

Chapter 6: Visitor Use and User Capacity

This chapter addresses the user capacity requirement of the Wild and Scenic Rivers Act (WSRA). Consistent with the direction in the “Final Revised Guidelines for Eligibility, Classification and Management of River Areas” (Secretaries’ Guidelines for River Areas), this chapter outlines how the *Tuolumne River Plan* “determined the quantity and mixture of recreation and other public use which can be permitted without adverse impact on the resource values of the river area.”¹

The alternatives presented in “Chapter 7: Alternatives for River Management” differ with regard to the kinds and amounts of use the Tuolumne River corridor would receive in the future and the infrastructure needed to support that use. The alternatives address management of visitor use and user capacity for each river segment by specifying the kinds and maximum amounts of use that would occur in each segment under each alternative. The kinds and amounts of use allowed under each alternative would protect and enhance river values.

A brief discussion of user capacity is provided below, along with a description of how user capacity was calculated for each of the management alternatives described in chapter 7. Additionally, this chapter summarizes the actions that would be taken with each alternative to ensure that river values are protected and enhanced based on the kinds and amounts of use proposed. Chapter 7 provides a full list of these actions as well as actions common to all alternatives. Appendix G contains additional information on visitor use and the methods used to quantify use.

Under each alternative, all river values would be fully protected from any adverse impact or degradation and enhanced. Some alternatives may provide greater enhancement of certain river values and other resources, as described below. In addition, some alternatives would provide for public visitation and use at levels lower than the maximum capacity in order to provide the public with options regarding visitation levels and related user experience.

Requirements of the Wild and Scenic Rivers Act and Implementing Guidelines

The WSRA requires the National Park Service (NPS) to protect river values while allowing for recreational and other public use that does not “substantially interfere” with the enjoyment of river values. The WSRA gives “primary emphasis to protecting the river area’s esthetic, scenic, historic, archeological and scientific features.” To achieve this goal, the WSRA requires all comprehensive river management plans to address user capacity. The Secretaries’ Guidelines for River Areas define carrying capacity in the context of a management plan to mean “the quantity and mixture of recreation and other public use which can be permitted without adverse impact on the resource values of the river area.”² Under these guidelines, public use should be regulated and distributed where necessary to protect and enhance river values. Public use may be controlled by limiting public access to the river, by issuing permits, or by other means available to the managing agency through its general statutory authorities.

¹ National Wild and Scenic Rivers System; Final Revised Guidelines for Eligibility, Classification, and Management of River Areas, 47 *Federal Register* 39454 (1982).

² Secretaries Guidelines for River Areas, at 39459. WSRA and the Secretaries’ Guidelines for River Areas use the terms “carrying capacity” and “user capacity” interchangeably.

The U.S. Court of Appeals for the Ninth Circuit (Ninth Circuit) has interpreted these mandates to mean that a comprehensive river management plan “must deal with or discuss the maximum number of people that can be received” in the river area, and that the NPS must “adopt specific limits on user capacity” that “describe an actual level of visitor use that will not adversely impact” river values.³ The *Tuolumne River Plan* has been developed to be consistent with WSRA and the Secretaries’ Guidelines for River Areas, as interpreted by judicial opinions.

Process to Address User Capacity

Addressing user capacity is an integral part of the overall comprehensive river planning process (Haas 2002). Development of the *Tuolumne River Plan* included several steps to determine the kinds and amounts of visitor and other public use that the Tuolumne River could sustain without adverse impact on river values. Figure 6-1 presents a summary of the planning process as it relates to addressing user capacity. A more detailed explanation of each step in the process follows.

