those, only one was over the water quality standard of 20 cfu/100mL for this Region. The rest had no or very low levels of fecal coliform. Therefore, it is uncertain whether there is bacterial contamination in Glass Creek.

Pathogenic bacteria, such as *E. coli*, enter surface waters from leakage and failure of septic and sewage systems, pet waste, livestock waste, wildlife waste, human waste from recreationists, and indiscriminate flushing of recreational vehicle (RV) waste tanks. While activities in the Upper Owens headwaters could include such sources, these have not been noted and it is unknown if any of those are causing bacterial contamination in the corridor. Unpaved roads are the principal source of sediments from human activities throughout the Sierra Nevada (Kattelman 1996). This is also likely the case within the upper Owens River watershed. There may be accelerated erosion and sediment transport into Glass Creek from off-highway vehicle (OHV) use in and adjacent to the channel. The Forest has taken steps to address the problem through restricting vehicle use in the Glass/Hartley area, hardening the only wet stream crossing, moving campsites further away from the creeks, and other measures as part of implementing both the 2009 Travel Management Decision and the 2011 Deadman Creek Watershed Restoration Action Plan. Sedimentation of portions of Deadman Creek has been attributed to the road crossings of the creek and OHV use within and adjacent to the channel. Observations indicate dispersed camping along Upper Deadman Creek is another source of sedimentation. Roadside vegetation along the dirt roads near Deadman Creek has receded as a result of vehicle damage. There is less vegetative cover and more compacted soil. Runoff from storms and consequent surface erosion have been observed to increase.

Outstandingly Remarkable Values

The Act requires that each river possess one or more ORVs to qualify for designation. In order to be assessed as outstandingly remarkable, a river-related value must be a unique, rare, or exemplary feature that is significant at a comparative regional or national scale. While the spectrum of resources that may be considered is broad, all values should be directly river related. To be considered river related, a value should be located in the river or its immediate environment (generally within a quarter mile on either

side), contribute substantially to the functioning of the river ecosystem, owe its existence to the presence of the river, or some combination of these things. The Forest Service region of comparison is defined geographically in the Resource Assessment, included in this document as Appendix B.

In 1991, the Forest Service initiated an eligibility study of all rivers on the Forest. This eligibility assessment was revisited during the Land Management Planning revision process and considered which resources within the Owens River Headwaters designated corridor qualified as ORVs. A Resource Assessment for the corridor was then completed in November 2019 to support development of this CRMP. The River Management Society (RMS) held a workshop on the Forest from November 4-8, 2019, for the purpose of developing CRMPs for Cottonwood Creek and Owens River Headwaters WSRs on the Inyo National Forest. During that workshop, the resource experts on the CRMP team, along with representatives from the Forest Service and RMS, reviewed each ORV for the river. In April 2022, upon further internal evaluation and consultation with Mono Lake Kutzadika'a Tribe, the Forest Service identified an additional ORV for Prehistoric and Tribal Cultural values. The description of Prehistoric and Tribal Cultural Values below further details the rationale for including this as an ORV and its relation to the WSR corridor.

The identified ORVs are described below. Certain values did not qualify as ORVs because they did not meet the required criteria. See Appendix B for additional detail about ORV findings and rationales, as well as the criteria used to define each ORV.

Scenery

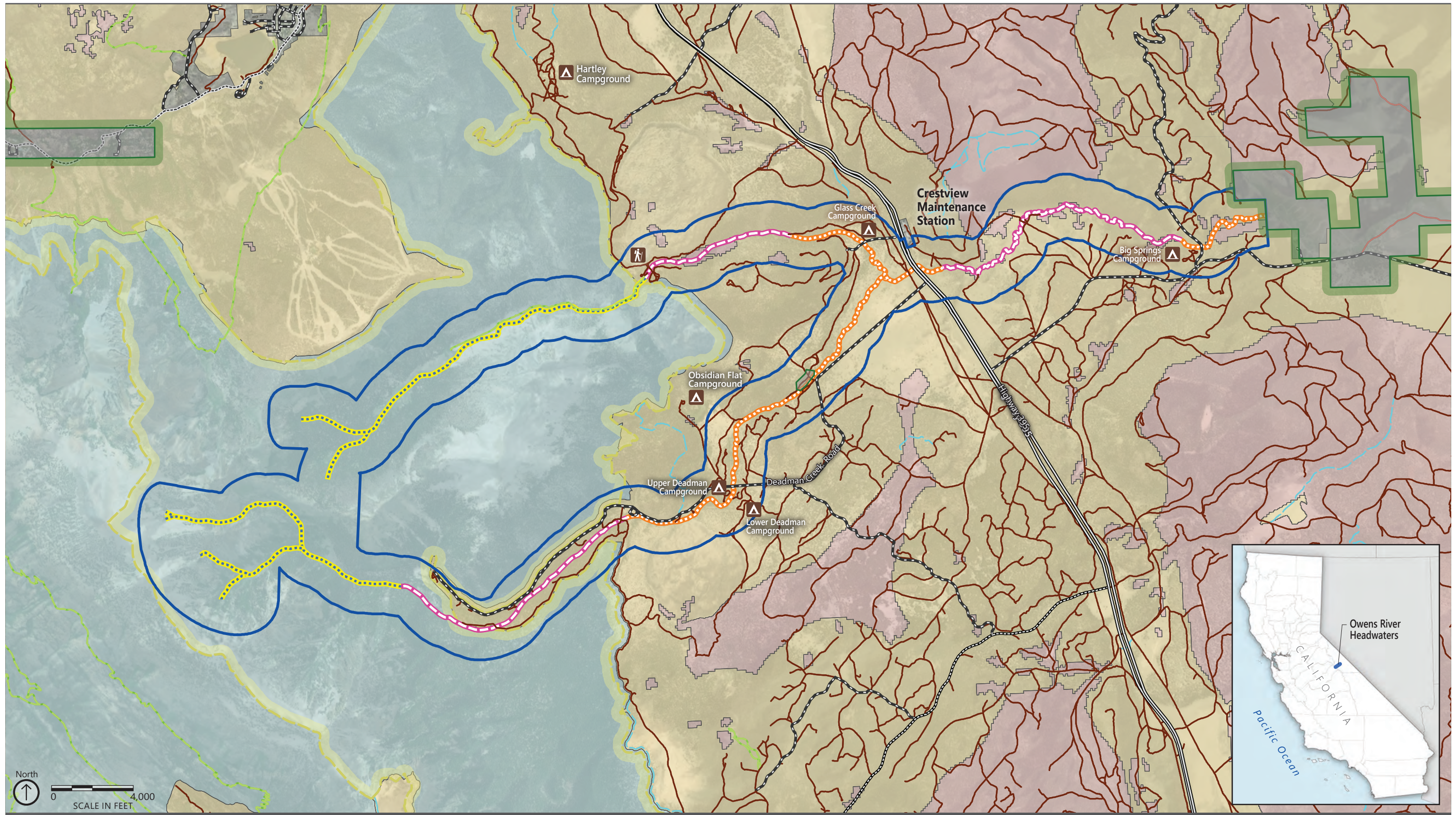
Outstandingly remarkable scenic values can be attributed to all of Owens River Headwaters, given its diversity of scenery. This includes Deadman Creek, Big Springs, and the Owens River. Views from Glass Creek Meadow and the meadow itself are determined to be outstandingly remarkable (USDA Forest Service 2019). The viewshed is limited to the foreground throughout much of the corridor due to low relief and forest cover. Glass Creek and Deadman Creek are both typically out of view from the main roads but can be seen from some parts of the campgrounds and dispersed campsites. A portion of Obsidian Dome can be seen from the corridor. The Glass Creek Meadow Trail closely parallels a short section of Glass Creek with a small cascade. The upper end of the trail provides wide views of Glass Creek Meadow and the surrounding mountains. A portion of Deadman Creek passes through a gorge that can be seen from above at the end of a few dead-end roads.

Obsidian Dome can be seen in the foreground from an OHV route and an access road in the corridor. The dome provides an unusual up-close view of a large obsidian feature. Glass Creek Meadow offers a large meadow with willows, grasses, and forbs surrounded by a volcanic landscape of pumice flats and hillsides. The background includes rounded ridges and peaks of the Sierra Nevada Range. Although outside the river corridor, White Wing Mountain is another unique natural feature which can be seen from Glass Creek and Deadman Creek, contributing outstanding scenic views of pumice on its peaks.

Glass Creek Meadow provides wide views of wildflowers in summer and golden colors from willow, aspen, and cured grasses in the fall. Winter offers views of the landscape under snow.

Within the corridor, visible modifications include native surface roads, campgrounds, road signs, and some mining evidence. Also present is a communication tower on a ridgeline visible from Glass Creek Meadow. Scenic Integrity Objectives (SIOs) are determined to be "High" and "Very High" for this area.

Scenic integrity objectives are those that define the minimum level to which landscapes are to be managed from an aesthetics standpoint (USDA Forest Service 2005). Specifically, a “Very High” SIO generally provides for ecological changes only and refers to landscapes where the valued (desired) landscape character is intact with only minute, if any, deviations. The landscape is unaltered (USDA Forest Service 2005). A “High” SIO provides for conditions where human activities are not visually evident. This refers to landscapes where the valued (desired) landscape character “appears” intact. Deviations may be present but must repeat the form, line, color, texture, pattern, and scale common to the landscape character. The landscape appears unaltered (USDA Forest Service 2005). See figure 2 for a map of SIOs in the project area.



North
 0 4,000
 SCALE IN FEET

- Inyo National Forest (US Forest Service)
- Private Land
- Owens River Headwaters WSR Corridor
- Scenic River
- Wild River
- Recreation River

- Owens River Headwaters Wilderness
- Forest Service Roads
- Forest Service Motorized Trails
- Forest Service Standard Trails

- Federal Highway
- State Road
- County Road
- Town Road

- Scenic Integrity Objectives
- Medium
 - High
 - Very High

- Trailhead
- Campground



FIGURE 2. SCENIC INTEGRITY OBJECTIVES
Owens River Headwaters Wild and Scenic River
Comprehensive River Management Plan

Wildlife

River dependent wildlife species in the corridor include habitat for the Yosemite toad, which is federally threatened. Yosemite toad is documented within Glass Creek Meadow. This is one of the few occurrences of Yosemite toad within the Forest that is outside of the USFWS designated critical habitat (USDA Forest Service 2017a). The northern goshawk occurs in abundance within the Forest, and there are also multiple northern goshawk nesting and foraging territories within and adjacent to the Deadman Creek and Glass Creek portions of the WSR corridor. There is potential habitat for willow flycatcher (includes Sierra Nevada mountain willow flycatcher and Great Basin willow flycatcher), but no known breeding habitats (California Department of Fish and Wildlife [CDFW] 2007; USDA Forest Service 2017b).

The Deadman Creek portion of the WSR corridor is a significant seasonal migration corridor for mule deer, and it provides summer foraging habitat and fawning areas. Deadman Creek also provides an important trans-Sierra migratory corridor for furbearing species, such as black bear and bobcat. The WSR corridor also hosts a diverse community of bird species. A survey conducted in 2010 and 2011 by Point Blue Conservation Science identified 17 bird species in a transect near Deadman Creek. The dominant species included dark-eyed junco, mountain chickadee, and warbling vireo (Point Blue Conservation Science 2021). The upper watershed may provide foraging habitat for California spotted owl located outside of the crest of San Joaquin Ridge. Glass Creek Meadow provides the high diversity of butterfly species, including six species listed as species of conservation concern (SCC) for the Forest (USDA Forest Service 2019). There have also been potential aquatic spring snail detections or surveys for Wong's springsnail and Owens Valley springsnail, both of which are SCC species.

The Sierra Nevada red fox (red fox) is not a species of conservation concern for the Forest but with the recent 2021 listing under ESA, red fox will be included among the Forest's at-risk species review process. The red fox has suitable habitat in the corridor but has a low likelihood of occurring in the corridor.

The Forest is closely collaborating with CDFW with regards to the red fox. The Forest response includes ongoing surveys for the red fox, conducted by CDFW. Two letters are on file at Mammoth Ranger Station authorizing CDFW to expand carnivore surveys to include the Forest. Surveys took place between 2018-2019 and again in 2020-2021. The most recent update by CDFW is from 2021 by B. Hatfield showing four scat detections near bishop pass and near Lamarck Lake.

The Forest Plan includes plan direction designed to maintain the diversity of plant and animal communities and supports the persistence of native species within the plan area. There are numerous plan components for at-risk species or groups of species that provide for ecosystem integrity and diversity to meet the ecological condition necessary for those species within their range. It is expected that Forest Plan components specific to fisher, marten, and owl will provide for red fox. Furthermore, wilderness designation and Forest-wide components for terrestrial ecosystems and vegetation are expected to contribute to the conservation of the red fox.

The unique combination of a wide variety of species makes this area outstandingly remarkable.

Botany

The river corridor hosts a diversity of plant species, ranging from subalpine meadows of upper Glass Creek to sagebrush and pumice flats with unique vegetation in the lower portion of Deadman Creek.

There is one known population of the SCC plant, western singlespike sedge, on Deadman Creek east of US Highway 395, and there is the potential for additional SCC plant species associated with the river corridor. Previously documented little grapefern in Glass Creek Meadow suggests potential for rare botrychium species elsewhere along the river corridors. Glass Creek Meadow is a locally important hiking destination for subalpine meadow and wildflower viewing; the meadow contains a high diversity of wet meadow associated plant species compared to the surrounding area. Additional at-risk species overlapping the corridor are Mono Lake lupine and whitebark pine; however, these are both upland species not associated with the river (USDA Forest Service 2018). There are a low number of rare species present compared to some other riparian systems; however, there could be additional unknown rare species found if additional botanical surveys were conducted.

In addition, the river drainage plays an important role for the migration of westside floristic species in the area to the east of the Sierra Nevada crest. Furthermore, Upper Deadman Creek flows through the world's largest Jeffrey Pine forest and supports stands of rare eastside old growth red fir trees. This unique forest represents "the only major east-side occurrence of this species between the Kern Plateau and Hope Valley near Carson Pass..." (Millar 1994 in Constantine-Shull 2000). Overall, the area has a diverse understory of plant species which represent seven unique floristic zones.

The plant habitat quality is generally good, though there is some lodgepole pine encroachment into Glass Creek Meadow. Although lodgepole pine is a native species, it is known to quickly recruit into disturbed or burned areas, and it is not a species typical of subalpine prairie. There are some recreation impacts (firewood collection, fuels reduction, dispersed camping, OHV trails, and roads) outside of designated wilderness that may impact the condition of riparian vegetation. Trail impacts to Deadman and Glass Creeks in designated wilderness are unknown but may include the potential for some trampling of vegetation. This area is likely to be generally free of invasive plants at higher elevations, but there are some cheatgrass and bull thistle populations mapped near the lowest end of the corridor east of US Highway 395. Cheatgrass and bull thistle are both invasive exotic species that have been introduced throughout the United States. There are likely more nuisance, low-priority invasive species along the corridor, but no high-priority, noxious weeds are known or currently pose a high threat to this WSR.

Recreation

Portions of the corridor are used year-round. Use in the spring, summer, and fall includes camping in Forest Service campgrounds and dispersed campsites, fishing, OHV riding, day hiking on the Glass Creek Meadow Trail, and hunting. Specifically, the area sees summer and winter range herds of Mule Deer (trophy X9-B and potentially X9-A hunt zone). There is also a recreation residence tract on Glass Creek. In the winter-spring season when there is enough snow, recreation includes backcountry ski touring in the Owens River Headwaters Wilderness, cross-country skiing, and snowmobiling outside of wilderness.

Recreational activities include camping in three Forest Service campgrounds and a separate Forest Service group camp. The campgrounds are known for easy access to local OHV routes and are popular for motorized recreation. Other opportunities include a 2-mile hiking trail into Glass Creek Meadow, several dispersed campsites along Deadman Creek, a 1.5-mile OHV/four-wheel drive route, hunting, and trout fishing. The nearby Obsidian Dome geologic feature is also a sightseeing attraction. Winter recreation includes snowmobiling and cross-country skiing. Currently, four outfitter or guide services are permitted to operate in the corridor: one jeep tour company, two camping trailer drop-off providers, and a

guide service providing guided trail rides and filming with horses. The narrow and shallow streams do not allow for much paddling, floating, or swimming.

The three campgrounds in the corridor include a total of 112 campsites. A separate group camp can accommodate up to 50 people. There are many dispersed campsites at the end of spur roads along Deadman Creek. The campgrounds are busy during peak summer season because they are inexpensive, close to US Highway 395, and have sites big enough to accommodate RVs and OHV trailers. Streamside dispersed campsites are also popular in the summer because the proximity to the creeks provides a cool and shady environment. Use is concentrated at these camping locations.

There are 78 campgrounds in the Forest, many of which are along creeks and lakes. Although the camping in the WSR corridor is pleasant, it does not stand out in comparison to other opportunities in the area. The presence of RV- and OHV-friendly campgrounds does make the area more unique. Many other local campgrounds do not have enough space to accommodate large vehicles and trailers. The proximity to many OHV routes and signed motorized trails also provides a unique experience. In the corridor, there is one OHV route crossing that is not a bridge or culvert. Sightseeing at Obsidian Dome is a unique experience in the area, although the primary access and viewing occurs outside of the WSR corridor. Other trails in the area include the Deadman Creek and Lower Glass Creek trails, in addition to informal trails that have been created. The Glass Creek Meadow Trail into the Owens River Headwaters Wilderness accesses beautiful views of the eastern Sierra which are common throughout the region. The presence of these specific creeks in combination with OHV-friendly campgrounds and nearby OHV routes offer scenery, cooler summer temperatures, and family-friendly recreation opportunities which draw people from outside the region.

Geology/Hydrology

There is geologic evidence of volcanic activity along Owens River Headwaters. Significant geologic features or attractions within the region include Inyo Craters, Obsidian Dome, Obsidian Flats, Glass Creek Flow, Deadman Dome (North and South), Recumbent Dome, Long Valley caldera, and Locatable Pumice. Five rhyolite dome-flows are known at Wilson Butte (volcanic cone jagged chunks); Obsidian Dome (volcanic glass extrusion); Glass Creek flow (a volcanic extrusion of jagged chunks); and North and South Deadman Dome (a volcanic extrusion of jagged chunks). Two small unnamed domes are known at Inyo Craters (three phreatic eruptions explosion pits, two of which contain small lakes) and Deer Mountain (a cone-shaped hill 500 feet high with a crater at the summit). Other features in the corridor include Resurgent Dome; Feeder Dike; vents and fumaroles; north-south trending fault scarps; and Sherwin, Tahoe, and Tioga glacial deposits.

Stream segments also contain unique geology. Rare geologic features include basalt and andesite, formed by volcanic and glacial events. The topographically defined Long Valley caldera is about 19 miles from east to west and 10 miles from north to south. Specifically, the Obsidian Dome and Glass Creek Dome are outstanding examples of rhyolite domes, tephra layers, explosion craters, and marble-cake blocks (mixed magmas containing a crystal-poor black obsidian and a crystal-rich light gray pumice).

The corridor has scenic geology with interpretive potential, historic mining, and is a known Geothermal Resource Area exhibiting a unique Geothermal Reservoir.

The Upper Owens River is fed by Big Springs, which is a large spring unique to the Eastern Sierra Mountains. It is recharged by runoff and snowmelt that infiltrates into permeable pumice deposits and migrates along a hydraulic gradient through fractured andesite to the springs primarily from the west and southwest watersheds of Deadman Creek and Dry Creek up to Deadman (San Joaquin) Ridge. Big Springs issues from a complex of andesitic, rhyolitic, and basaltic lava flows. Recharge for this groundwater system evidently occurs to the west and southwest in the watersheds of Deadman, Glass, and Dry Creeks. Groundwater flow from Mammoth Mountain, via Dry Creek, specifically to Big Springs has never been demonstrated, but using available data on hydraulic head gradient, transmissivities, volcanic stratigraphy, and some chemical and isotopic data, scientists estimated that about 10% of the water discharge at Big Springs could result from precipitation on Mammoth Mountain. Monitoring hydrologic inputs (precipitation and snowmelt) and outputs (groundwater well discharges and water levels, Big Spring discharges, and groundwater chemical composition) would, over time, provide a better understanding of the hydrologic connection to the surrounding area as climate changes and the effects thereof persist. This is a unique hydrogeologic system that results in headwater springs of the Owens River, an important feature and recreational asset in the Eastern Sierra. The Upper Owens and Big Springs discharge is relatively constant throughout the year with flows peaking annually during the snowmelt season in late spring to early summer. Big Springs and Deadman Creek provide natural sources of phosphorus, which encourages abundant growth of aquatic plants in the upper Owens River and in Crowley Lake. Big Springs was found to be the primary source of phosphorus for Crowley Lake. Big Springs also serves as a source of naturally occurring arsenic concentrations, which are prevalent in Crowley Lake, however the dominant source of Arsenic is the Hot Creek geothermal area (Jellison and Dawson 2003).

Prehistoric/Tribal Cultural Values

Pre-contact archaeological sites along the river corridor west of US Highway 395 along Glass Creek and Deadman Creek are predominately lithic scatters and resource processing sites associated with the river environment and the obsidian sources near Obsidian Dome. Sites along the Owens River Headwaters east of US Highway 395 are predominately lithic scatters associated with the obsidian quarry at Lookout Mountain that runs along the south side of the river. Site density increases moving east along the corridor and are primarily habitation sites with a large variety of artifacts and features associated with resource procurement. The entire reach of the Owens River was highly significant to pre-contact inhabitants of the region, evidenced by village sites, burial mounds, and rock art panels further south of this location. Sites are generally in good condition; however, recreational use of the river corridor on the east side of US Highway 395 has resulted in some vandalism and disturbance. The Lookout Mountain obsidian quarry is eligible for listing in the National Register. It is currently managed as a Priority Heritage Asset by the Forest. The prehistoric sites along the corridor are eligible for listing to the National Register of Historic Places but are not unique to this location or this region of the Forest. The sites do, however, owe their existence to the presence of the river and the intersection of the obsidian resources and water would have contributed to selecting these locations for habitation and use.

Tribal Cultural: The tribal groups of the Sierra Nevada region practiced a seasonal round that included hunting and gathering of animal and plant resources, regular resource exchange with neighboring groups; and social and ceremonial interactions to affirm cultural bonds and relationships (Steward 1933; Davis 1965; Fowler and Liljeblad 1986; Liljeblad and Fowler 1986; Davis-King 2010). The river corridor provided a place where many, if not all, of these needs intersected. Dramatic changes to indigenous landscape use began in the 1850s with the first Euroamerican miners and settlers establishing homesteads

and claiming water rights. Though homesteading did occur along the river corridor, much of the space remained unencumbered and available for traditional uses. Further archaeological survey in both the Glass Creek and Deadman Creek corridors is highly likely to identify additional sites associated with resource processing and procurement that can be reasonably dated from the pre-contact period through the historic ethnographic period.

Tribal consultation indicates ongoing use for this WSR corridor, particularly for the Mono Lake Kutzadika'a Tribe. In a letter dated April 13, 2022, the Kutzadika'a identified additional cultural and tribal values associated with the corridor. From Chairwoman Charlotte Lange:

“This area has important cultural values that sustained our people prior to Euroamerican arrival and still serve Tribal needs in the present. These cultural resource values are integral to the springs and creeks in this area...”

The ethnographic record highlights the Owens River Headwaters as a linguistic boundary between the Mono Lake Kutzadika'a Paiute and the Owens Valley Paiute (Busby et al. 1979:114). Recent tribal stories collected by the Traditionally Associated Tribes of Yosemite National Park further recognize this area as a shared cultural boundary between both groups and the neighboring Sierra Nevada tribes including the Tuolumne Band of Me-wuk Indians, the Western Mono, and the Southern Sierra Miwuk (National Park Service 2019).

The ethnohistoric record as compiled by Davis-King (2010) provides long-standing connection to the Owens River Headwaters and Owens River, as observed by the earliest Euroamerican entrants to the region. A.W. Von Schmidt, contracted to survey the east side of the Sierra Nevada range by the Department of the Interior in 1855, reported encountering “Indians of the Mono Tribe” at the headwaters of the Owens River (Davis-King 2010:55). The subsequent plat maps produced by Von Schmidt and other surveyors of the early General Land Office (1879, 1882) identify north-south trending trails near the river corridor as “Mono Lake Trail.” Because Euroamerican settlement in this region did not occur in great number until the late 1850s, trails well enough defined on the landscape to publish on the early plat maps would have been indigenous in origin. This trail is also noted by the California Geologic Survey in 1873 (Hoffmann 1873) as “Indian Trail” though the scale of the map is more difficult to situate spatially with the river corridor.

In subsequent consultation meetings, the Mono Lake Kutzadika'a reiterated the importance of the river corridor as a travel route between Mono Lake and Long Valley. Traditional walks organized by the Mono Lake Kutzadika'a occur along the corridor to this day, serving to connect the tribe with important and unique places on the landscape in this region of the Forest. Though demonstrated with historical information, the tribal cultural ORV identified for the WSR corridor is defined from the point of the view of the Tribe. Specific details of the tribal cultural ORV remain confidential and known only to the Mono Lake Kutzadika'a Tribe. The tribe has expressed concern for visitor use levels, water quality and quantity, motorized recreation, and authorized mineral extraction as potential impacts to the ORV. These concerns speak to a desired condition in the corridor that maintains the untrammled visual and auditory qualities of the natural river environment.

Visitor Use Management and Capacity

(The information below is excerpted from Appendix A, *User Capacity Analysis for Owens River Headwaters Wild and Scenic River Corridor*. Additional detail on the framework, concepts, and approach used to develop the capacity analysis can be found in Appendix A.)

Scenic and Recreational Segments

Recreational Use Setting

The recreational and scenic segments of Owens River Headwaters are located entirely within Inyo National Forest. Portions of the corridor are used for recreational purposes year-round. Public recreational access within the recreational and scenic segments of Owens River Headwaters occurs along paved and unpaved forest roads which access three Forest Service campgrounds with a total of 112 campsites, a group campsite which can accommodate up to 50 people, and approximately 50 dispersed campsites at the end of nearby road spurs and alongside roads. There is very limited data to draw conclusions about the amount of day use in the area, but observations from USFS recreation managers indicate that most recreation use is concentrated around the campgrounds and dispersed campsites. Recreation activities that occur during the spring, summer, and fall include camping, fishing, OHV use on nearby routes and some equestrian use. Plowed winter and spring parking outside the wild and scenic river corridor provide access to snowmobile trails, some of which cross into the corridor. Other winter and spring activities within the corridor include Nordic skiing and snowshoeing.

River Values Potentially Affected by Visitor Use

The purpose of this section is to identify and discuss the effects or potential effects of recreation use on river values in the river segment. The effects of recreation use considered in Appendix A are not only with respect to the amounts of recreation use, but also other characteristics of use (e.g., visitor behavior, dispersed versus concentrated use, etc.). The assessments of the effects of recreation use on river values in this section are general in nature and relationships between recreation use and impacts are better understood for some river values than others.

The scenic and recreational segments of Owens River Headwaters possess outstandingly remarkable values for scenery, wildlife, botany, recreation, and geology/hydrology. As noted, natural resource conditions are generally not directly related to recreation use levels but can be impacted by recreation use depending on a number of situational factors (e.g., visitor behavior, terrain, weather). As such, the botany and wildlife ORVs and water quality of the creek could be sensitive to recreation-related impacts and these should be addressed by managing the characteristics of visitor use (e.g., concentrating use on established trail treads, road surfaces, and campsites, promoting low-impact use behaviors). In addition, the botany ORV and water quality would potentially be adversely impacted if the physical footprint of the campgrounds, group campsite, or dispersed campsites were expanded to accommodate higher levels of recreation use. Campsites that were experiencing seasonal flooding in the past were closed by USFS to prevent degradation of water quality.

The amount of recreation use in the area could impact the quality of visitors' experiences and degrade the recreation ORV. For example, high levels of recreation use might force visitors to have to share campsites with other groups. These impacts to the recreation ORV could cause indirect impacts to the botany and

wildlife ORVs and/or to water quality, for example, if visitors expand campsites or create new informal campsites. Based on the proximity of the Big Springs Campground to Big Springs, the hydrology value of the river segment may be adversely impacted if the physical footprint of the campground were expanded to accommodate higher levels of recreation. Scenic values are unlikely to be impacted by recreation use levels if use remains concentrated at existing campgrounds and disperse campsites.

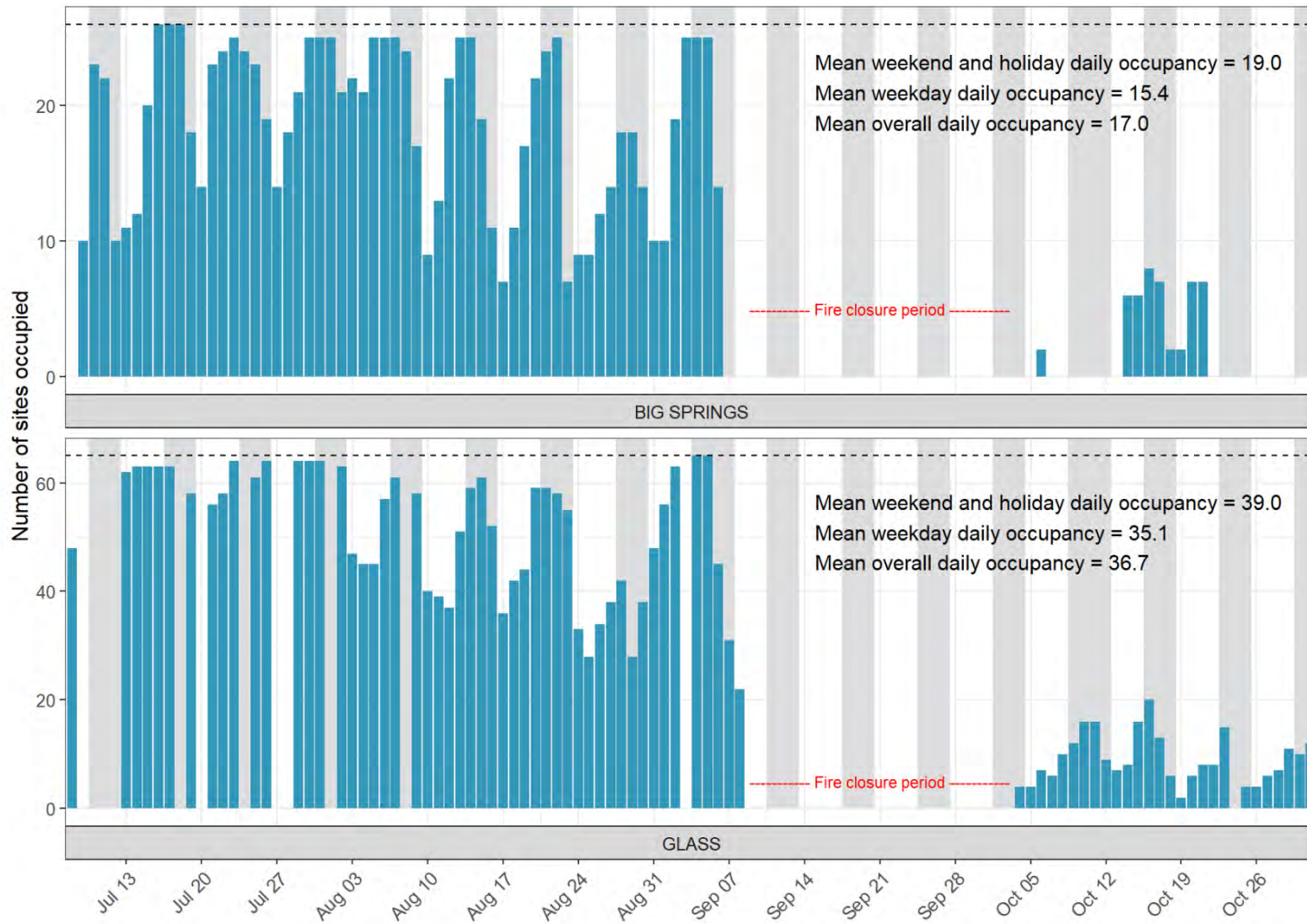
Estimated Current Daily Use

The following subsection reports estimates of current daily use in the scenic and recreational segments of Owens River Headwaters based on campground occupancy data collected for a total of 69 days at Big Springs Campground and a total of 79 days at Glass Campground between July and October 2020. A nearby fire closed the portion of the Forest where the two campgrounds are located from September 7 through October 4, 2020. Occupancy data were not collected during the fire closure period. Campground occupancy data were not collected at Upper/Lower Deadman Campground and observation data were recorded for only a single day at the dispersed camping and day use sites due to a lack of staffing, shortage of volunteers due to the COVID-19 pandemic, and limits of project timing and funding.

Table 2 presents the mean, minimum, and maximum campground occupancy by campground for Big Springs and Glass Campgrounds. Figure 3 presents current total daily campsite occupancy by date and campground. These summaries of estimated current daily use provide a basis of comparison to the estimate of user capacity presented above, and the management triggers and associated actions outlined in the next subsection. These results suggest that overnight and day use in this area is moderate to high during peak use times.

Table 2. Owens River Headwaters scenic and recreational segments mean, minimum, and maximum daily campground occupancy, and percent of days all campsites were occupied, by campground during the data collection period

Location	Mean	Minimum	Maximum	Number of data collection days	Percent of days all campsites were occupied
Big Springs Campground	17	2	26	69	4%
Glass Campground	37	2	65	79	3%



--- CAMPGROUND CAPACITY

Days when campsite occupancy counts were not conducted are not shown

Figure 3. Owens River Headwaters scenic and recreational segments campground occupancy, by campground and date during the counting period
 (gray shading indicates weekends/holidays; Fridays were classified as weekend days)

Capacity Analysis

As noted, any expansion of the physical footprint of developed or dispersed campsites in this area to accommodate higher levels of recreation use would potentially adversely impact the botany, wildlife, and hydrology ORVs and water quality of the river. Therefore, the limiting factor for recreational use in the recreational and scenic segments of Owens River Headwaters is the physical designed capacity of the developed campgrounds and the capacity of the dispersed campsites in the area. Most day use in the area is focused on the campgrounds and dispersed campsites. As such, the estimated numeric daily user capacity for the scenic and recreational segments of Owens River Headwaters was calculated by multiplying the number of available campsites by the number of visitors per campsite. There are three campgrounds with 112 total campsites that accommodate a maximum of six visitors per site, one group campsite that accommodates a maximum of 50 visitors, and up to 50 dispersed sites. Each site accommodates a maximum of five visitors based on an observed average of approximately two vehicles per campsite and an average vehicle occupancy of 2.5 visitors per vehicle as estimated by the USDA Forest Service National Visitor Use Monitoring Program (USFS NVUM). Therefore, it is estimated that a maximum of approximately 950 visitors per day can be accommodated in the recreational and scenic segment of the Owens River Headwaters without adversely impacting river values or water quality.

Developed campground user capacity: 112 sites x 6 visitors per site = 672 visitors per day

Group campsite: 1 site x 50 visitors per site = 50 visitors per day

Dispersed campsites: 50 sites x 5 visitors per site = 250 visitors per day

Total daily user capacity estimate = 950 visitors per day¹

The campground occupancy data summarized in table 2 and figure 3 provide a basis of comparison between the designed capacity of campgrounds and current use. The campground occupancy data suggest that current use reaches the design capacity of the Big Springs and Glass Campgrounds less than 5% of days during the visitor use season, but that it approaches the design capacity often during the peak summer season. Triggers are specified in the next section to provide early warning signs about increasing campground use. As such, the triggers, monitoring plan, and adaptive management strategies outlined below provide a systematic basis to manage use in the corridor well in advance of use levels that consistently reach the design capacity of campgrounds in the river segment.

Wild Segment

Recreational Use Setting

The wild segment of Owens River Headwaters is located entirely within the Forest. The primary public access within the Owens River Headwaters wild segment occurs along the Glass Creek Meadow Trail, which is located in federally designated Wilderness. This trail includes a 2-mile hike to Glass Creek Falls and Glass Creek Meadow which provides opportunities for solitude. Recreational activities along this segment of the Owens River Headwaters include hiking, horseback riding, camping, fishing, and birding. Backcountry skiing and snowshoeing are popular activities in the winter. Glass Creek Meadow is a

¹ Note, this number is rounded to account for the level of precision of the estimated numeric capacity.

locally important hiking destination for subalpine meadow and wildflower viewing and contains a diversity of wet meadow plant species.

River Values Potentially Affected by Visitor Use

The purpose of this section is to identify and discuss the effects or potential effects of recreation use on river values in the river segment. The effects of recreation use considered in Appendix A are not only with respect to the amounts of recreation use, but also other characteristics of use (e.g., visitor behavior, dispersed versus concentrated use, etc.). The assessments of the effects of recreation use on river values in this section are general in nature and relationships between recreation use and impacts are better understood for some river values than others.

The wild segment of Owens River Headwaters WSR possesses outstandingly remarkable values for scenery, wildlife, botany, recreation, and geology/hydrology. As noted, natural resource conditions are generally not directly related to recreation use levels but can be impacted by recreation use depending on a number of situational factors (e.g., visitor behavior, terrain, weather). As such, the botany and wildlife ORVs and water quality of the river could be sensitive to recreation-related impacts, and these should be addressed by managing the characteristics of visitor use (e.g., concentrating use on established trail trends, road surfaces, and campsites, promoting low-impact use behaviors).

The amount of recreation use in the area could impact the quality of visitors' experiences and degrade the recreation ORV. For example, high levels of recreation use might increase the number of encounters with other groups while hiking. Use-related impacts to the recreation ORV could cause indirect impacts to the botany and wildlife ORVs and/or to water quality, for example, if visitors travel off-trail at increasing rates to avoid crowding. The scenic and geology/hydrology values of the river segment are unlikely to be impacted by recreation use levels if use remains focused primarily on the Glass Creek Meadow Trail.

Current Recreation Use

Counts of daily visitor use and intergroup encounters per hour on the Glass Creek Meadow Trail in the wild segment of the Owens River Headwaters were conducted on 80 days and 10 days respectively, between August and November 2020. The portion of the Forest where Glass Creek Meadow Trail is located was closed from September 7 through early December 2020, as part of Regional fire closures. Daily visitor use data collected during the fire closure period were excluded from statistical summaries in table 3 and figure 5. Table 3 presents the mean, minimum, and maximum current daily visitor use on the Glass Creek Meadow Trail. Figure 4 reports current total daily visitor use by date, and figure 5 reports the distribution of current total daily visitor use on the Glass Creek Meadow Trail. Daily and average intergroup encounter rates, reported per hour, are presented in figure 6. These results suggest that current use in this area is generally very low.