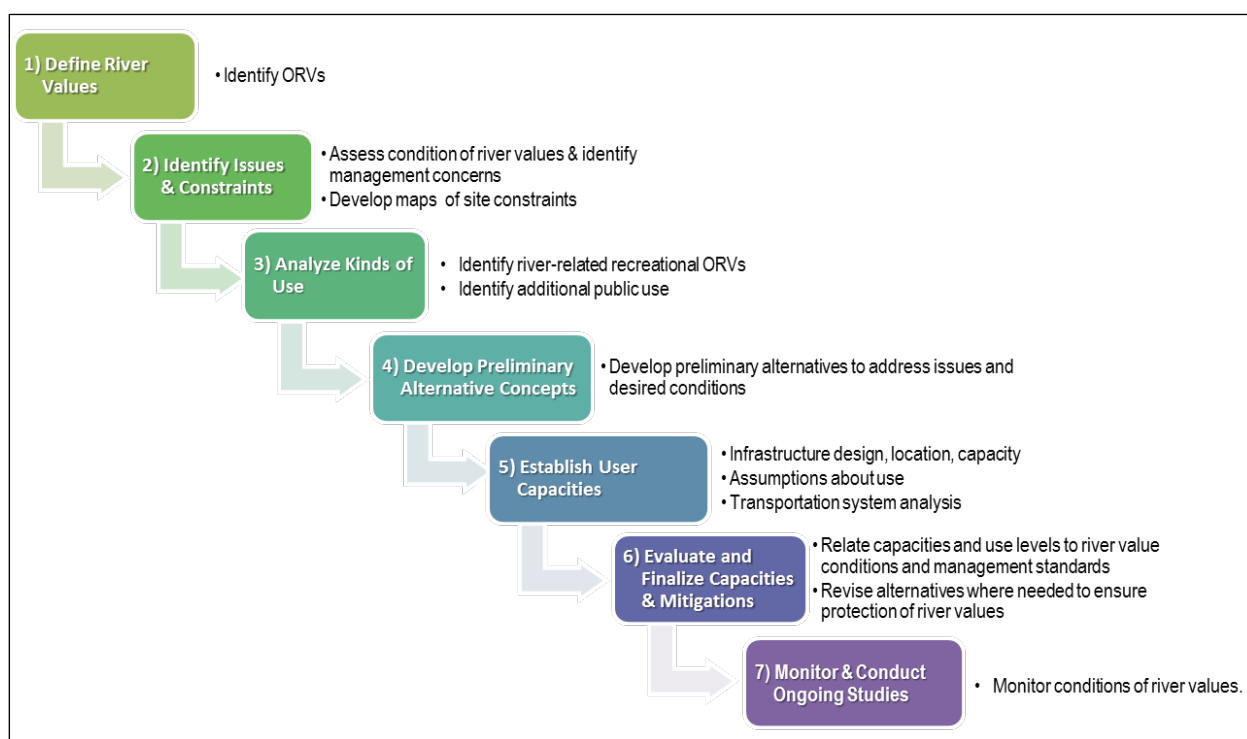


Figure 6-1. Planning Process and Addressing User Capacity.

Step 1. Define River Values

The first step in the overall river planning process is identifying the river’s outstandingly remarkable values. These values, along with preserving water quality and the river’s free-flowing condition, are the foundational elements of the *Tuolumne River Plan*. Public use, and the facilities to support that use, must not adversely affect these values. This step in the process includes developing detailed maps to illustrate the location and extent of the river values to be protected. This information is provided in “Chapter 5: River Values and Their Management” (see figure 5-1).

3 *Friends of Yosemite Valley v. Kempthorne*, 520 F.3d 1024 (Ninth Circuit 2008).

Step 2. Identify Issues and Constraints

For the second step, the NPS documented the baseline condition of the river values to be protected. This included a comprehensive review of existing research and monitoring information, as well as a targeted investment in additional research needed to provide a comprehensive assessment. An important component of this assessment, presented in chapter 5, is identifying the extent to which visitor use is affecting river values. Existing data were also used to develop maps of physical site constraints (see chapter 7, figure 7-3) to guide the next steps of the planning process. Choices on facility locations and infrastructure design were guided by the location of outstandingly remarkable values, wetlands, floodplains, archeological sites, rare plants, and other important resource and financial considerations, such as water quantity and quality, costs, and operational logistics. The baseline assessment, understanding of visitor use impacts, and overlays of important resource considerations were used by the planning team to generate a comprehensive list of management issues that needed to be addressed by the plan to improve conditions in the Tuolumne River corridor and ensure the protection of river values. These issues are summarized in chapter 5 and in appendix A.