Table 3. Owens River Headwaters wild segment mean, minimum, and maximum daily visitor use on the Glass Creek Meadow Trail during the data collection period

Location	Mean	Minimum	Maximum
Visitors per day	5	0	15

Note: no days are calculated to be extreme outliers (partial and fire closure days were removed from calculations)

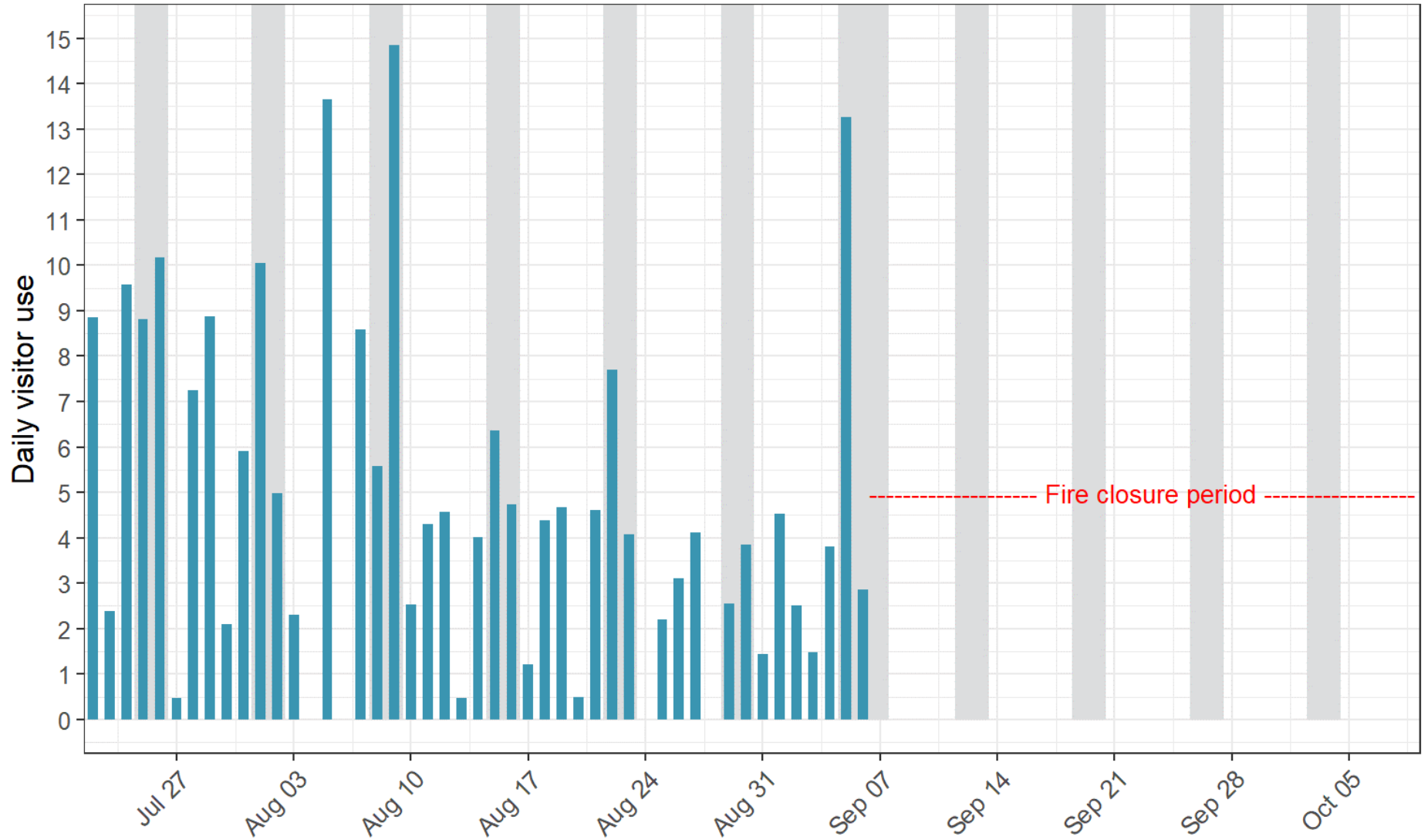
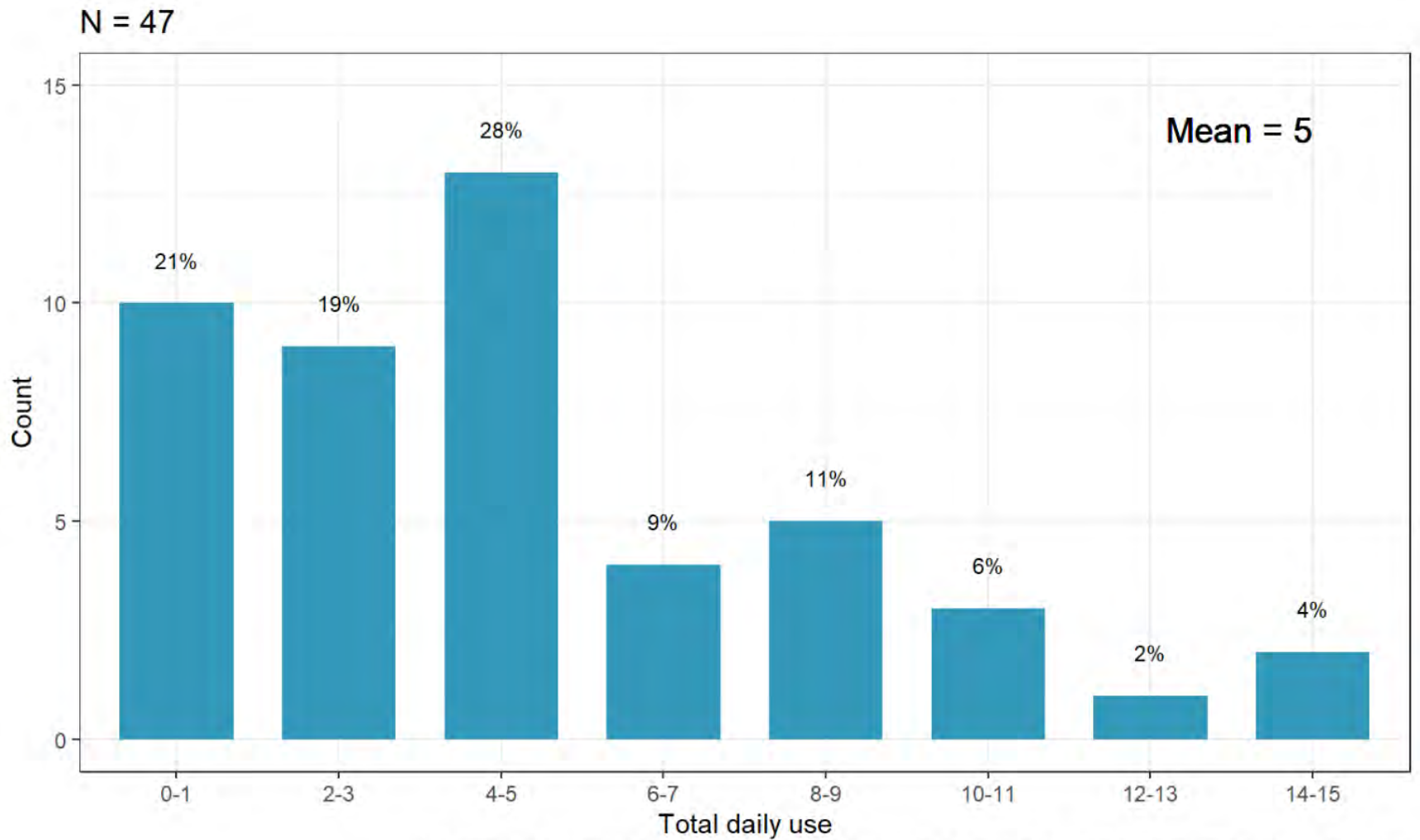


Figure 4. Owens River Headwaters wild segment daily visitor use on the Glass Creek Meadow Trail
 (gray shading indicates weekends/holidays)



No days are calculated to be extreme outliers (partial and fire closure days were removed from calculation)

Figure 5. Owens River Headwaters wild segment distribution of daily visitor use on the Glass Creek Meadow Trail

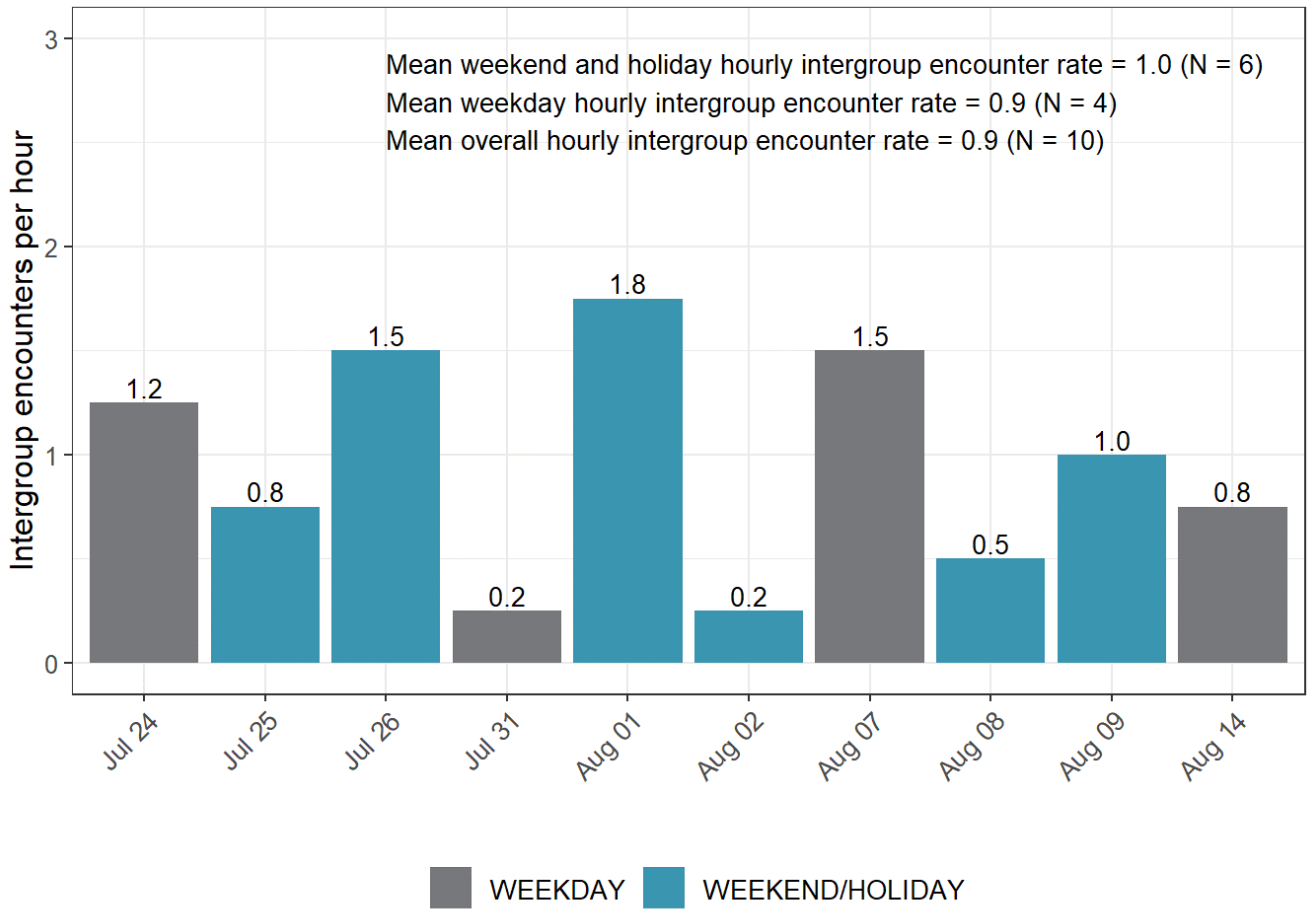


Figure 6. Owens River Headwaters wild segment intergroup encounters per hour on the Glass Creek Meadow Trail by sampling date and day of week category²

User Capacity Estimate

The primary public access within the Owens River Headwaters wild segment occurs along the Glass Creek Meadow Trail. As noted, high levels of recreation use could directly impact the recreation ORV and indirectly impact the botany and wildlife ORVs and water quality of the river (if off-trail travel increases by visitors trying to seek solitude and/or avoid crowding). Therefore, an important limiting factor for recreation use in the wild segment of the Owens River Headwaters is the number of intergroup encounters per hour on the Glass Creek Meadow Trail. The number of intergroup encounters is an almost universally important indicator among recreational visitors to outdoor recreation settings, particularly for opportunities for solitude in Wilderness areas (Manning 2011).

Based on a review of relevant planning documents and published studies in the academic and professional literature (USDA Forest Service 1998, 2017c, and 2020c) that provided thresholds for intergroup encounters for trails in settings similar to Glass Creek Meadow Trail (trails within a primitive opportunity

² Fridays were classified as weekdays.

class in federally designated Wilderness), a range of potential thresholds was evaluated as the potential basis for a numeric user capacity estimate. The potential thresholds evaluated ranged from an average of one encounter with other groups per hour while hiking, to an average of four encounters with other groups per hour while hiking. Based on discussions with and direction from USFS, a threshold of no more than two encounters with other groups per hour while hiking was used to estimate the numeric user capacity for the wild segment of the Owens River Headwaters.

The daily visitor use and intergroup encounter rate data collected for this study were used to estimate the relationship between daily visitor use on the Glass Creek Meadow Trail and the number of intergroup encounters per hour (figure 7). This regression model was used to estimate a numeric user capacity for the wild segment of the Owens River Headwaters as the maximum number of people who could hike the Glass Creek Meadow Trail per day without exceeding the threshold of no more than two encounters with other groups per hour. Based on the results of this analysis, the numeric user capacity for this river segment is estimated as a total 18 people per day (table 4).

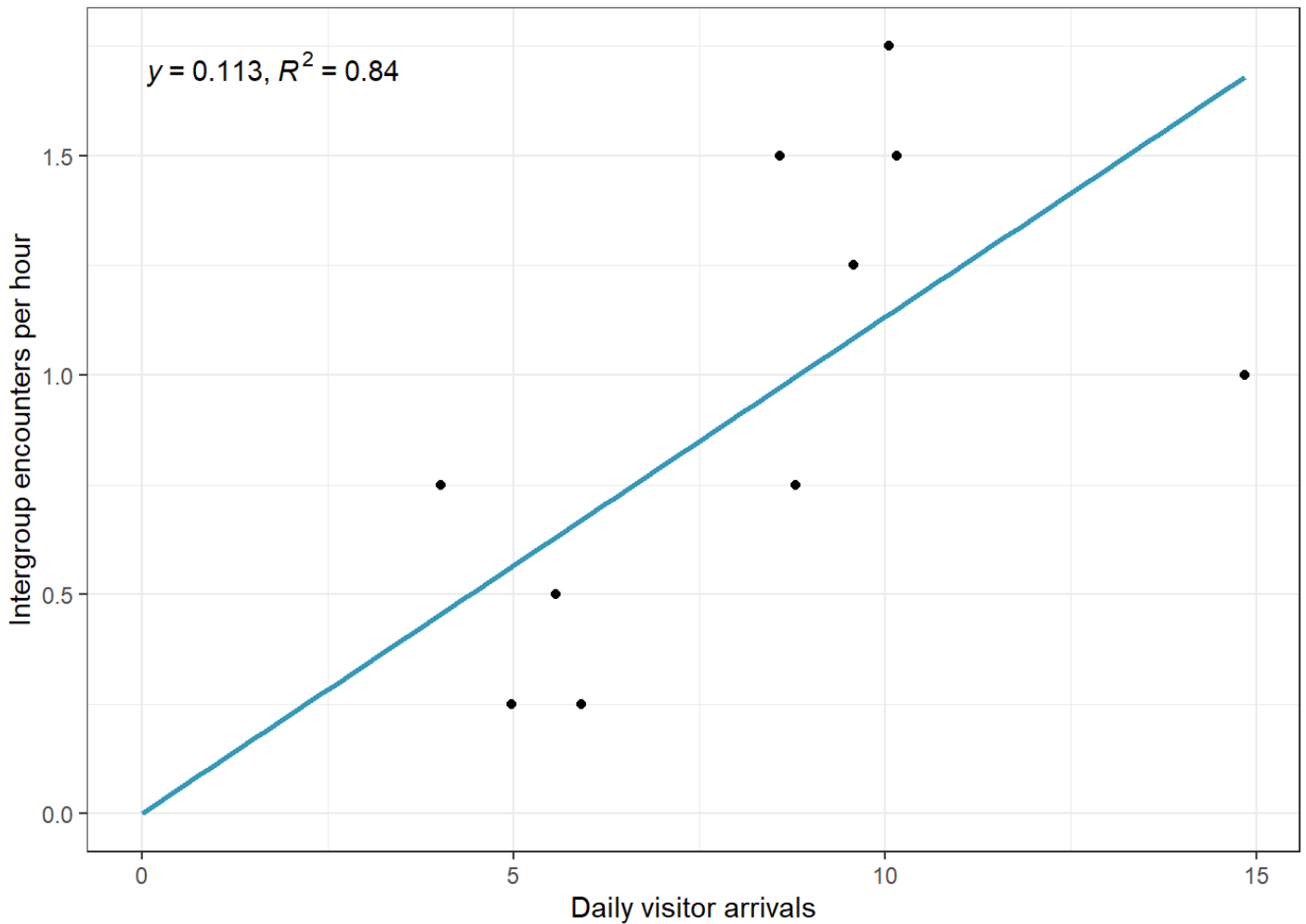


Figure 7. Owens River Headwaters wild segment user capacity scatterplot and regression equation: daily visitor arrivals and intergroup encounters per hour

Table 4. Owens River Headwaters wild segment numeric user capacity estimate

Threshold (intergroup encounters per hour)	Daily capacity (visitors/day)
2	18

Management Direction

Management direction contained in this plan is designed to meet requirements of the Act as well as Forest Service requirements, in order to provide a long-term management strategy for protecting and enhancing the river segment's free-flowing condition, water quality, and ORVs. Management direction in this section consists of desired conditions and management standards and guidelines, some of which are drawn from the 2019 LMP. Those that are derived from the 2019 LMP include the document section reference in parentheses following the standard, guideline, or action. They prioritize protecting and enhancing WSR values during the planning and implementation of resource management activities in the river corridor. Some specific management actions were developed through the interdisciplinary team's (IDT) internal planning and discussions, and further informed by public comment.

As noted above, this CRMP establishes programmatic management direction. Site-specific National Environmental Policy Act (NEPA) analysis will be done for actions proposed on National Forest lands in the WSR corridor. All proposed projects would be checked for consistency with the CRMP during the site-specific analysis.

Desired Conditions

Desired conditions for the WSR describe the resource conditions, visitor experiences and opportunities, and facilities and services that the Forest Service should strive to achieve and maintain within the designated river corridor. The desired conditions present a broad vision of the desired state for resources in the river corridor. Actions that lead toward the desired conditions over the long term would be considered consistent with this plan. Actions that lead the corridor away from desired conditions over the long term would be considered inconsistent with his plan.

- The designated river has excellent water quality that supports diverse ecological communities. The river segment exists in a free-flowing condition with a range of flows that provide optimum conditions for wildlife, natural processes, and channel integrity.
- The free-flowing condition, water quality and specific ORVs of designated WSRs are protected or enhanced from current condition. Any development is consistent with the river's classification, and management is consistent with a current CRMP (DA-WSR-DC-01 in LMP).
- Regionally outstanding views are maintained and enhanced, including views from Glass Creek Meadow and the meadow itself, views of Obsidian Dome, views of White Wing Mountain, and seasonal landscape views.
- Habitat conditions for threatened, endangered, proposed, or candidate species or species of conservation concern in the designated river corridor are improving over time. Enhancement of habitat for threatened, endangered, proposed, and candidate species and Species of Conservation Concern, such as the Yosemite Toad and western singlespike sedge will be emphasized in management activities. Habitats for at-risk species support self-sustaining populations within the inherent capabilities of the plan area. Ecological conditions provide habitat conditions that:

contribute to the survival, recovery, and delisting of species under the Endangered Species Act; preclude the need for listing new species; improve conditions for species of conservation concern (including minimal impacts from diseases); and sustain both common and uncommon native species (SPEC-FW-DC-2 in LMP).

- Owens River Headwaters provides a variety of recreation opportunities, including camping and fishing. Recreation uses and amenities protect river values and are consistent with the river segment's classification.
- Public recreation and resource uses are provided that do not adversely impact or degrade the values for which the river was designated (DA-WSR-DC-02).

Management Standards, Guidelines, and Actions

The management standards below prioritize protecting and enhancing WSR values during the planning and implementation of resource management activities in the river corridor. These standards, guidelines, and actions are derived from the 2019 LMP, IDT planning and discussions, and public comment. They are intended to preserve the designated river's free-flowing condition and protect and enhance their ORVs and water quality.

A standard is a mandatory constraint on project and activity decision making, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

A guideline is a constraint on project and activity decision making that allows for departure from its terms, so long as the purpose of the guideline is met. Guidelines are established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

These standards and guidelines are also intended to achieve the SIOs established by the Forest Service.

Standards

- Site-specific activities occurring in the General Recreation Areas will promote the maintenance or restoration of Watershed Condition Framework indicators, which are attained at the watershed scale (MA-CW-STD-01).
- Road and motorized trail access to rivers must be consistent with river classification, travel management direction, and the recreation opportunity spectrum (ROS) classification (DA-WSR-STD-01). (See figure 8 for ROS classes.)
- In recreation and scenic segments, expansion of structural improvements may only be authorized outside designated wilderness and must meet assigned SIOs and allow for user access (DA-WSR-STD-02).
- Within the wild segment, structural improvements will be limited to existing structures (DA-WSR-STD-03).
- Utility rights-of-way within recreation and scenic segments will be authorized only when there are no alternatives (DA-WSR-STD-04).
- Utility rights-of-way will not be authorized within wild segments (DA-WSR-STD-05).

- Uses of facilities, including maintenance and minor modifications to facilities, in existence at the date of designation that do not conform to the river's classification may be allowed so long as the river's free-flowing condition, water quality, and ORVs are protected (DA-WSR-STD-06).
- If new recreation facilities are needed, they must be consistent with river classification, ROS classification, and SIOs, and located to protect ORVs (DA-WSR-STD-07).
- Follow thresholds and capacity guidelines from the User Capacity Analysis to ensure recreation activities do not negatively affect river values.
- Use hydrology best management practices to mitigate impacts from recreational activities and facilities.

Guidelines

- Design project activities in conservation watersheds to attain functional Watershed Condition Framework indicators (MA-CW-GDL-02).

Management Actions

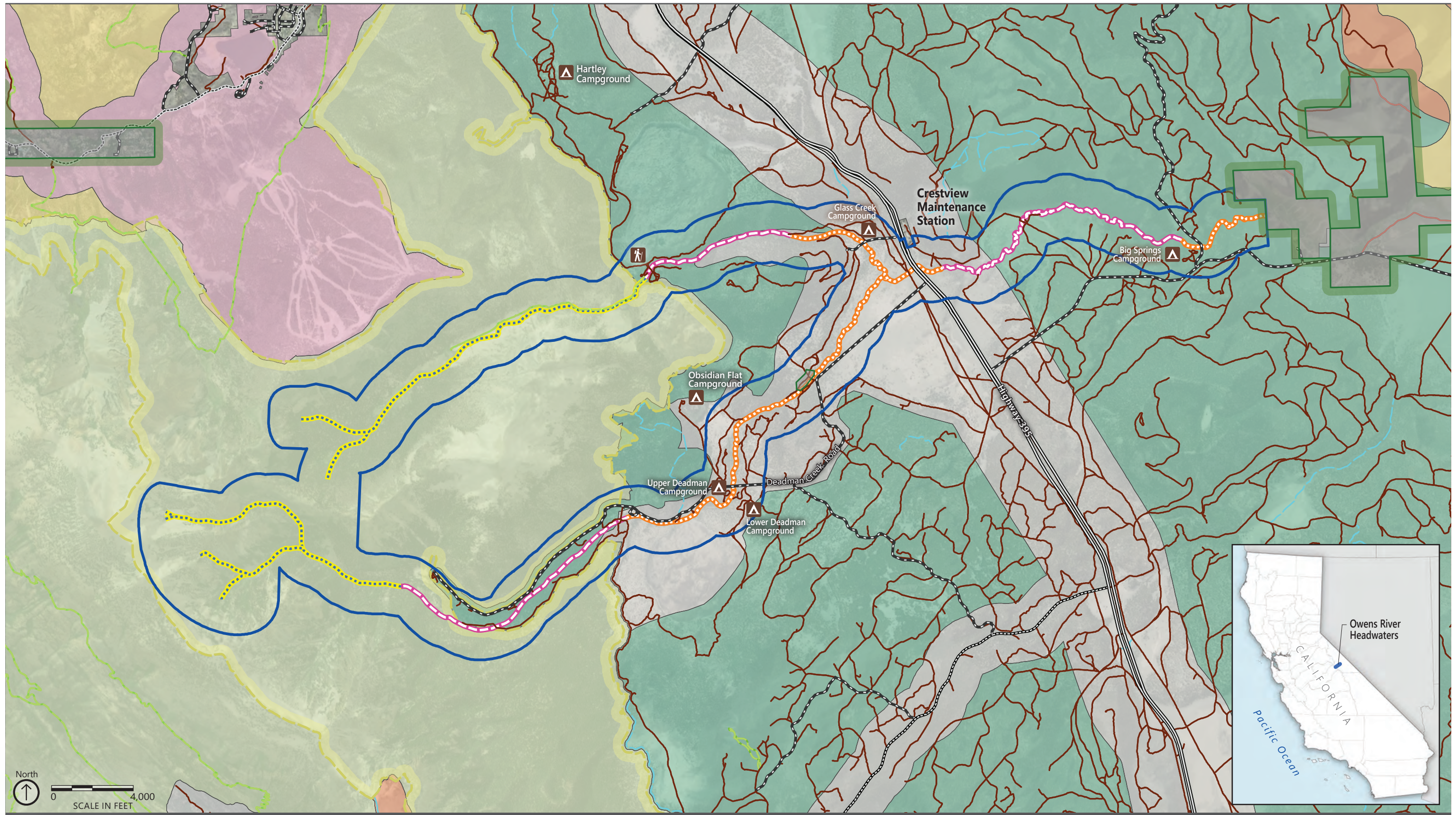
Although this CRMP is programmatic, it does incorporate ongoing management activities approved in other decisions such as the 2011 Deadman Creek Watershed Restoration Action Plan and the 2009 Motorized Travel Management Record of Decision. Some of these actions, if not yet approved, may still require site-specific NEPA analysis.

- Reroute the lower half mile of the Glass Creek Meadow trail onto a sustainable alignment (Deadman Creek WRAP Essential Project #14).
- Update Deadman Creek Watershed Restoration Action Plan to include entering into a formal road maintenance agreement with Mono County for Deadman Creek Road (currently county maintained, but no formal agreement with maintenance standards).
- Continue implementing the Motorized Travel Management ROD within the area through an integrated program of monitoring the designated system, maintaining system roads and trails, and actively restoring non-designated roads and areas.
- Continue to maintain and improve revegetation work done along Glass Creek in the Glass Creek Campground.
- Remove rock dams constructed in Glass Creek by visitors in Glass Creek Campground.
- Evaluate campsites to ensure hydrology best management practices are being met at Glass Creek Campground.
- Continue containment of dispersed campsites along creeks to reduce erosion, soil compaction, and vegetation loss while restoring newly created sites.
- Evaluate dispersed campsites that may be adversely affecting water quality and restore to natural conditions if necessary.
- Restore damage from unauthorized vehicle use in the corridor.
- Evaluate relocating and maintaining the trail from Glass Creek campground to Glass Meadow trailhead.
- Evaluate parking and dispersed camping at Glass Creek Meadow trailhead.
- Install signs along the WSR corridor to indicate that the segments are part of the National Wild and Scenic Rivers system.

Potential Future Management Actions

This CRMP establishes programmatic management direction. The Forest may consider more site-specific projects in the WSR corridor in the future, for which separate NEPA analysis would be conducted. As noted above, all proposed projects would be checked for consistency with the CRMP during the site-specific analysis.

- Consider acquiring non-federal land and easements to implement the Wild and Scenic Rivers Act and to facilitate management of other resources.
- Consider decommissioning all or part of Upper and Lower Deadman Campground to remove campsites and all facilities from the floodplain.
- Consider adding campsites at Hartley Campground to replace some of the reduced camping capacity if campsites are closed within the WSR corridor.
- Evaluate trails along Glass Creek and Deadman Creek for impacts to river values and for recreation opportunities.
- Consider redesigning the culvert on Deadman Creek Road between Upper and Lower Deadman Creek Campgrounds.
- Consider building retaining walls to control erosion where the road crosses Glass Creek in Glass Creek Campground.
- Consider redesigning OHV crossings if monitoring indicates significant impacts (OHV monitoring is conducted as part of California State Parks OHV restoration grants).



- Inyo National Forest (US Forest Service)
- Private Land
- Owens River Headwaters WSR Corridor
- Scenic River
- Wild River
- Recreation River

- Owens River Headwaters Wilderness
- Forest Service Roads
- Forest Service Motorized Trails
- Forest Service Standard Trails
- Federal Highway
- State Road

- County Road
- Town Road
- Trailhead
- Campground

- Recreation Opportunity Spectrum
- Roded Modified
 - Roded Natural
 - Primitive
 - Rural
 - Semi-Primitive/Motorized
 - Semi-Primitive/Non-Motorized



FIGURE 8. RECREATION OPPORTUNITY SPECTRUM
Owens River Headwaters Wild and Scenic River
Comprehensive River Management Plan

Monitoring Plan

The CRMP monitoring plan is intended to track river corridor impacts from various kinds of land uses, including recreation, and to maintain the river corridor’s desired conditions. Monitoring these items will provide managers with key thresholds for when changes to management must be considered in order to protect the corridor’s ORVs, free flow, and water quality, and to manage use within capacity.

The following table lists the location, issue being addressed, and brief description of CRMP monitoring items. Monitoring design considers past, current, and anticipated future funding levels, along with staffing level and other Mono Lake Ranger District priorities. The monitoring actions selected are those that address areas of highest concern.

Table 5. Possible Monitoring Items and their Locations in the Wild and Scenic River and Corridor

Location of Monitoring Action	Potential Issue / ORV Addressed	Monitoring Action
Various existing locations along major contributing tributaries	Water quality	Continue documenting water quality metrics at existing monitoring locations and consolidate data in a database to include a collection of point-in-time data from field observations of fish, land use, color, smell, water alkalinity or lab samples; use California Environmental Data Exchange Network for past water quality data
Throughout the corridor	Water quality	Conduct surveys of surface water and groundwater to monitor for wildlife, recreation use, and riparian health.
Above and below Glass Creek campground/ recreation residence tract	Water quality	Conduct annual water quality monitoring and include interested tribes as relevant.
Downstream limits of major contributing tributaries	Free flow	Establish a practice of annual observations, at a minimum, to note water elevations/depth at certain locations that can be easily replicated upon subsequent visits. These locations could be surveyed so that water depth could be used to calculate flow and to establish a basic database to determine adequate flow when compared to fish or other species survivability. At a minimum, include a survey point at the US Highway 395 crossing. Establish metrics for water quantity to better track and predict climate change trends and effects.
Throughout the corridor and adjacent Dry Creek watershed	Free flow	Monitor and collect Big Springs stream gage data and groundwater well data from available sources including USGS and MMSA within the contributing watershed. Data will support future analysis, calibration and prediction of flow at Big Springs to assess the effects of climate change and future upstream groundwater withdrawals. Monitoring at Big Springs will also include annual collection of two stable isotope samples to assist in analyzing hydrologic connectivity with Mammoth Mountain Ski Area.

Location of Monitoring Action	Potential Issue / ORV Addressed	Monitoring Action
Campgrounds	Potential ORV impacts from camping level of use	Campground hosts will collect campground occupancy data annually.
Throughout the corridor	Scenic impacts	Begin monitoring scenic integrity upon use changes such as grazing, mining, or other development.
Throughout the corridor	Wildlife impacts from visitor use	Continue surveys for/documentation of SCC wildlife species within the WSR corridor.
Throughout the corridor	Wildlife impacts/mule deer migration corridors	Continue collaboration with CDFW to monitor mule deer migration and population trends.
Throughout the corridor	Botany impacts from visitor use	Continue surveys for/documentation of SCC and invasive plant species within the WSR corridor.
Throughout the corridor	Prehistoric cultural resource impacts from visitor use and motorized recreation	Continue surveys for/documentation of previously recorded and unknown historic properties within the corridor. Monitor at risk sites as identified
Throughout the corridor	Tribal cultural values of the Mono Lake Kutzadika'a	Annual Tribal and Forest Service field trip to corridor to identify concerns.

Table 6, below, lists triggers and associated management actions for various recreational sites along the river corridor, as well as the rationale for each action. Monitoring of campsite occupancy should occur every three years unless a trigger is reached, and action is taken to increase the monitoring frequency. On the scenic and recreational segments, the triggers allow all campgrounds and dispersed campsites to be occupied for a limited percentage of time before prompting adaptive management actions to protect river values and water quality. On the wild segment, the triggers allow the threshold of intergroup encounters per hour to be reached for a limited percentage of time before prompting adaptive management actions to protect river values and water quality (information in table 6 is taken from Appendix A; see Appendix A for additional detail).

Table 6. Owens River Headwaters Triggers and Management Actions

Classification segment	Management trigger	Adaptive management action	Rationale for adaptive management action
Scenic/recreational	Trigger 1: All campsites are occupied at two of the camping locations (Big Springs Campground, Glass Campground, Deadman Campground, the group campsite, or the dispersed campsites) on 25% or more of monitoring days for one year.	Monitor occupancy at the location(s) with 25% or more monitoring days in year one at capacity for the next two years. Educate visitors about low impact camping practices and inform them of alternate recreation opportunities.	To ensure that river values are protected, managers would immediately address early indications of unanticipated increases in campsite occupancy. More frequent monitoring of campground occupancy will allow managers to identify changes in use patterns and take appropriate actions. Management actions such as education and outreach to visitors would help to maintain the level of use within the physical design capacity of the developed and dispersed campsites by providing visitors with information about where it is appropriate to camp and how they can help protect river values.

Classification segment	Management trigger	Adaptive management action	Rationale for adaptive management action
Scenic/recreational	Trigger 2: All campsites are occupied at three or more of the camping locations (Big Springs Campground, Glass Campground, Deadman Campground, the group campsite, or the dispersed campsites) on 25% or more of monitoring days for two years.	<p>Monitor occupancy at all locations annually for the next two years.</p> <p>Use site management techniques to clearly define campsites boundaries and prevent campsite expansion.</p> <p>Use information, signage, and enforcement to keep visitors from camping outside of existing campsites.</p> <p>Actively rehabilitate and close areas where signs of new dispersed campsites start to form.</p> <p>Make necessary changes to campground access, such as instituting a mandatory reservation system to make sure campground occupancy does not exceed capacity.</p>	<p>Management actions such as enforcing camping only in sanctioned campsites would help to maintain the level of use within existing infrastructure by preventing new informal campsites from forming.</p> <p>Rehabilitation in areas where signs of new informal campsites begin to form will discourage formalization of those new campsites and prevent increases in the overall camping footprint.</p> <p>As use increases, a reservation system would control the level of use and discourage visitors from camping in new informal sites.</p>
Wild	Trigger 1: Hourly intergroup encounters on the Glass Creek Meadow Trail reaches the threshold level of intergroup encounters per hour on 50% or more of monitoring days for one year.	<p>Monitor intergroup encounter rates by direct observation annually for the next two years.</p> <p>Use data collected to refine the relationship between visitor use levels and intergroup encounter rates.</p> <p>Assure that access points are “right-sized” (e.g., there are an appropriate number of parking spaces at the trailhead to prevent use from exceeding the threshold)</p> <p>Educate visitors about the unique and sensitive natural resources along the trail. Encourage visitors to hike the trail during less busy days of the week.</p>	<p>To ensure that river values are protected, managers would immediately address early indications of unanticipated increases in intergroup encounter rates. More frequent monitoring will allow managers to identify changes in use patterns and take appropriate actions.</p> <p>Management actions such as education and outreach to visitors would help to maintain the level of use within a desirable limit by providing visitors with information to avoid high use times</p>

Classification segment	Management trigger	Adaptive management action	Rationale for adaptive management action
Wild	Trigger 2: Hourly intergroup encounters on the Glass Creek Meadow Trail reaches threshold level of intergroup encounters per hour on 50% or more of monitoring days for two consecutive years.	Monitor intergroup encounter rates annually for the next two years Make necessary changes to trail access, such as limiting and enforcing parking restrictions to reduce the number of visitors on the trail at one time. If needed, institute a mandatory daily reservation system to spread use to off-peak days, or limit use with a mandatory permit system.	As use increases, managing parking access would control the level of visitor use and is generally less invasive than a reservation system. If needed, a reservation system would further control the level of visitor use and distribute visitor use across days of the week.

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Appendix A: User Capacity Analysis for Owens River Headwaters Wild and Scenic River Corridor

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Comprehensive River Management Planning for Inyo National Forest
User Capacity Analysis for Owens River Headwaters Wild and Scenic River Corridors

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Tables

No table of figures entries found.

ACRONYMS

CRMP	Comprehensive River Management Plan
IDT	Interdisciplinary Team
IVUMC	Interagency Visitor Use Management Council
IWSRCC	Interagency Wild and Scenic Rivers Coordinating Council
OHV	Off-Highway Vehicles
ORV	Outstandingly Remarkable Value
USFS	United States Forest Service
USFS NVUM	USDA Forest Service National Visitor Use Monitoring Program
WSR	Wild and Scenic River

Introduction

The US Forest Service (USFS) is working with VHB to develop a comprehensive river management plan (CRMP) for a river corridor in the Inyo National Forest (“the Forest”) that was recently designated under the Wild and Scenic Rivers Act. The river for which the CRMP is being developed is the Owens River Headwaters Wild and Scenic River (WSR). Otak, Inc., working as a subcontractor to VHB, completed data collection and analysis to help USFS establish current recreation use conditions, estimate user capacities, and specify management triggers and adaptive management strategies required for this plan.

The purpose of this report is to present the framework and methods we used and the results to help USFS establish current recreation use conditions and estimate numeric user capacities for the Owens River Headwaters. In the remainder of this introduction section, we describe the geographic setting of the river corridor, provide information about the regulatory requirements for our work, and explain the concept of and established framework we applied to help USFS estimate numeric user capacities for the river corridor.

Following the introduction, we provide an overview of the river corridor, information about river values potentially affected by visitor use, and a description of and rationale for our approach and methods to help USFS establish current recreation use conditions and estimate user capacities. We then present results of our analysis, including statistical summaries of current recreation use conditions, estimates of numeric user capacities, and corresponding management triggers, monitoring, and adaptive management actions.

Background

Geographic Setting

The Inyo National Forest is located in parts of the eastern Sierra Nevada of California and the White Mountains of California and Nevada, and spans portions of Fresno, Inyo, Madera, Mono, and Tulare Counties of eastern California, and Esmeralda and Mineral Counties of western Nevada. The Forest encompasses approximately two million acres and was established in 1907 for the purpose of protecting lands needed to build the Los Angeles Aqueduct. The headwaters and tributaries into Mono Lake, the Owens River, and Owens Lake are important for the supply of water to the City of Los Angeles.

Congress designated three wild and scenic rivers that are either in whole or in part on the Forest. One of those rivers, the Owens River Headwaters WSR, is the subject of this report. Figure 1 shows the Owens River Headwaters, as well as another WSR in the area, Cottonwood Creek, in the context of the Forest. The Owens River Headwaters is located in the northwest portion of the Forest in the Mammoth Lakes District.

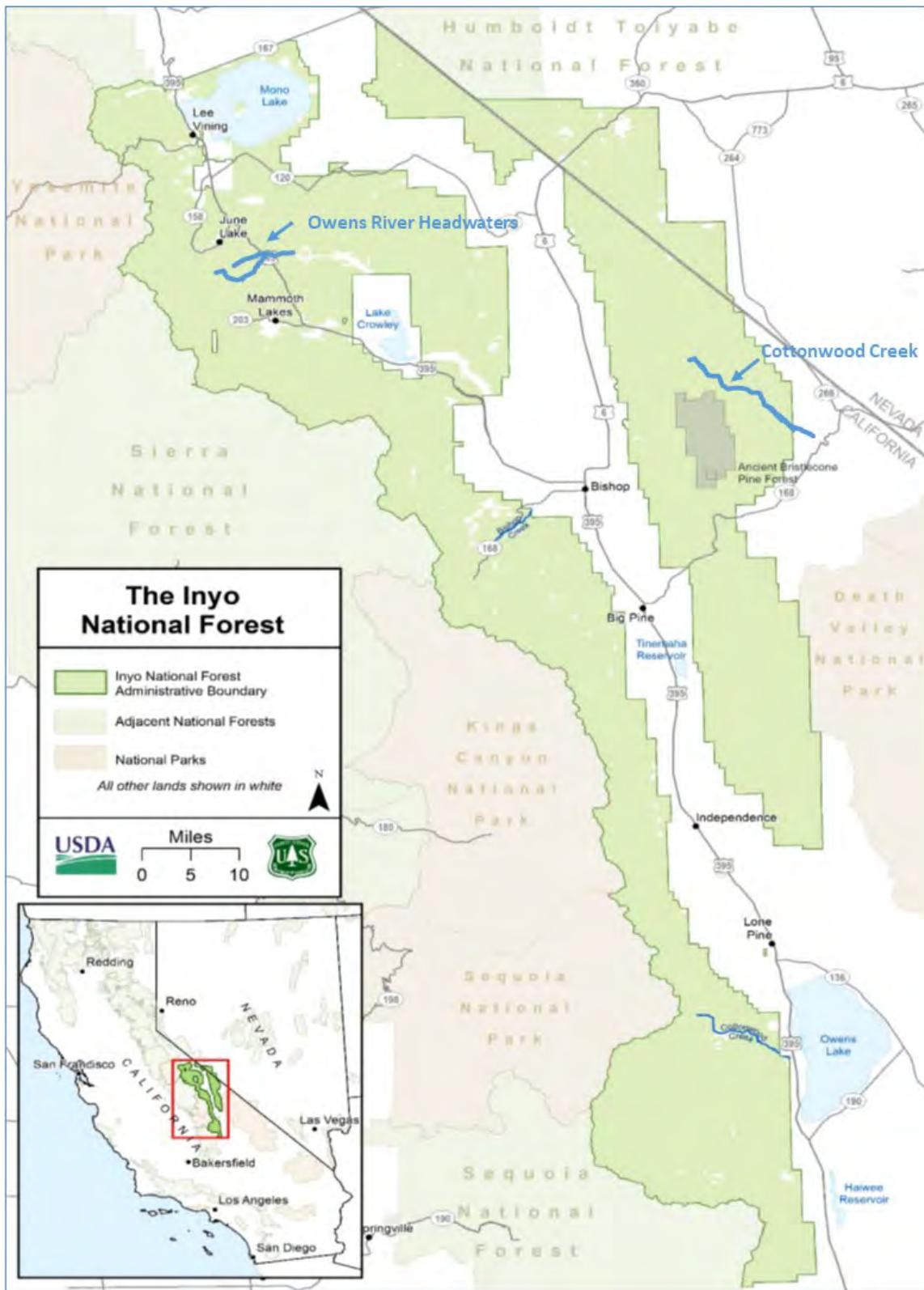


Figure 1. Inyo National Forest map
(base map from the 2019 Land Management Plan for the Inyo National Forest, p. 2)

Regulatory Requirements

The Wild and Scenic Rivers Act (“the Act”) was signed into law in 1968 (Wild and Scenic Rivers Act, Public Law 90-542). The Act protects the free-flowing waters of many of the nation’s most spectacular rivers and safeguards the special character of these rivers, while also recognizing the potential for appropriate use and development. The Act strives to balance river development with permanent protection for the country’s most outstanding free-flowing rivers.