Step 3. Analyze Kinds of Use

Under WSRA, the NPS is to provide for public use and enjoyment of river areas in a manner that is consistent with the protection and enhancement of river values. The NPS may also provide for other types of uses if such uses are protective of river values and do not substantially interfere with public use and enjoyment of river values.⁴

Recreational use is the most significant subset of public use that occurs in the Tuolumne River corridor (administrative use to support recreational use and resource protection is another use, also addressed below). The Secretaries' Guidelines for River Areas further divide recreational use into the categories of "primary" and "secondary." Primary recreational activities are those that involve direct contact with the water, while secondary activities occur on the shore. Outstandingly remarkable recreational values may include both primary and secondary uses but must also be rare, unique, or exemplary at a regional or national scale. Recreational and other public uses that do not meet the definition of an outstandingly remarkable value are permitted under the WSRA and Secretaries' Guidelines for River Areas so long as those uses do not substantially interfere with the use and enjoyment of outstandingly remarkable values and other river values. Thus, depending on the setting, the public use associated with the recreational outstandingly remarkable value may only be a small component of overall recreational and other public use in the river corridor.

During plan initiation and scoping, NPS planners asked the public to describe what they liked to do in the Tuolumne River corridor and which facilities and services these activities would require. The resulting public scoping report (NPS 2006m) provided important feedback to the NPS regarding the level of public interest in different activities. This information gave planners a better sense of the uses that members of the public would like to preserve as well as uses that the public preferred to see be reduced or restricted. Planners also conducted visitor surveys and studies to understand use patterns and reviewed the findings of social research completed for similar settings for its relevance to the Tuolumne River (Littlejohn et al. 2005; Le et al. 2008). This effort provided additional insight into the types of activities and experiences visitors preferred. Finally, NPS planners compiled information on the historic, current, and projected levels of visitor use at Tuolumne Meadows and along the Tuolumne River (DEA 2007; NPS 2008d; NPS 2008e; NPS 2009c; and NPS 2009e). Appendix G (and to some extent, chapter 7) provide more detail on the existing kinds and amounts of visitor use occurring in Tuolumne Meadows.

4 Secretaries Guidelines for River Areas, at 39456.

Step 4. Develop Preliminary Alternative Concepts

Based upon legal requirements, management issues, resource constraints, and public comments identified during the previous steps, NPS planners developed a set of preliminary alternative concepts. These concepts were designed to protect and enhance river values by specifying the kinds and amounts of use that could occur while meeting the established management standards for each outstandingly remarkable value (which are discussed in more detail in chapter 5):

A) Indicators and Management Standards

For each river value, Yosemite National Park scientists identified at least one, and as many as three, indicators and management standards. As explained in chapter 5, an indicator is a quantifiable measure of resource conditions that the NPS will periodically measure and monitor as representative of the condition of the river value. A management standard is the desired condition of the river value. If the indicator measurement falls below the level of the management standard, then specific management actions (including, where appropriate, adjustments to user capacity) will be taken to address the situation to ensure that the river value is protected and enhanced and any deterioration of condition is arrested before the river value experiences any adverse impact or degradation. In addition, for each river value, specific quantifiable definitions of adverse impact and degradation have been established, and triggers for management action have been set at points well before such conditions are reached to ensure that all river values are protected and enhanced. (For definitions of adverse impact and degradation in the context of the *Tuolumne River Plan*, please see chapter 5, pages 5-14 and 5-15.)

B) Management Actions to Protect and Enhance River Values

For each outstandingly remarkable value (see chapter 5, pages 5-2 through 5-7), the NPS specified a series of management actions to ensure that the river values were protected and enhanced, as well as a set of triggers to compel management action if the condition of a river value begins to decline.

As the Ninth Circuit has noted, the WSRA “does not mandate one particular approach to user capacity.”⁵ In a river environment as diverse and dynamic as the Tuolumne, no single approach can be used to successfully address all issues. Rather, a suite of management strategies and tools is the most effective approach. These include actions such as providing visitors with information and education; establishing and enforcing regulations on visitor activities such as group size limits; manipulating sites and designing infrastructure to accommodate use, such as trails or boardwalks; implementing restrictions on use levels and access, such as trailhead quotas for backcountry use; and many other management activities. The management strategies and tools employed to protect and enhance river values differ among the alternatives presented in chapter 7.