The Act requires the identification of user capacities and the development of management strategies to manage use within those capacities (IVUMC 2016a). The Wild and Scenic Rivers Act, Section 3(d)(1) states:

“...the Federal agency charged with the administration of each component of the National Wild and Scenic Rivers System shall prepare a comprehensive management plan for such river segment to provide for the protection of the river values. The plan shall address resource protection, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the purposes of this Act.”

Section 3(d)(1) of the Act requires that river managers address user capacities in CRMPs even when use levels are low and do not currently threaten river values or the established desired conditions for those values.

The Act does not define user capacities or prescribe a particular approach to address user capacities in CRMPs. However, more recent federal court rulings have directed that agencies must specify *numeric* user capacities to define the maximum number of people that can be accommodated in a designated river area without adversely impacting river values (IVUMC 2016b).

User Capacity Framework, Concepts, and Approach

Framework

Decisions about user capacities for Wild and Scenic Rivers can be challenging. Relationships between the types and amounts of recreation use in a river corridor and impacts to river resources and values are complex. For example, relatively high levels of recreation use can be sustained without resource impacts, in some cases, where use is concentrated on trail treads, forest roads, campsites, and other “hardened surfaces.” At the same time, impacts to resources can occur at even very low levels of visitor use, depending on weather, terrain, visitor behavior, and other factors not directly related to the types or amounts of recreation use.

The Interagency Wild and Scenic Rivers Coordinating Council (IWSRCC) developed guidance and a framework to help address user capacities for Wild and Scenic Rivers (IWSRCC 2018). The IWSRCC framework is adapted specifically to the context of Wild and Scenic Rivers from the Interagency Visitor Use Management Council’s Framework (IVUMF) for managing visitor use and addressing user capacity on federally managed lands and waters. The IVUMF has been developed and adopted together by all of the primary federal land management agencies as the “gold standard” for addressing user capacities. The IWSRCC framework specifies the following set of nine steps to provide a legally defensible, systematic, and transparent process for determining numeric user capacities according to the legal requirements of the Wild and Scenic Rivers Act:

Step 1. Describe the baseline and current conditions and uses for the WSR

- Identify baseline conditions. Baseline conditions are the conditions which were present at the time of river designation.
- Describe the current amounts and types of use and the current management direction.

Step 2. Identify desired conditions for river values and classifications

- Integrate visitor use, other public use, and administrative uses into desired conditions.
- Take into account the WSR classification as wild, scenic, or recreational.
- Divide the WSR into relevant analysis areas.
- Identify the need for action by comparing existing and desired conditions.

Step 3. Identify the kinds of use that the WSR corridor can accommodate

- Tie the kinds of public uses to the facilities that support those uses.

Step 4. Identify measurable indicators for desired conditions

- Indicators are specific resource or social attributes that can be measured to track changes in conditions associated with human use.

Step 5. Establish thresholds for each indicator

- Thresholds are the highest levels of indicators that prevent degradation of a river's baseline condition.

Step 6. Identify triggers that elicit management response

- A trigger is the predetermined point at which changes in an indicator require a management response to ensure that the threshold for that condition is not crossed.
- Where appropriate, more than one trigger may be set to identify levels where action is needed to prevent further decline or to reverse decline.

Step 7. Identify management actions to take when triggers are reached

- Tie management actions to triggers that prevent degradation of river values.
- Identify and decide upon those capacity-related actions ripe for decision.

Step 8. Determine the WSR corridor's user capacity

- Identify a measurable amount of use each analysis area can receive without crossing thresholds.
- Establish user capacities that reflect an appropriate quantity of use.
- Support user capacity decisions with information that meets NEPA and agency requirements.

Step 9. Establish a monitoring and adaptive management approach

- Monitoring of indicators is critical to help determine whether management actions are:
 1. Implemented as designed.
 2. Effective in preventing degradation and protecting and enhancing river values.
 3. Based on valid assumptions about user behaviors, relationship of use to river values, and changes in social perception about crowding.
- New information may require a CRMP amendment or capacity adjustment.
- An adaptive management strategy can be a critical tool which allows managers to use new information to shape future management approaches.

- The types of new information that may lead to a capacity adjustment include the following:
 1. Results of monitoring.
 2. Identification of more appropriate indicators and thresholds.
 3. Clarification of the relationship between the level of use and condition of river values.
 4. Changes in visitor use patterns that could affect river values.
 5. Changes in original assumptions, such as management actions to be taken.
 6. Identification of a new ORV or new information about an existing ORV.

Key Concepts

There are several key concepts incorporated in the ISWRCC framework for addressing user capacity in Wild and Scenic Rivers that warrant further description. Each of these key concepts is described in this section.

Desired conditions provide an important part of the foundation for addressing user capacities. Desired conditions are narrative statements that describe the quality, character, and conditions of river values and visitor experiences to be protected by the CRMP, while allowing for uses that are consistent with the Act. It is the responsibility and privilege of the managing agency (i.e., USFS or BLM for this project) to specify desired conditions for river values and visitor experiences.

Indicators are measurable proxies for desired river resource and visitor experience conditions that can be monitored to track changes in river values associated with recreation use. For example, the number of encounters with other groups per hour while hiking is an indicator related to the quality and character of visitors' experiences. Good indicators are those that can be easily and reliably measured, are related to and representative of desired conditions, and are responsive to visitor use management actions. For the purposes of managing use according to numeric user capacities, indicators must also be directly related to the amounts and types of recreation use.

Social indicators (e.g., hiking encounters, number of people at one time at boat ramps, etc.) tend to be directly related to changes in the types and amounts of recreation use and provide a reliable basis for managing recreation use according to numeric user capacities. In contrast, natural resource-related indicators generally do not have direct and reliably quantifiable relationships to recreation use levels except in extreme low use situations (e.g., trail-less/cross country zones, foot trails with less than 50 to 250 hikers *per year*). Nonetheless, resource-related indicators should be monitored, and adaptive resource management actions should be taken to protect ORVs from impacts. Managing the characteristics of visitor use (e.g., to concentrate use on established trail tread, road surfaces, and other established recreation resources and facilities, to promote low-impact use behaviors and patterns, etc.) is the most effective method for limiting or reducing impacts to natural resource-related indicators.

Thresholds are the minimally acceptable conditions of indicators to prevent degradation of river values. Thresholds should be precise, time-bounded, and outcomes of recreation use rather than types or amounts of recreation use themselves. Like thresholds, **triggers** are quantifiable conditions of indicators; they represent points at which adaptive management actions are needed to ensure the conditions of indicators do not cross thresholds. In other words, triggers are designed to support proactive visitor use management to protect river values from adverse impact, while allowing for recreation use that is consistent with the requirements of the Act.

Within the ISWRCC framework, **numeric user capacities** are estimated based on quantifiable relationships between the types and amounts of recreation use and the conditions of use-related indicators ("user capacity indicators"). The best available data are used to estimate the maximum amount of recreation use that can be accommodated without crossing thresholds for user capacity indicators. For example, trail counter data could be

correlated with observations from encounter patrols to estimate the maximum number of people who can hike in a river corridor without crossing a threshold for the number of encounters hikers have with other groups per hour or day.

A systematic **monitoring** program provides the structure to measure indicators and assess their conditions in relation to triggers and thresholds on a recurring basis. Monitoring results provide the basis to determine if actions are needed to **adapt management** of recreation use to protect river values from adverse impacts.

Overall Approach

The framework and concepts described above were operationalized and applied to the specific contexts of Owens River Headwaters WSR beginning at a week-long CRMP workshop held on site with forest managers and contractors. As part of the workshop, a map-based recreation use and user capacity work session was conducted. The Interdisciplinary Team (IDT) identified and mapped all types and locations of currently established uses and discussed and documented that there were generally no reasonably foreseeable new types of uses expected to occur in the future. Possible limiting factors were identified, as were the ORVs that may potentially be impacted by visitor use. Desired conditions, WSR classifications, and potential analysis areas were discussed and documented.

Draft user capacity methods were developed to specify estimated numeric user capacities for analysis areas within the river corridor. The method for the river corridor specified the: 1) analysis area; 2) type(s) of use; 3) indicators directly related to types and amounts of use; 4) basis for specifying thresholds; and 5) mathematical or statistical methods used to calculate the numeric capacities. The IDT conducted a series of conference calls to refine the user capacity approach for the river corridor before finalization. Triggers for the user capacity indicators and adaptive management strategies were identified based on a review of literature and other recent CRMPs.

Visitor Use and User Capacities

This section presents the methods and results to establish current recreation use conditions, user capacities, and management triggers and adaptive management strategies for the Owens Headwaters WSR. This section contains information about:

- River classifications and recreation use settings;
- River values potentially affected by recreation use;
- Methods and results to estimate current recreation use and numeric user capacities; and
- Indicators, triggers, thresholds, and adaptive management strategies.

Owens River Headwaters

The Owens River Headwaters wild and scenic river is comprised of two creeks; Deadman Creek and Glass Creek, both located in Mono County, California. Deadman Creek is located four miles southeast of the community of June Lake. The headwaters are at an elevation of 9,280 feet on the east side of the San Joaquin Ridge. The Deadman Creek segment in the wild and scenic river starts at the headwaters and continues downstream past the confluence with Glass Creek to Big Springs where Deadman Creek becomes the Owens River. Glass Creek is located three miles southwest of the community of June Lake. The headwaters are at an elevation of 9,360 feet on the east side of the San Joaquin Ridge. All of Glass Creek, from its headwaters to the confluence with Deadman Creek is within the wild and scenic river corridor. The Owens River Headwaters wild and scenic river is a total of 19.1 miles in length with 6.3 miles designated as wild, 6.6 miles designated as scenic, and 6.2 miles designated as recreational. The scenic and recreational segments are described together below, and the wild segment is described alone. The whole Owens River Headwaters corridor is shown in Figure 2.

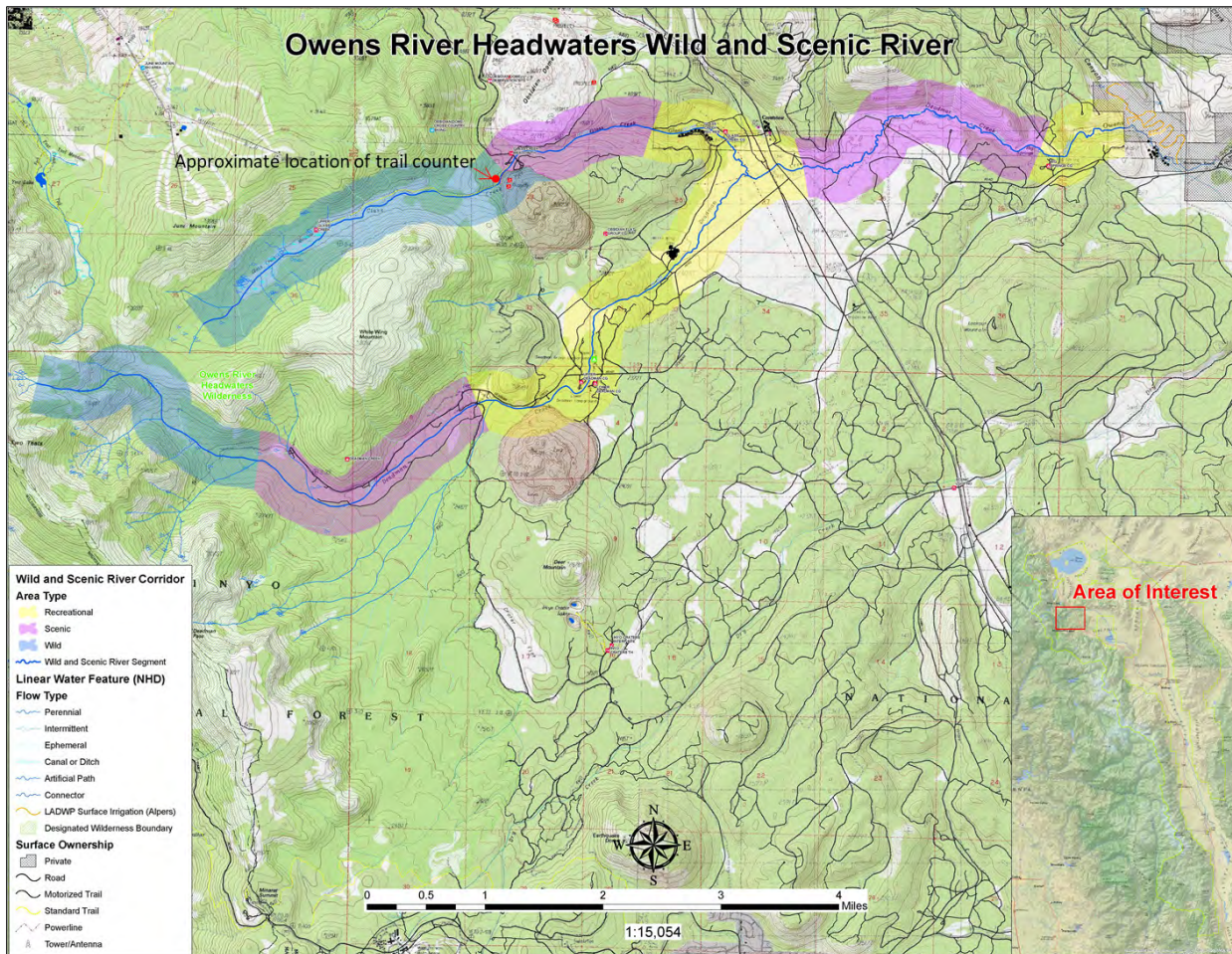


Figure 2. Owens River Headwaters Wild and Scenic River corridor

Scenic and Recreational Segments

Recreational Use Setting

The recreational and scenic segments of Owens River Headwaters are located entirely within Inyo National Forest. Portions of the corridor are used for recreational purposes year-round. Public recreational access within the recreational and scenic segments of Owens River Headwaters occurs along paved and unpaved forest roads which access three Forest Service campgrounds with a total of 112 campsites, a group campsite which can accommodate up to 50 people, and 50 dispersed campsites at the end of nearby road spurs. A small amount of day use also occurs on the road spurs, but most recreation in the corridor is focused around the campgrounds and some of the dispersed campsites. Recreation activities that occur during the spring, summer, and fall include camping, fishing, OHV use on nearby routes and some equestrian use. Plowed winter and spring parking outside the wild and scenic river corridor provide access to snowmobile trails, some of which cross into the corridor. Other winter and spring activities within the corridor include Nordic skiing and snowshoeing.

River Values Potentially Affected by Visitor Use

The scenic and recreational segments of Owens River Headwaters possess outstandingly remarkable values for scenery, wildlife, botany, recreation, and geology/hydrology. As noted, natural resource conditions are generally not directly related to recreation use levels but can be impacted by recreation use depending on a number of situational factors (e.g., visitor behavior, terrain, weather). As such, the botany and wildlife ORVs and water quality of the creek could be sensitive to recreation-related impacts and these should be addressed by managing the characteristics of visitor use (e.g., concentrating use on established trail treads, road surfaces, and campsites, promoting low-impact use behaviors). In addition, the botany ORV and water quality would potentially be adversely impacted if the physical footprint of the campgrounds, group campsite, or dispersed campsites were expanded to accommodate higher levels of recreation use.

The amount of recreation use in the area could impact the quality of visitors' experiences and degrade the recreation ORV. For example, high levels of recreation use might force visitors to have to share campsites with other groups. These impacts to the recreation ORV could cause indirect impacts to the botany and wildlife ORVs and/or to water quality, for example, if visitors expand campsites or create new informal campsites. Based on the proximity of the Big Springs Campground to Big Springs, the hydrology value of the river segment may be adversely impacted if the physical footprint of the campground were expanded to accommodate higher levels of recreation. Scenic values are unlikely to be impacted by recreation use levels if use remains concentrated at existing campgrounds and disperse campsites.

Estimated Current Daily Use

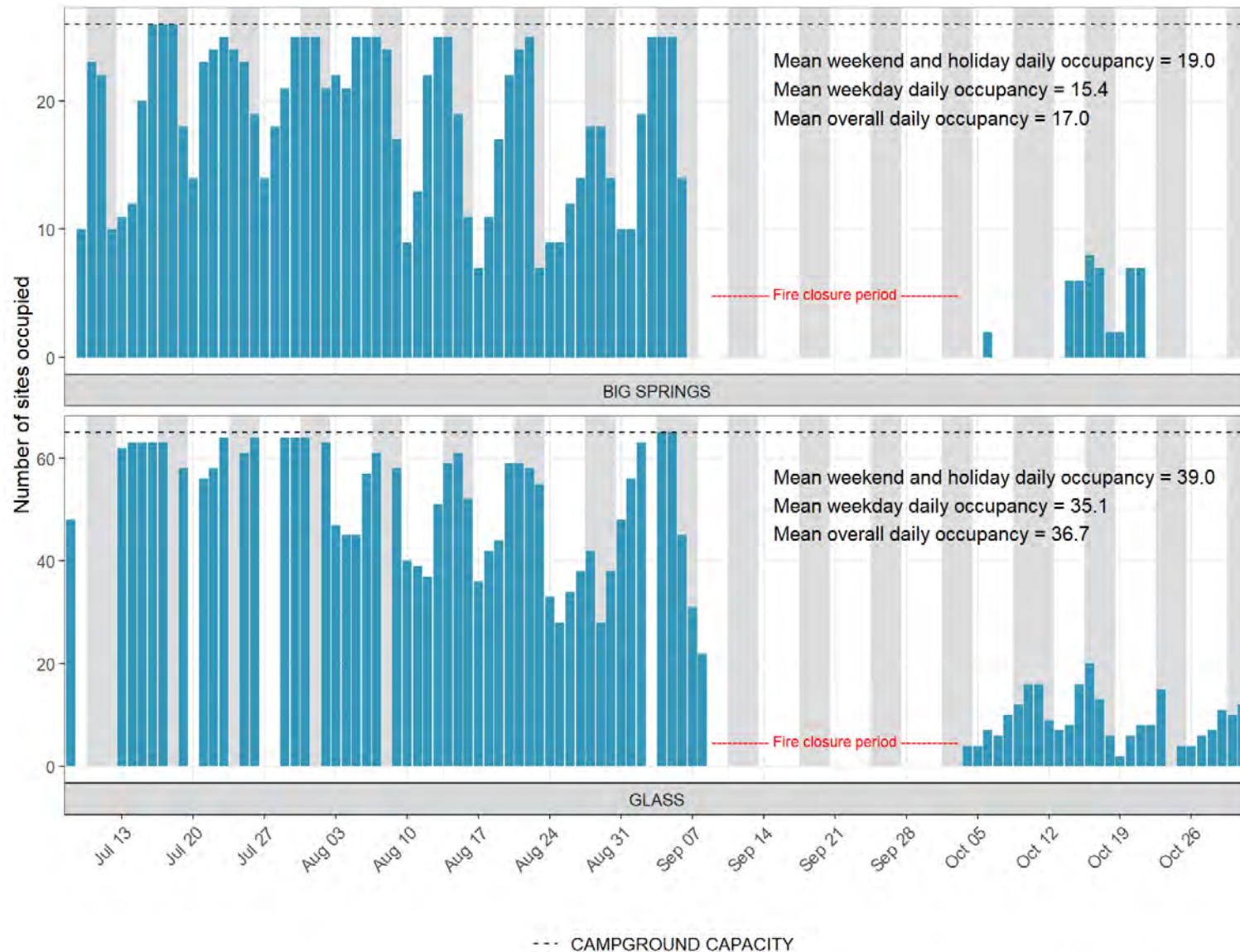
The following subsection reports estimates of current daily use in the scenic and recreational segments of Owens River Headwaters based on campground occupancy data collected for a total of 69 days at Big Springs Campground and a total of 79 days at Glass Campground between July and October 2020. A nearby fire closed the portion of the Forest where the two campgrounds reside from September 7 through October 4, 2020. Occupancy data were not collected during the closure period. Table 1 presents the mean, minimum, and maximum campground occupancy by campground. Figure 3 presents current total daily campsite occupancy by date and campground. These summaries of estimated current daily use provide a basis of comparison to the estimate of user capacity presented above, and the management triggers and associated actions outlined in the next subsection. These results suggest that overnight and day use in this area is moderate to high during peak use times.