Step 5. Establish User Capacities

The next step in the process involved the establishment of user capacities for each alternative. These calculations varied depending on the type of use considered: overnight visitor, day visitor, and administrative use.

- **Overnight use.** This category includes people who stay in a campsite in the Tuolumne Meadows campground, in a guest tent cabin at the Tuolumne Meadows Lodge or the Glen Aulin High Sierra Camp, or who backpack in the Yosemite Wilderness.

⁵ *Friends of Yosemite Valley, Mariposans for Environmentally Responsible Growth v. Dirk Kempthorne et al.*, Opinion, March 27, 2008, 520 F.3d 1024 (Ninth Circuit 2008).

Overnight use levels are expressed in terms of the maximum occupancy of all camping, lodging, and wilderness zones for a given night. This represents the total number of people per night.

Based on past use rates, overnight lodging, campsites, and wilderness trailhead quotas will not generally be used to full capacity. Only the maximum capacities are presented in chapter 7 and analyzed in “Chapter 8: Affected Environment and Environmental Consequences.”

- **Day use.** This category includes people who come for the day to sightsee, hike, or pursue other activities and spend the night outside the river corridor. Much of this use is concentrated in the Tuolumne Meadows and Lower Dana Fork segments, although day visitors also hike into wilderness segments that can be reached on a day hike from Tuolumne Meadows or below O’Shaughnessy Dam. This category also includes people passing through on the Tioga Road who make a brief stop at Tuolumne Meadows or at the roadside pullouts between Tuolumne Meadows and Tioga Pass.

Day use capacities are expressed in terms of parking spaces and the corresponding number of “people at one time,” which refers to the total number of people at a single point in time within a specified area. For parking, this would be the total number of cars parked at any given point in time multiplied by the estimated average number of people per vehicle.

The calculation of day use capacity is based on people at one time and represents the number of people who can be received in the corridor at one time without adverse impact on river values and without substantial interference with public use and enjoyment of those values.⁶

- **Administrative use.** This category includes NPS, park concessioner, park partner, and volunteer personnel. Specific examples of NPS, park partner, and volunteer administrative uses include the trail crews, maintenance, resource protection, university research activities, commercial delivery, and visitor service personnel. Specific examples of concessioner uses include the employees who staff the lodge, campground, visitor center, store, grill, and stables at Tuolumne Meadows.

In the alternatives presented in chapter 7, administrative use levels are expressed in terms of the number of employees housed in the river corridor because this use has the highest per capita water demand and the most extensive footprint on the land. (Most of the other administrative uses are minimal and would not have a measureable effect on other public use).

Step 6. Evaluate and Finalize Capacities and Mitigations

After deriving the maximum user capacities for each alternative, NPS planners evaluated these capacities against the management standards for all river values to be sure the levels of use proposed would be consistent with protecting river values. Where capacities posed concerns, adjustments were made to the alternatives to ensure that the use permitted under each alternative would allow NPS to meet the management standards established for the outstandingly remarkable values. Planners then drafted the alternatives, specifying in each the final maximum capacities along with related management actions. The user capacity elements of each alternative are summarized later in this chapter.

⁶ The calculations do not take account of the turnover of parking spaces because some day visitors leave and are replaced by other day visitors. Thus, it does not provide an estimate of the total number of unique daily visitors who can be received in the river corridor. No data are currently available from which a reliable estimate could be calculated.

Step 7. Monitor and Conduct Ongoing Studies of River Values

The final step in the process to address user capacity includes measuring and monitoring the condition of river values. While NPS planners designed each alternative to protect and enhance river values (for example, moving parking away from the meadow, restoring informal trails, and relocating some infrastructure outside of the river's 100-year floodplain), it is impossible to predict every possible impact from visitor use. Regardless of the kinds and amounts of use and related management actions specified in a plan, some degree of impact might still occur over time (Cole 1990; Cole and Stankey 1997; Marion 1998; Hammit and Cole 1998; Cole et al. 2005, Manning 2007, McCool et al. 2007). It is therefore important to monitor conditions to ensure that any impacts associated with visitor and other public use do not cause any adverse impacts or degradation of river values and that river values are protected and enhanced.