Visitor Use and User Capacities (continued)

Table 1. Owens River Headwaters scenic and recreational segments mean, minimum, and maximum daily campground occupancy, and percent of days all campsites were occupied, by campground during the data collection period

Location	Mean	Minimum	Maximum	Number of data collection days	Percent of days all campsites were occupied
Big Springs Campground	17	2	26	69	4%
Glass Campground	37	2	65	79	3%

Visitor Use and User Capacities (continued)



Days when campsite occupancy counts were not conducted are not shown

Figure 3. Owens River Headwaters scenic and recreational segments campground occupancy, by campground and date during the counting period (gray shading indicates weekends/holidays; Fridays were classified as weekend days)

Visitor Use and User Capacities (continued)

Capacity Analysis

As noted, any expansion of the physical footprint of developed or dispersed campsites in this area to accommodate higher levels of recreation use would potentially adversely impact the botany, wildlife and hydrology ORVs and water quality of the river. Therefore, the limiting factor for recreational use in the recreational and scenic segments of Owens River Headwaters is the physical designed capacity of the developed campgrounds and the capacity of the dispersed campsites in the area. Most day use in the area is focused around the campgrounds and dispersed campsites. As such, the estimated numeric daily user capacity for the scenic and recreational segments of Owens River Headwaters was calculated by multiplying the number of available campsites by the number of visitors per campsite. Given that there are three campgrounds with 112 total campsites that accommodate a maximum of six visitors per site, one group campsite that accommodates a maximum of 50 visitors, and up to 50 dispersed sites that each accommodate a maximum of five visitors based on an observed average of approximately two vehicles per campsite and an average vehicle occupancy of 2.5 visitors per vehicle as estimated by the USDA Forest Service National Visitor Use Monitoring Program (USFS NVUM), it is estimated that a maximum of approximately 950 visitors per day can be accommodated in the recreational and scenic segment of the Owens River Headwaters without adversely impacting river values or water quality.

Developed campground user capacity: 112 sites x 6 visitors per site = 672 visitors per day

Group campsite: 1 site x 50 visitors per site = 50 visitors per day

Dispersed campsites: 50 sites x 5 visitors per site = 250 visitors per day

Total daily user capacity estimate = 950 visitors per day¹

¹ Note, this number is rounded to account for the level of precision of the estimated numeric capacity.

Visitor Use and User Capacities (continued)

Monitoring, Triggers, and Management Actions

Table 2 lists potential management triggers and adaptive management actions that should be taken if triggers are reached. Monitoring of campground and campsite occupancy should occur every three years, unless a trigger is reached and action is taken to increase the monitoring frequency. The triggers allow all campgrounds and dispersed campsites to be occupied for a limited percentage of time before prompting adaptive management actions to protect river values and water quality.

Table 2. Owens River Headwaters scenic and recreational and segments triggers and management actions

Management trigger	Adaptive management action	Rationale for adaptive management action
<p>Trigger 1: All campsites are occupied at two of the camping locations (Big Springs Campground, Glass Campground, Deadman Campground, the group campsite, or the dispersed campsites) on 25% or more of monitoring days for one year.</p>	<p>Monitor occupancy at the location(s) with 25% or more monitoring days in year one at capacity for the next two years.</p> <p>Educate visitors about low impact camping practices and inform them of alternate recreation opportunities.</p>	<p>To ensure that river values are protected, managers would immediately address early indications of unanticipated increases in campsite occupancy. More frequent monitoring of campground occupancy will allow managers to identify changes in use patterns and take appropriate actions.</p> <p>Management actions such as education and outreach to visitors would help to maintain the level of use within the physical design capacity of the developed and dispersed campsites by providing visitors with information about where it is appropriate to camp and how they can help protect river values.</p>
<p>Trigger 2: All campsites are occupied at three or more of the camping locations (Big Springs Campground, Glass Campground, Deadman Campground, the group campsite, or the dispersed campsites) on 25% or more of monitoring days for two years.</p>	<p>Monitor occupancy at all locations annually for the next two years.</p> <p>Use site management techniques to clearly define campsites boundaries and prevent campsite expansion.</p> <p>Use information, signage, and enforcement to keep visitors from camping outside of designated campsites.</p> <p>Actively rehabilitate and close areas where signs of new dispersed campsites start to form.</p> <p>Make necessary changes to campground access, such as instituting a use-limiting system to make sure campground occupancy does not exceed capacity.</p>	<p>Management actions such as enforcing camping only in sanctioned campsites would help to maintain the level of use within existing infrastructure by preventing new informal campsites from forming.</p> <p>Rehabilitation in areas where signs of new informal campsites begin to form will discourage formalization of those new campsites and prevent increases in the overall camping footprint.</p> <p>As use increases, a reservation system would control the level of use and discourage visitors from camping in new informal sites.</p>

Wild Segment

Recreational Use Setting

The wild segment of Owens River Headwaters is located entirely within Inyo National Forest. The only notable public access within the Owens River Headwaters wild segment occurs along the Glass Creek Meadow Trail, which is located in federally designated Wilderness. This trail includes a 2-mile hike to Glass Creek Falls and Glass Creek Meadow which provides opportunities for solitude. Recreational activities along this segment of the Owens River Headwaters include hiking, horseback riding, camping, fishing, and birding. Nordic skiing and snowshoeing are popular activities in the winter. Glass Creek Meadow is a locally important hiking destination for subalpine meadow and wildflower viewing and contains a diversity of wet meadow plant species.

River Values Potentially Affected by Visitor Use

The wild segment of Owens River Headwaters WSR possesses outstandingly remarkable values for scenery, wildlife, botany, recreation, and geology/hydrology. As noted, natural resource conditions are generally not directly related to recreation use levels but can be impacted by recreation use depending on a number of situational factors (e.g., visitor behavior, terrain, weather). As such, the botany and wildlife ORVs and water quality of the river could be sensitive to recreation-related impacts, and these should be addressed by managing the characteristics of visitor use (e.g., concentrating use on established trail trends, road surfaces, and campsites, promoting low-impact use behaviors).

The amount of recreation use in the area could impact the quality of visitors' experiences and degrade the recreation ORV. For example, high levels of recreation use might increase the number of encounters with other groups while hiking. Use-related impacts to the recreation ORV could cause indirect impacts to the botany and wildlife ORVs and/or to water quality, for example, if visitors travel off-trail at increasing rates to avoid crowding. The scenic and geology/hydrology values of the river segment are unlikely to be impacted by recreation use levels if use remains focused primarily on the Glass Creek Meadow Trail.

Current Recreation Use

Counts of daily visitor use and intergroup encounters per hour on the Glass Creek Meadow Trail in the wild segment of the Owens River Headwaters were conducted on 80 days and 10 days respectively, between August and November 2020. A nearby fire closed the portion of the Forest where Glass Creek Meadow Trail resides from September 7 through early December 2020. Daily visitor use data collected during the fire closure period were excluded from statistical summaries in Table 3 and Figure 5. Table 3 presents the mean, minimum, and maximum current daily visitor use on the Glass Creek Meadow Trail. Figure 4 reports current total daily visitor use by date, while Figure 5 reports the distribution of current total daily visitor use on the Glass Creek Meadow Trail. Daily and average intergroup encounter rates, reported per hour, are presented in Figure 6. These results suggest that current use in this area is generally very low.

Table 3. Owens River Headwaters wild segment mean, minimum, and maximum daily visitor use on the Glass Creek Meadow Trail during the data collection period

Location	Mean	Minimum	Maximum
Visitors per day	5	0	15

Note: no days are calculated to be extreme outliers (partial and fire closure days were removed from calculations)

Visitor Use and User Capacities
(continued)

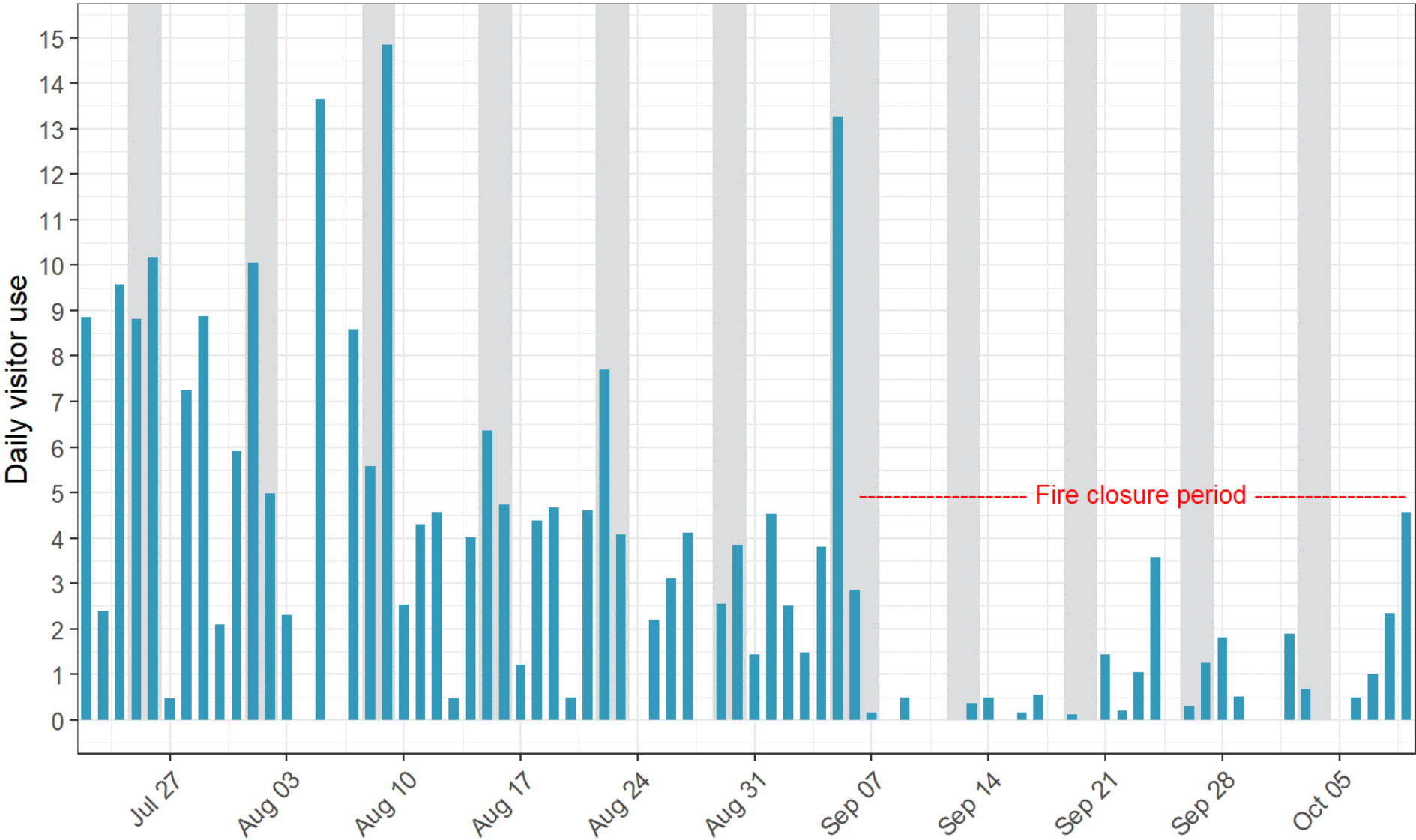


Figure 4. Owens River Headwaters wild segment daily visitor use on the Glass Creek Meadow Trail (gray shading indicates weekends/holidays)

Visitor Use and User Capacities (continued)

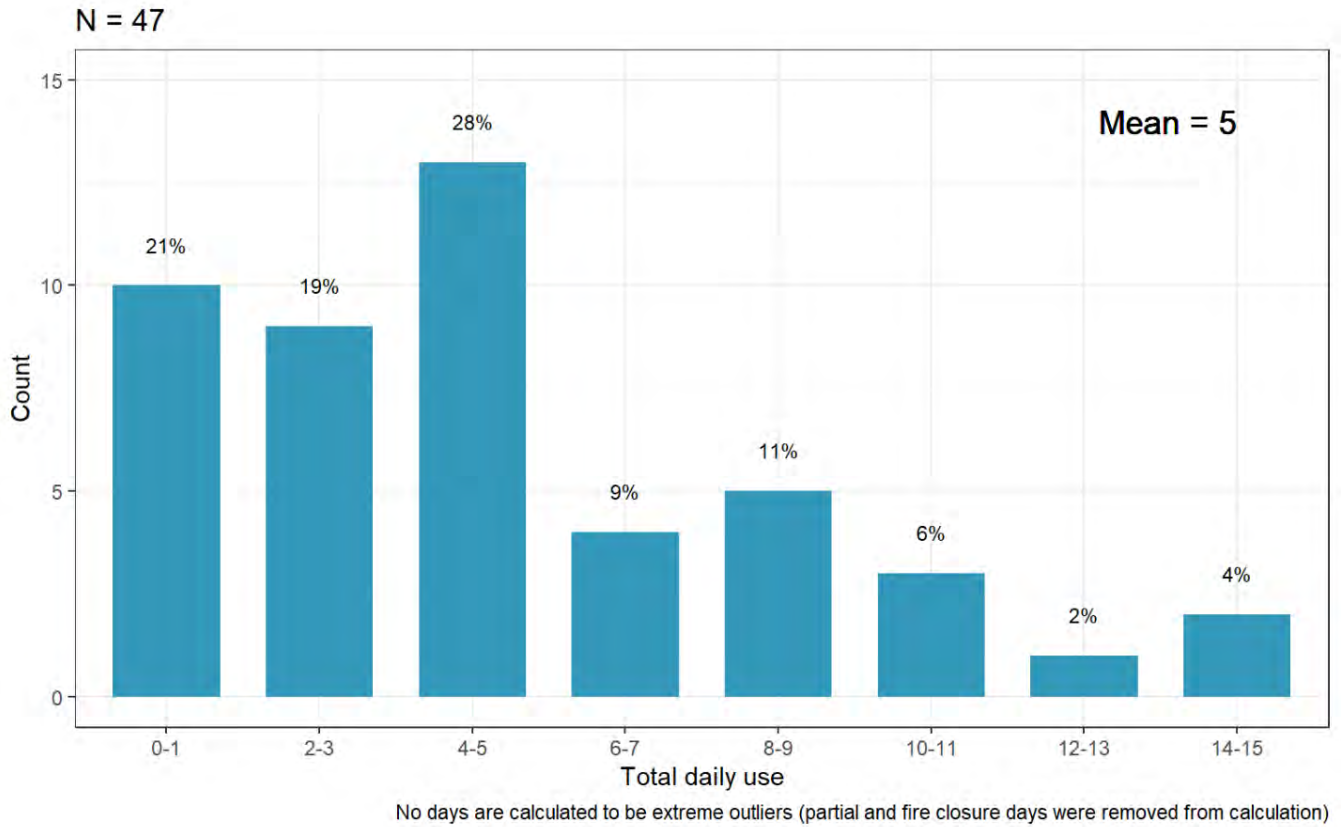


Figure 5. Owens River Headwaters wild segment distribution of daily visitor use on the Glass Creek Meadow Trail (days during the fire closure period were excluded)²

² Data during the fire closure period (September 7 – December 4, 2020) were excluded from this summary.

Visitor Use and User Capacities (continued)

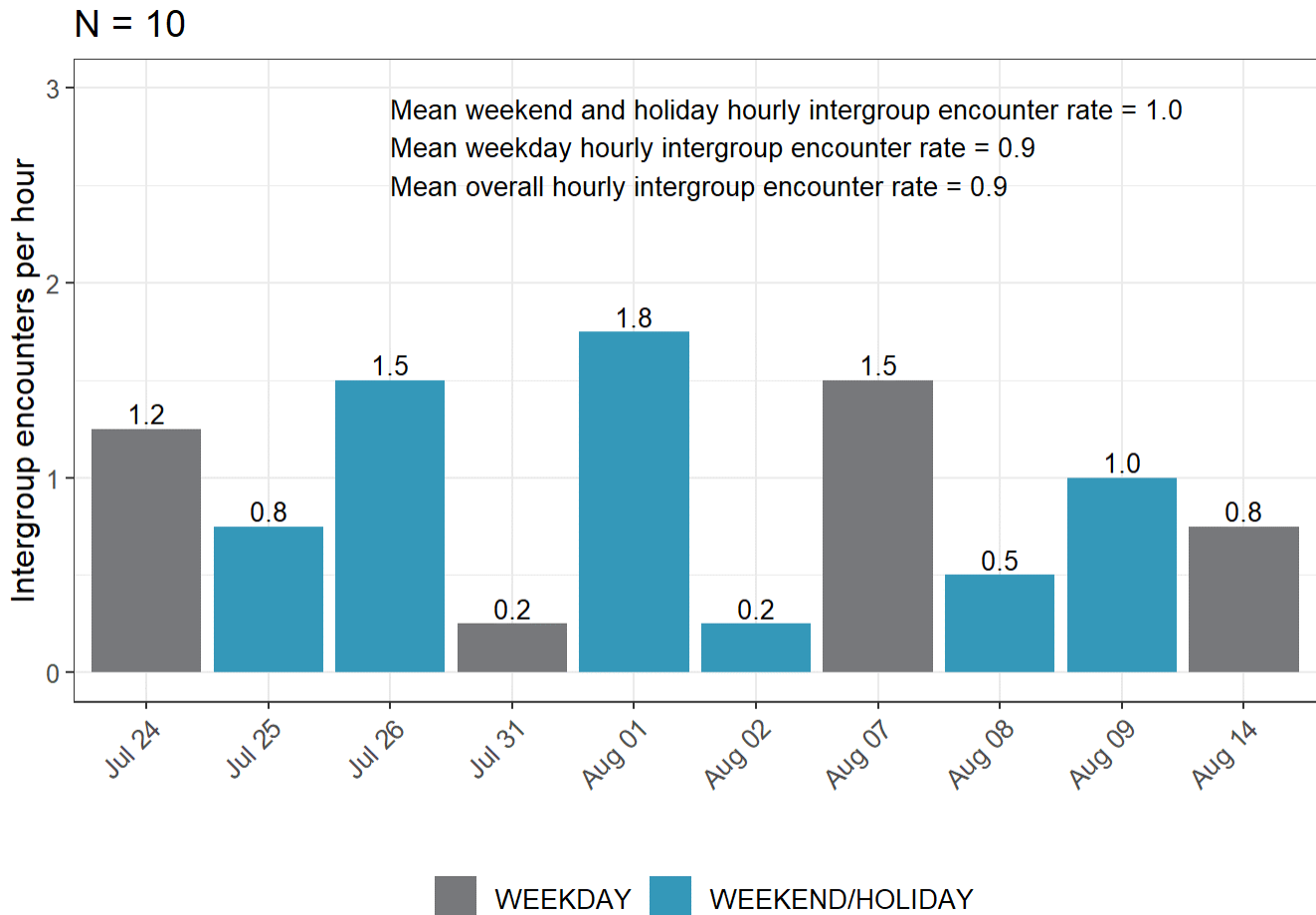


Figure 6. Owens River Headwaters wild segment intergroup encounters per hour on the Glass Creek Meadow Trail by sampling date and day of week category³

User Capacity Estimate

The only notable public access within the Owens River Headwaters wild segment occurs along the Glass Creek Meadow Trail. As noted, high levels of recreation use could directly impact the recreation ORV and indirectly impact the botany and wildlife ORVs and water quality of the river (if off-trail travel increases by visitors trying to seek solitude and/or avoid crowding). Therefore, an important limiting factor for recreation use in the wild segment of the Owens River Headwaters is the number of intergroup encounters per hour on the Glass Creek Meadow Trail. The number of intergroup encounters is an almost universally important indicator among recreational visitors to outdoor recreation settings, particularly for opportunities for solitude in Wilderness areas (Manning 2011).

Based on a review of relevant planning documents and published studies in the academic and professional literature (USDA Forest Service 1998, 2003, 2017a, and 2020) that provided thresholds for intergroup encounters for trails in settings similar to Glass Creek Meadow Trail (trails within a primitive opportunity class in federally designated Wilderness), a range of potential thresholds was evaluated as the potential basis for a numeric user capacity estimate. The potential thresholds evaluated ranged from an average of one encounter with other groups

³ Fridays were classified as weekdays.

Visitor Use and User Capacities (continued)

per hour while hiking, to an average of four encounters with other groups per hour while hiking. For each potential threshold, the numeric user capacity was estimated as the maximum number of visitors that can be accommodated on the Glass Creek Meadow Trail per day without exceeding the threshold for intergroup encounters per hour.

The daily visitor use and intergroup encounter rate data collected for this study were used to estimate the relationship between daily visitor use on the Glass Creek Meadow Trail and the number of intergroup encounters per hour (Figure 7). This regression model was used to estimate a range of potential numeric user capacities for the wild segment of the Owens River Headwaters as the maximum number of people who could hike the Glass Creek Meadow Trail per day without exceeding each of the potential thresholds for intergroup encounters.

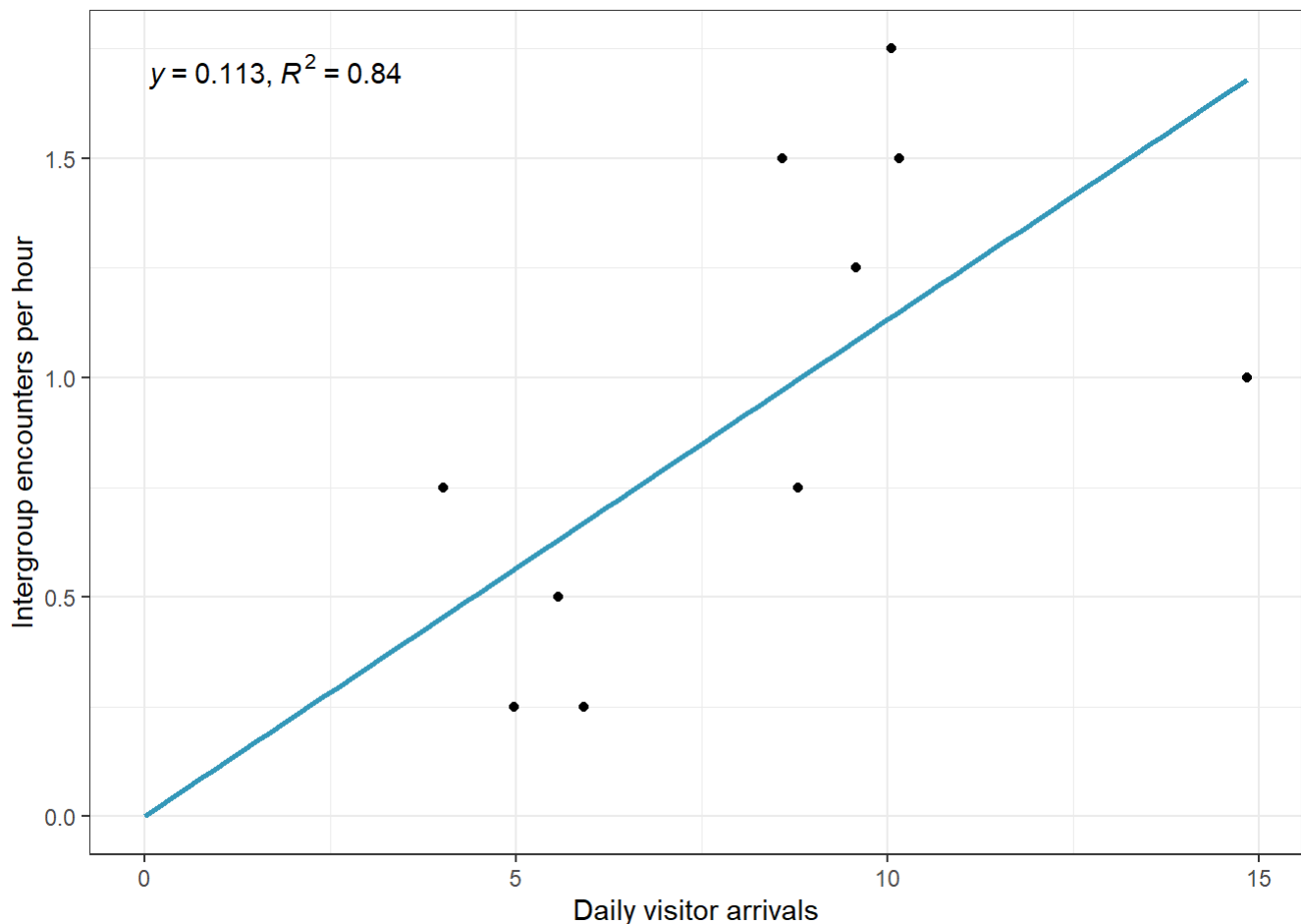


Figure 7. Owens River Headwaters wild segment user capacity scatterplot and regression equation: daily visitor arrivals and intergroup encounters per hour

Visitor Use and User Capacities (continued)

Table 4. Owens River Headwaters wild segment range of potential numeric user capacities

Threshold (intergroup encounters per hour)	Daily capacity (visitors/day)
1	9
2	18
3	27
4	35

Monitoring, Triggers, and Management Actions

Table 5 lists potential management triggers and adaptive management actions that should be taken if triggers are reached. Monitoring of daily visitor use and hourly intergroup encounters on the Glass Creek Meadow Trail should occur every three years, unless a trigger is reached and action is taken to increase the monitoring frequency. The triggers allow the threshold of intergroup encounters per hour to be reached for a limited percentage of time before prompting adaptive management actions to protect river values and water quality.

Table 5. Owens River Headwaters wild segment triggers and management actions

Management trigger	Adaptive management action	Rationale for adaptive management action
<p>Trigger 1: Hourly intergroup encounters on the Glass Creek Meadow Trail reaches the threshold level of intergroup encounters per hour on 50% or more of monitoring days for one year.</p>	<p>Monitor intergroup encounter rates by direct observation annually for the next two years. Use data collected to refine the relationship between visitor use levels and intergroup encounter rates.</p> <p>Assure that access points are “right-sized” (e.g., there are an appropriate number of parking spaces at the trailhead to prevent use from exceeding the threshold)</p> <p>Educate visitors about the unique and sensitive natural resources along the trail. Encourage visitors to hike the trail during less busy days of the week.</p>	<p>To ensure that river values are protected, managers would immediately address early indications of unanticipated increases in intergroup encounter rates. More frequent monitoring will allow managers to identify changes in use patterns and take appropriate actions.</p> <p>Management actions such as education and outreach to visitors would help to maintain the level of use within a desirable limit by providing visitors with information to avoid high use times</p>
<p>Trigger 2: Hourly intergroup encounters on the Glass Creek Meadow Trail reaches threshold level of intergroup encounters per hour on 50% or more of monitoring days for two consecutive years.</p>	<p>Monitor intergroup encounter rates annually for the next two years</p> <p>Make necessary changes to trail access, such as limiting and enforcing parking restrictions to reduce the number of visitors on the trail at one time. If needed, institute a mandatory daily reservation system to spread use to off-peak days, or limit use with a mandatory permit system.</p>	<p>As use increases, managing parking access would control the level of visitor use and is generally less invasive than a reservation system. If needed, a permit and reservation system would further control the level of visitor use and distribute visitor use across days of the week.</p>

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Appendix B: Resource Assessment for Owens River Headwaters Wild and Scenic River Corridor

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Owens River Headwaters Resource Assessment

Introduction

Wild and scenic river (WSR) planning for Owens River Headwaters began for the Forest Service during the development of the Inyo National Forest's (the Forest) Land Management Plan. An interdisciplinary team then further discussed river resources and values in November 2019 during an internal workshop that was held at the Inyo National Forest Supervisor's office to support development of a comprehensive river management plan (CRMP) for Owens River Headwaters. The purpose of the evaluation was to identify river-related outstandingly remarkable values (ORVs), which help guide the focus of the CRMP. Forest Service criteria for outstandingly remarkable values are pulled from Appendix C ("Wild and Scenic Rivers Evaluation for the Inyo National Forest") of the *Inyo National Forest 2019 Land Management Plan EIS*. Upon further internal evaluation and consultation with Mono Lake Kutzadika's Tribe, the Forest Service identified an additional ORV for prehistoric and tribal cultural values in April 2022. The "Discussion of Values" section under the description of the Prehistoric and Tribal Cultural value below further details the rationale for including this as an ORV and its relation to the WSR corridor.

Resource Assessment

The resource assessment is important to guide the preparation of the CRMP for the Owens River Headwaters Wild and Scenic River, to protect river values. The assessment must take into consideration all features which are directly river-related, and it helps provide a holistic approach to investigating the relationship of river features. Features existing along a river's tributaries may also contribute to the ORVs of the river system. The resource assessment process comprises 1) identifying potential ORVs and 2) determining ORV status based on the river-related values which contribute to the river's overall character.

River Segment Classification

Different segments of Owens River Headwaters are classified as either wild, scenic, or recreational, based on the degree of access and amount of development along the river area (Public Law 90-542). The primary criteria for the three classifications are outlined below:

- **Wild River Areas:** Those rivers, or sections of rivers, that are free from impoundments, generally inaccessible except by trail (no roads), with watersheds or shorelines essentially primitive, and having unpolluted waters.
- **Scenic River Areas:** Those rivers, or sections of rivers, that are free from impoundments, having shorelines or watersheds largely primitive and undeveloped, but accessible in places by roads (i.e., roads may cross but generally do not run parallel to or in close proximity to the river). These rivers or segments of rivers are usually more developed than wild and less developed than recreational. This classification does not, however, imply that scenery is an ORV.

- **Recreational River Areas:** Those rivers or sections of rivers that are readily accessible by road or railroad, may have had some development of the shoreline, and may have had some impoundment or diversion in the past. This classification does not, however, imply that recreation is an ORV.

Region of Comparison Used for the Eligibility Assessment

The Forest Service used the following regions of comparison for each value reviewed in the inventory of ORVs evaluated for eligibility (USDA Forest Service 2019a):

- Scenery – Scenery values were evaluated across the southeastern subregions of the assessment area identified in the Bioregional Assessment Report. This area includes the southern Sierra Nevada and small portions of the Great Basin located in western Nevada.
- Recreation – Recreation values were evaluated across the southeastern subregions of the assessment area identified in the Bioregional Assessment Report. This area includes the southern Sierra Nevada and Great Basin and Desert areas of eastern California, approximately from the Bodie Hills in the north, to Owens Lake in the southeast, and including portions of the Sierra and Sequoia National Forests.
- Geology – Geology values were evaluated across the Central and Southern Sierra Nevada (Lake Tahoe to the Sequoia National Forest), the Western Great Basin (Nevada), and northern Mojave Desert.
- Fish and Wildlife – Fish and wildlife values, population, and habitat were evaluated as follows:
 - Across the species range for Sierra Nevada yellow-legged frog (*Rana sierrae*), northern distinct population segment of mountain yellow-legged frog (*Rana muscosa*), Yosemite toad (*Bufo canorus*), Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), Paiute cutthroat trout (*Oncorhynchus clarki seleniris*), golden trout (*Oncorhynchus aguabonita*), willow flycatcher (*Empidonax traillii*), and Panamint alligator lizard (*Elgaria panamintina*).
 - Across the species range within the Forest for Owens tui chub (*Siphateles bicolor snyderi*).
 - Across the Forest for Owens Valley springsnail (*Pyrgulopsis owensensis*) and Wong’s springsnail (*Pyrgulopsis wongi*).
- Prehistory and Tribal Cultural– Prehistory values were evaluated across the Forest. Tribal cultural values were evaluated based on well-substantiated knowledge of unique and significant river-related Tribal cultural values across the Forest.
- History – History values were evaluated across the Forest.
- Other (Botanical) – Other (botanical) values were evaluated across the Central and Southern Sierra Nevada (Lake Tahoe to the Sequoia National Forest), the Western Great Basin (Nevada), and northern Mojave Desert.

ORV evaluation is further described in the section below.

Outstandingly Remarkable Values

The term “outstandingly remarkable value” has never been precisely defined, but criteria have been described in “The Wild and Scenic River Study Process,” which is a technical report of the Interagency Wild and Scenic Rivers Coordinating Council and Forest Service Handbook 1909.12 (82.73a) (USDA Forest Service 2015). This resource assessment is based on the professional judgment of the interdisciplinary team and documents objective, scientific analysis based on reviews of available literature, consultation with experts, and field work.

ORVs are commonly such things as scenery, recreation, geology, fisheries, wildlife, prehistory, history, or botany. To be considered river related, a value should be located in the river or its immediate environment (generally within one-quarter mile on either side), contribute substantially to the functioning of the river ecosystem, owe its existence to the presence of the river, or some combination of these things.

The following ORVs were identified for Owens River Headwaters:

ORV Name	Owens River Headwaters
Scenery	X
Wildlife	X
Fisheries	-
Prehistoric/Tribal Cultural	X
Historic Values	-
Other	X (Botany)
Recreation	X
Geologic/Hydrologic	X

The process for determining ORVs on the river is further described below.

The Forest Service identified the following criteria for determining if any river-related values were outstandingly remarkable:

- **Scenery**
 - The landscape element forms of landform, vegetation, water, color, and related factors result in notable or exemplary visual features, attractions, or both. When analyzing scenic values, additional factors, such as seasonal variations in vegetation, scale of cultural modifications, and the length of time negative intrusions are viewed, may be considered. Scenery and visual attractions may be highly diverse over the majority of the river or river segment (USDA Forest Service 2015).
 - In applying these scenery criteria, unique scenery considered as an outstandingly remarkable value included scenery with views of unique geologic formations; unique vistas; or unique landscapes with combinations of alpine lakes, high peaks, and water features such as waterfalls (USDA Forest Service 2019a).
- **Recreation**

- Recreational opportunities are, or have the potential to be, popular enough to attract visitors from throughout the region or are unique or rare within the region. Visitors are willing to travel long distances to use the river resources for recreational purposes. River-related opportunities could include, but are not limited to, sightseeing, wildlife observation, camping, photography, hiking, fishing, hunting, and boating. Interpretive opportunities may be exceptional and attract, or have the potential to attract, visitors from outside the region. The river may provide, or have the potential to provide, settings for national or regional usage or competitive events (USDA Forest Service 2015).
 - In applying recreation criteria, unique recreation considered as an ORV included recreation experiences such as unique fishing opportunities (for example, fishing for golden trout or Blue Ribbon fishery areas); areas that offered unique scenery which enhanced the recreation experience (for example, unique formations or vistas); or where a combination of multiple recreational experiences occur, such as hiking, backpacking, wildlife viewing, photography, and fishing (USDA Forest Service 2019a).
- **Geology**
 - The river or the area within the river corridor contains one or more examples of a geologic feature, process, or phenomenon that is unique or rare within the region of comparison. The feature(s) may be in an unusually active stage of development, represent a “textbook” example, or represent a unique or rare combination of geologic features (erosional, volcanic, glacial, or other geologic structures).
 - In applying these criteria for geology, unique geologic features considered as an ORV included lava formations, rare mineral deposits, hot springs, or unique rock formations (USDA Forest Service 2019a).
- **Hydrology/Hydrogeology**
 - The river has a unique flow regime, or exceptional water quality or water chemistry, compared to the region of comparison. The feature may be an unusual water source, either in volume or in the way it relates to the area’s geology, or it may possess unique water chemistry related to underlying rock types.
 - In applying these criteria for hydrology, unique features considered as ORVs included high volume springs, springs with unique water chemistry, unique regimes, critical hydrological related values, and exceptionally good water quality (USDA Forest Service 2015).
- **Fish**
 - Fisheries values should be judged on the relative merits of fish populations, habitat, or a combination of these river-related conditions (USDA Forest Service 2019a).
 - Populations: The river is nationally or regionally an important producer of resident and/or anadromous fish species. Of particular significance is the presence of wild stocks and/or

federal or state listed (or candidate) threatened or endangered species or Species of Conservation Concern (SCC). Diversity of species is an important consideration and could, in itself, lead to a determination of “outstandingly remarkable” (USDA Forest Service 2019a).

- Habitat: The river provides exceptionally high-quality habitat for fish species indigenous to the region of comparison. Of particular significance is habitat for wild stocks and/or federal or state listed (or candidate) threatened or endangered species or SCCs. Diversity of habitats is an important consideration and could, in itself, lead to a determination of “outstandingly remarkable” (USDA Forest Service 2019a).
- In applying these criteria, these features were identified as an ORV if the area represented important habitat for breeding or are occupied at critical life stages, such as breeding; or the area offers exceptional habitat or diverse habitat for the species (USDA Forest Service 2019a).

- **Wildlife**

- Wildlife values should be judged on the relative merits of either terrestrial or aquatic wildlife populations, habitat, or a combination of these things (USDA Forest Service 2015).
- Populations: The river, or area within the river corridor, contains nationally or regionally important populations of indigenous wildlife species. Of particular significance are species considered to be unique, and/or populations of federal or state listed (or candidate) threatened or endangered species or SCCs. Diversity of species is an important consideration and could, in itself, lead to a determination of “outstandingly remarkable” (USDA Forest Service 2019a).
- Habitat: The river, or area within the river corridor, provides exceptionally high-quality habitat for wildlife of national or regional significance, and/or may provide unique habitat or a critical link in habitat conditions for federal or state listed (or candidate) threatened or endangered species or SCCs. Contiguous habitat conditions are such that the biological needs of the species are met. Diversity of habitats is an important consideration and could, in itself, lead to a determination of “outstandingly remarkable” (USDA Forest Service 2019a).
- In applying these criteria, these features were identified as an ORV if the area represented important habitat for breeding or are occupied at critical life stages, such as breeding; or the area offers exceptional habitat or diverse habitat for the species.

- **Prehistoric, Historic, and Cultural Resources**

- The river, or area within the river corridor, contains important evidence of historic or prehistoric occupation or use by humans. Sites may have national or regional importance for interpreting history or prehistory (USDA Forest Service 2015).

- Historic: The river or area within the river corridor contains one or more sites or features associated with a significant event, an important person, or a cultural activity of the past that was rare or one-of-a-kind in the region. Many such sites are listed in the National Register of Historic Places (the National Register), which is administered by the National Park Service. A historic site or feature is 50 years old or older in most cases (see notes below regarding National Register sites) (USDA Forest Service 2019a).
- Prehistoric/Cultural: The river, or area within the river corridor, contains a site(s) where there is evidence of occupation or use by Native Americans. Sites must have unique or rare characteristics or exceptional human-interest value(s). Sites may have national or regional importance for interpreting prehistory, may be rare and represent an area where a culture or cultural period was first identified and described, may have been used concurrently by two or more cultural groups, and/or may have been used by cultural groups for rare sacred purposes. Many such sites are listed in the National Register (see notes below regarding National Register sites) (USDA Forest Service 2019a). **Notes about sites listed in the National Register of Historic Places:** The Inyo National Forest heritage database was used to identify documented historic and prehistoric sites within one-quarter mile of each analyzed stream segment as river-related values. Because there presently are no National Register listed cultural properties on the Forest, the National Register had limited use in identifying ORVs. In absence of identified National Register sites, the following factors were considered to determine if documented sites (if present) might qualify as outstanding and remarkable values:
 - **Does an important interrelationship exist between documented cultural sites and the river?** In the case of prehistoric sites, or when insufficient information was available, this relationship was presumed to exist.
 - **Is unique or rare significance of all or any of the documented cultural sites established through National Register of Historic Places evaluation, associative history, site density, or other means?** The significance of some sites has been established through a consensus determination with the California State Historic Preservation Office as qualifying National Register eligible properties and, in a few cases, draft National Register nomination forms substantiating site significance have been compiled. Other sites, while not formally evaluated against National Register criteria, occur in such great densities, or are associated with such well-established themes of significance that outstanding and remarkable values were assumed. These themes of significance were defined in “Appendix C: Wild and Scenic Rivers Evaluation” of the *Inyo National Forest Final Environmental Impact Statement Revision of the Inyo National Forest Land Management Plans – Vol. 2* and include the following: nationally important high elevation prehistoric habitation sites in the White Mountains, regionally significant prehistoric obsidian sources, regionally important development of the Los Angeles Aqueduct in Owens Valley, and regionally significant historic hydroelectric development.

- The same process was used in the reconsideration of past evaluations as well as for all new evaluations. It is important to note that while known themes of history and prehistory exist throughout the Forest, not all cultural properties have been discovered and documented. For the purposes of the analysis, the ability to recognize prehistory or history values was presumed to rely upon the confirmed presence of associated cultural sites. If the heritage database contained no record of documented prehistoric and/or historic cultural sites within one-quarter mile of a stream reach, then no corresponding river-related value (potential ORV) was identified. If prehistoric and/or historic sites were known, the above criteria were used to determine if available site information warranted identification of an ORV.
- **Botany**
 - ORVs were determined for this resource based on the unique combination or numerous botanical values associated with the river segments (USDA Forest Service 2019a).

River-related values must be rated for level of significance. Levels include:

- Outstandingly remarkable — Unique, rare, or exemplary feature that is significant at a comparative regional or national scale.
- Significant (not outstandingly remarkable) — Values which still contribute substantially to the river’s character. These values may still need varying levels of protection and consideration during river planning process.
- Insufficient information — If the level of existing data is insufficient to make a determination of significance, then it must be identified what is needed to get sufficient data. The value needs to be protected as outstandingly remarkable until more information is gathered.

No river-related values studied in this assessment were deemed to be significant or with insufficient information. Values were deemed as either outstandingly remarkable or were dismissed from consideration.

River Descriptions

Owens River Headwaters is comprised of Glass Creek and Deadman Creek. Both creeks contain wild, scenic, and recreational segments, then converge at Big Springs, which contains scenic and recreational segments. In total, the wild segments of the river extend for 6.3 miles; the scenic portions are 6.6 miles in length; and the recreational segments comprise 6.2 miles. This totals 19.1 miles of designated river (US Congress 2009).

Findings and Discussion of Values

Discussion of the values, criteria, findings, and rationales for conclusions specific to Owens River Headwaters WSR are detailed below.

Owens River Headwaters

1. Scenery

Finding

The river corridor possesses outstandingly remarkable scenic values.

Discussion of Values – Rationale for Conclusion

Outstandingly remarkable scenic values can be attributed to all of Owens River Headwaters, given its diversity of scenery. This includes Deadman Creek, Big Springs, and the Owens River. Views from Glass Creek Meadow and the Meadow itself are determined to be outstandingly remarkable (USDA Forest Service 2019b). The viewshed is limited to the foreground throughout much of the corridor due to low relief and forest cover. Glass Creek and Deadman Creek are both typically out of view from the main roads but can be seen from some parts of the campgrounds and dispersed campsites. A portion of Obsidian Dome can be seen from the corridor. The Glass Creek Meadow Trail closely parallels a short section of Glass Creek with a small cascade. The upper end of the trail provides wide views of Glass Creek Meadow and the surrounding mountains. A portion of Deadman Creek passes through a gorge that can be seen from above at the end of a few dead-end roads.

Obsidian Dome can be seen in the foreground from an off-highway vehicle (OHV) route and an access road in the corridor. The Dome provides an unusual up-close view of a large obsidian feature. Glass Creek Meadow offers a large meadow with willows, grasses, and forbs surrounded by a volcanic landscape of pumice flats and hillsides. The background includes rounded ridges and peaks of the Sierra Nevada Range. Although outside the river corridor, White Wing Mountain is another unique natural feature which can be seen from Glass Creek and Deadman Creek, contributing outstanding scenic views of pumice on its peaks.

Glass Creek Meadow provides wide views of wildflowers in summer and golden colors from willow, aspen, and cured grasses in the fall. Winter offers views of the landscape under snow.

Within the corridor, visible modifications include native surface roads, campgrounds, road signs, and some mining evidence. Also present is a communication tower on a ridgeline visible from Glass Creek Meadow. Scenic Integrity Objectives (SIOs) are determined to be “High” and “Very High” for this area. Scenic integrity objectives are those that define the minimum level to which landscapes are to be managed from an aesthetics standpoint (USDA Forest Service 2005). Specifically, a “Very High” SIO generally provides for ecological changes only and refers to landscapes where the valued (desired) landscape character is intact with only minute, if any, deviations. The landscape is unaltered (USDA Forest Service 2005). A “High” SIO provides for conditions where human activities are not visually evident. This refers to landscapes where the valued (desired) landscape character “appears” intact. Deviations may be present but must repeat the form, line, color, texture, pattern, and scale common to the landscape character. The landscape appears unaltered (USDA Forest Service 2005).

2. Recreation

Finding

The river corridor possesses outstandingly remarkable recreation values.

Discussion of Values – Rationale for Conclusion

Portions of the corridor are used year-round. Use in the spring, summer, and fall includes camping in Forest Service campgrounds and dispersed campsites, fishing, OHV riding, day hiking on the Glass Creek Meadow Trail, and hunting. Specifically, the area sees summer and winter range herds of mule deer (*Odocoileus hemionus*; trophy X9-B and potentially X9-A hunt zone). There is also a recreation residence tract on Glass Creek. In the winter-spring season when there is enough snow, recreation includes snowmobiling, cross-country skiing, and some backcountry ski touring in the Owens River Headwaters Wilderness.

Recreational activities include camping in three Forest Service campgrounds and a separate Forest Service group camp. The campgrounds are known for easy access to local OHV routes and are popular for motorized recreation. Other opportunities include a 2-mile hiking trail into Glass Creek Meadow, several dispersed campsites along Deadman Creek, a 1.5-mile OHV/four-wheel drive route, hunting, and trout fishing. The nearby Obsidian Dome geologic feature is also a sightseeing attraction. Winter recreation includes snowmobiling and cross-country skiing. Currently, four outfitter or guide services are permitted to operate in the corridor: one jeep tour company, two camping trailer drop-off providers, and a guide service providing guided trail rides and filming with horses. The narrow and shallow streams do not allow for much paddling, floating, or swimming.

The three campgrounds in the corridor include a total of 112 campsites. A separate group camp can accommodate up to 50 people. There are many dispersed campsites at the end of spur roads along Deadman Creek. The campgrounds are busy during peak summer season because they are inexpensive, close to US Highway 395, and have sites big enough to accommodate recreational vehicles (RVs) and OHV trailers. Streamside dispersed campsites are also popular in the summer because the proximity to the creeks provides a cool and shady environment. Use is concentrated at these camping locations. There are 78 campgrounds in the Forest, many of which are along creeks and lakes. Although the camping in the WSR corridor is pleasant, it does not stand out in comparison to other opportunities in the area. The presence of RV- and OHV-friendly campgrounds does make the area more unique. Many other local campgrounds do not have enough space to accommodate large vehicles and trailers. The proximity to many OHV routes and signed motorized trails also provides a unique experience. In the corridor, there is one OHV route crossing that is not a bridge.

Sightseeing at Obsidian Dome is a unique experience in the area, although the primary access and viewing occurs outside of the WSR corridor. Other trails in the area include the Deadman Creek and Lower Glass Creek trails, in addition to informal trails that have been created. The Glass Creek Meadow Trail into the Owens River Headwaters Wilderness accesses beautiful views of the eastern Sierra which are common throughout the region. The presence of these specific creeks in combination with OHV-friendly campgrounds and nearby OHV routes offer scenery, cooler summer temperatures, and family-friendly recreation opportunities which draw people from outside the region.

3. Geology/Hydrology

Finding

The river corridor possesses outstanding remarkable geology and hydrology values.

Discussion of Values – Rationale for Conclusion

There is geologic evidence of volcanic activity along Owens River Headwaters. Significant geologic features or attractions within the region include: Inyo Craters, Obsidian Dome, Obsidian Flats, Glass Creek Flow, Deadman Dome (North and South), Recumbent Dome, Long Valley caldera, and Locatable Pumice. Five rhyolite dome-flows are known, at Wilson Butte (volcanic cone jagged chunks); Obsidian Dome (volcanic glass extrusion); Glass Creek flow (a volcanic extrusion of jagged chunks); and North and South Deadman Dome (a volcanic extrusion of jagged chunks). Two small unnamed domes are known at Inyo Craters (three phreatic eruptions explosion pits, two of which contain small lakes) and Deer Mountain (a cone-shaped hill 500 feet high with a crater at the summit). Other features in the corridor include Resurgent Dome; Feeder Dike; vents and fumaroles; north-south trending fault scarps; and Sherwin, Tahoe, and Tioga glacial deposits.

Stream segments also contain unique geology. Rare geologic features include basalt and andesite, formed by volcanic and glacial events. The topographically defined Long Valley caldera is about 19 miles from east to west and 10 miles from north to south. Specifically, the Obsidian Dome and Glass Creek Dome are outstanding examples of rhyolite domes, tephra layers, explosion craters, and marble-cake blocks (mixed magmas containing a crystal-poor black obsidian and a crystal-rich light gray pumice).

The corridor has scenic geology with interpretive potential, historic mining, and is a known Geothermal Resource Area exhibiting a unique Geothermal Reservoir.

The Upper Owens River is fed by Big Springs, which is a large spring unique to the Eastern Sierra Mountains. It is recharged by runoff and snowmelt that infiltrates into permeable pumice deposits and migrates along a hydraulic gradient through fractured andesite to the springs primarily from the west and southwest watersheds of Deadman Creek and Dry Creek up to Deadman (San Joaquin) Ridge. Big Springs issues from a complex of andesitic, rhyolitic, and basaltic lava flows. Recharge for this groundwater system evidently occurs to the west and southwest in the watersheds of Deadman, Glass, and Dry Creeks. Groundwater flow from Mammoth Mountain, via Dry Creek, specifically to Big Springs has never been demonstrated, but using available data on hydraulic head gradient, transmissivities, volcanic stratigraphy, and some chemical and isotopic data, scientists estimated that about 10% of the water discharge at Big Springs could result from precipitation on Mammoth Mountain. This is a unique hydrogeologic system that results in headwater springs of the Owens River, an important feature and recreational asset in the Eastern Sierra. The Upper Owens and Big Springs discharge is relatively constant throughout the year with flows peaking annually during the snowmelt season in late spring to early summer. Big Springs and Deadman Creek provide natural sources of phosphorus, which encourages abundant growth of aquatic plants in the upper Owens River and in Crowley Lake. Big Springs was found to be the primary source of phosphorus for Crowley Lake. Big Springs also serves as a source of naturally occurring arsenic concentrations, which are prevalent in Crowley Lake, however the dominant source of Arsenic is the Hot Creek geothermal area (Jellison and Dawson 2003).

4. Fish

Finding

Fish values are not considered to be outstandingly remarkable.

Discussion of Values – Rationale for Conclusion

Inyo National Forest
Owens River Headwaters
Resource Assessment

There are no known native species within this section of the river; there are only non-native stocked trout (some are self-sustaining).

5. Wildlife

Finding

The river corridor possesses outstandingly remarkable wildlife values.

Discussion of Values – Rationale for Conclusion

The corridor includes habitat for the river-dependent species, Yosemite toad, which is federally threatened. Yosemite toad are documented within Glass Creek Meadow. This is one of the few occurrences of Yosemite toad within the Forest that is outside of the U.S. Fish and Wildlife (USFWS) designated critical habitat (USDA Forest Service 2017a). The northern goshawk (*Accipiter gentilis*) occurs in abundance within the Forest, and there are also multiple northern goshawk nesting and foraging territories within and adjacent to the Deadman Creek and Glass Creek portions of the WSR corridor. There is potential habitat for willow flycatcher, including Sierra Nevada Mountain willow flycatcher, but no known breeding habitats (California Department of Fish and Wildlife [CDFW] 2007; USDA Forest Service 2017b).

The Deadman Creek portion of the WSR corridor is a significant seasonal migration corridor for mule deer, and it provides summer habitat and fawning areas. Deadman Creek also provides an important trans-Sierra migratory corridor for furbearing species, such as brown bear (*Ursus arctos*) and bobcat (*Lynx rufus*). The WSR corridor also hosts a diverse community of bird species. Surveys conducted in 2010 and 2011 by Point Blue Conservation Science identified 17 bird species in a transect near Deadman Creek. The dominant species included dark-eyed junco (*Junco hyemalis*), mountain chickadee (*Poecile gambeli*), and warbling vireo (*Vireo gilvus*) (Point Blue Conservation Science 2021). The upper watershed may provide foraging habitat for California spotted owl (*Strix occidentalis caurina*) located outside of the crest of San Joaquin Ridge. Glass Creek Meadow provides a high diversity of butterfly species, including six SCC in the Forest (USDA Forest Service 2019c). There have also been potential aquatic spring snail detections or surveys for Wong's springsnail and Owens Valley springsnail, both of which are SCCs. The unique combination of a wide variety of species makes this area outstandingly remarkable.

The Sierra Nevada red fox (red fox) is not a species of conservation concern for the Forest but with the recent 2021 listing under ESA, red fox will be included among the Forest's at-risk species review process.

The Forest is closely collaborating with CDFW with regards to the red fox. The Forest response includes ongoing surveys for the red fox, conducted by CDFW. Two letters are on file at Mammoth Ranger Station authorizing CDFW to expand carnivore surveys to include the Forest. Surveys took place between 2018-2019 and again in 2020-2021. The most recent update by CDFW is from 2021 by B. Hatfield showing four scat detections near bishop pass and near Lamarck Lake.

The Forest Plan includes plan direction designed to maintain the diversity of plant and animal communities and supports the persistence of native species within the plan area. There are numerous plan components for at-risk species or groups of species that provide for ecosystem integrity and diversity to meet the ecological condition necessary for those species within their range. It is expected that Forest

Plan components specific to fisher, marten, and owl will provide for red fox. Furthermore, wilderness designation and Forest-wide components for terrestrial ecosystems and vegetation are expected to contribute to the conservation of the red fox.

6. Historic and Prehistoric/Tribal Cultural Values

Finding

The river corridor possesses outstandingly remarkable prehistoric and tribal cultural values. Historic values are not considered to be outstandingly remarkable.

Discussion of Values – Rationale for Conclusion

Historic: This portion of the Forest, including the Owens River Headwaters, has a rich local history of settlement, ranching, and recreation development. Land patents along the river corridor date to the 1880s. Fishing resorts were established along the corridor as early as 1919, including the Alpers Owens River Ranch where the local “Alpers trout” was bred and introduced. Water conveyance systems associated with the historic ranching features are also found throughout the corridor. The Glass Creek Recreation Residence Tract, a National Register eligible property, was established along the creek in 1929 to accommodate the expanding recreation economy of the Forest. Although these historic period resources retain integrity of setting, location, association, and feeling, they are not unique among similar recreation-related resources found along the eastern escarpment of the Sierra Nevada range and this portion of the Forest.

Prehistoric: Pre-contact archaeological sites along the river corridor west of US Highway 395 along Glass Creek and Deadman Creek are predominately lithic scatters and resource processing sites associated with the river environment and the obsidian sources near Obsidian Dome. Sites along the Owens River Headwaters east of US Highway 395 are predominately lithic scatters associated with the obsidian quarry at Lookout Mountain that runs along the south side of the river. Site density increases moving east along the corridor and are primarily habitation sites with a large variety of artifacts and features associated with resource procurement. The entire reach of the Owens River was highly significant to pre-contact inhabitants of the region, evidenced by village sites, burial mounds, and rock art panels further south of this location. Sites are generally in good condition; however, recreational use of the river corridor on the east side of US Highway 395 has resulted in some vandalism and disturbance. The Lookout Mountain obsidian quarry is eligible for listing in the National Register. It is currently managed as a Priority Heritage Asset by the Forest. The prehistoric sites along the corridor are eligible for listing to the National Register of Historic Places but are not unique to this location or this region of the Forest. The sites do, however, owe their existence to the presence of the river and the intersection of the obsidian resources and water would have contributed to selecting these locations for habitation and use.

Tribal Cultural: The tribal groups of the Sierra Nevada region practiced a seasonal round that included hunting and gathering of animal and plant resources; regular resource exchange with neighboring groups; and social and ceremonial interactions to affirm cultural bonds and relationships (Steward 1933; Davis 1965; Fowler and Liljeblad 1986; Liljeblad and Fowler 1986; Davis-King 2010). The river corridor provided a place where many, if not all, of these needs

intersected. Dramatic changes to indigenous landscape use began in the 1850s with the first Euroamerican miners and settlers establishing homesteads and claiming water rights. Though homesteading did occur along the river corridor, much of space remained unencumbered and available for traditional uses. Further archaeological survey in both the Glass Creek and Deadman Creek corridors is highly likely to identify additional sites associated with resource processing and procurement that can be reasonably dated from the pre-contact period through the historic ethnographic period.

Tribal consultation indicates ongoing use for this WSR corridor, particularly for the Mono Lake Kutzadika'a Tribe. In a letter dated April 13, 2022, the Kutzadika'a identified additional cultural and tribal values associated with the corridor. From Chairwoman Charlotte Lange:

“This area has important cultural values that sustained our people prior to Euroamerican arrival and still serve Tribal needs in the present. These cultural resource values are integral to the springs and creeks in this area...”

The ethnographic record highlights the Owens River Headwaters as a linguistic boundary between the Mono Lake Kutzadika'a Paiute and the Owens Valley Paiute (Busby et al. 1979:114). Recent tribal stories collected by the Traditionally Associated Tribes of Yosemite National Park further recognize this area as a shared cultural boundary between both groups and the neighboring Sierra Nevada tribes including the Tuolumne Band of Me-wuk Indians, the Western Mono, and the Southern Sierra Miwuk (National Park Service 2019).

The ethnohistoric record as compiled by Davis-King (2010) provides long-standing connection to the Owens River Headwaters and Owens River, as observed by the earliest Euroamerican entrants to the region. A.W. Von Schmidt, contracted to survey the east side of the Sierra Nevada range by the Department of the Interior in 1855, reported encountering “Indians of the Mono Tribe” at the headwaters of the Owens River (Davis-King 2010:55). The subsequent plat maps produced by Von Schmidt and other surveyors of the early General Land Office (1879, 1882) identify north-south trending trails near the river corridor as “Mono Lake Trail.” Because Euroamerican settlement in this region did not occur in great number until the late 1850s, trails well enough defined on the landscape to publish on the early plat maps would have been indigenous in origin. This trail is also noted by the California Geologic Survey in 1873 (Hoffmann 1873) as “Indian Trail” though the scale of the map is more difficult to situate spatially with the river corridor.

In subsequent consultation meetings, the Mono Lake Kutzadika'a reiterated the importance of the river corridor as a travel route between Mono Lake and Long Valley. Traditional walks organized by the Mono Lake Kutzadika'a occur along the corridor to this day, serving to connect the tribe with important and unique places on the landscape in this region of the Forest. Though demonstrated with historical information, the tribal cultural ORV identified for the WSR corridor is defined from the point of the view of the Tribe. Specific details of the tribal cultural ORV remain confidential and known only to the Mono Lake Kutzadika'a Tribe.

7. Botany

Finding

The river corridor possesses outstandingly remarkable botanical values.

Discussion of Values – Rationale for Conclusion

The river corridor hosts a diversity of plant species, ranging from subalpine meadows of upper Glass Creek to sagebrush and sandy flats with minimal vegetation in the lower portion of Deadman Creek. There is one known population of the SCC plant, western single-spike sedge (*Carex scirpoidea* ssp. *pseudoscirpoidea*), on Deadman Creek east of US Highway 395 and there is the potential for additional SCC plants associated with the river corridor. Previously documented little grapefern (*Botrychium simplex*) in Glass Creek Meadow suggests potential for rare botrychium species elsewhere along the river corridor. Glass Creek Meadow is a locally important hiking destination for subalpine meadow and wildflower viewing; the meadow contains a high diversity of wet meadow associated plant species compared to the surrounding area. Additional SCC plants overlapping the corridor are Mono Lake lupine (*Lupinus duranii*) and whitebark pine (*Pinus albicaulis*); however, these are both upland species and are not associated with the river (USDA Forest Service 2018). There are a low number of rare species present compared to some other riparian systems; however, there could be additional unknown rare species found if additional botanical surveys were conducted.

In addition, the river drainage plays an important role for the migration of westside floristic species in the area to the east of the Sierra Nevada crest. Furthermore, Upper Deadman Creek flows through the world's largest Jeffrey Pine forest and supports stands of rare eastside old growth red fir trees. This unique forest represents “the only major east-side occurrence of this species between the Kern Plateau and Hope Valley near Carson Pass...” (Millar 1994 in Constantine-Shull 2000). Overall, the area has a diverse understory of plant species which represent seven unique floristic zones.

The plant habitat quality is generally good, though there is some lodgepole pine (*Pinus contorta*) encroachment noted in Glass Creek Meadow. Although lodgepole pine is a native species, it is known to quickly recruit into disturbed or burned areas, and it is not a species typical of subalpine prairie. There are some recreation impacts (firewood collection, fuels reduction, dispersed camping, OHV trails, and roads) outside of designated wilderness that may impact condition of riparian vegetation. Trail impacts to Deadman and Glass Creeks in designated wilderness are unknown but may include the potential for some trampling of vegetation. This area is likely to be generally free of invasive plants at higher elevation, but there are some cheatgrass (*Bromus tectorum*) and bull thistle (*Cirsium vulgare*) populations mapped near the lowest end of the corridor east of US Highway 395. Cheatgrass and bull thistle are both invasive exotic species that have been introduced throughout the United States. There are likely more nuisance, low-priority invasive species along the corridor, but no high-priority, noxious weeds are known or currently pose a high threat to this WSR.

There are a low number of rare species present compared to some other riparian systems; however, there could be additional unknown rare species found if additional botanical surveys were conducted.

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