This step resulted in various adjustments in management to protect river values, including changes to infrastructure to reduce capacity or additional mitigation measures that will ensure river values are protected and enhanced under any given capacity. For more information on the monitoring and study of river conditions refer to chapter 5, which contains a comprehensive discussion of the monitoring program for the Tuolumne Wild and Scenic River.

Factors Limiting User Capacity

This section discusses the factors used to establish the overall maximum amounts of use that may be provided in the Tuolumne River corridor without adverse impact on river values. In determining maximum user capacity for each alternative, planners must take into account existing constraints that could affect such use. For example, visitor services and employee housing require water withdrawals from the river, and the amount of water that can be withdrawn from the river is limited by the need to ensure free-flowing conditions and the health of downstream ecosystems. Therefore, potential limitations on the water supply must be taken into account. Under the WSRA and it implementing Secretaries' Guidelines for River Areas, the NPS must specify the number of people who can be received in the river corridor consistent with the protection and enhancement of outstandingly remarkable values. This is the "maximum user capacity" for the river corridor.

Some alternatives would allow more people to visit the area, and some would allow fewer. These differing use levels reflect differing visions of providing a visitor experience in the Tuolumne River corridor; these visions are based in large part on public comment received in the scoping phase of this process. Some of these visions introduce other restrictions on user capacity that reduce the use levels under an alternative. For example, alternative 1 envisions a visitor experience characterized by self-reliance and close experience with the river and the wilderness. As a result, the total number of people allowed in the meadows at any one time would be low to allow visitors opportunities for solitude and quiet reflection envisioned with alternative 1. The level of visitor use under alternative 1 would be substantially less than that allowed under the no-action alternative or the other action alternatives (see table 6-2, below).

Depending on the alternative, the maximum user capacity of the Tuolumne River corridor will be limited by the following several factors:

- **Constraints on the level of development.** The level of development and related facilities that can be provided in the Tuolumne River corridor is constrained by wilderness designation and by river segment classifications under WSRA. More than 90% of the Tuolumne flows through federally designated wilderness, which is described by the Wilderness Act as "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation" (16 *United States Code* [USC] 1131-1136, section 2c). Similarly, the river classifications contained in WSRA pose

restrictions on the level of development appropriate in river segments. The majority of the Tuolumne River corridor is classified as wild (generally coinciding with the areas also protected by wilderness designation). Only the Tuolumne Meadows area and the area below O'Shaughnessy Dam are classified as scenic (see river classifications in "Chapter 3: Wild and Scenic River Corridor Boundaries and Segment Classifications"). According to the WSRA, a scenic river segment contains shorelines largely undeveloped but accessible in places by roads. Collectively, these designations pose constraints on the level of development and infrastructure that may be provided in the river corridor and thus have a direct effect on the kinds and amounts of use that may be accommodated.

- **Resource constraints and site suitability.** These constraints include topography, meadow and riparian areas, rare and sensitive plant and animal populations, scenic vista points, and cultural resource sites (see figure 7-3 in chapter 7 for a map of these constraints). Generally, planning for visitor use and access to the river corridor seeks to avoid these sensitive resource areas to prevent unacceptable impacts. For instance, the parking associated with Cathedral Lakes trailhead along Tioga Road is constrained by several factors, including its effect on the edge of the meadow, runoff from Budd Creek, high scenic visibility, cultural resources, and safety concerns associated with passing traffic and pedestrians. Considering these factors, the *Tuolumne River Plan* proposes various alternatives to provide this parking in a less sensitive location. Alternative locations for this parking are further constrained by topography and the various site constraints found within the Tuolumne Meadows area.
- **Water consumption.** A key limiting factor to user capacity in the scenic segment of the river in Tuolumne Meadows is the availability of water. Water for Tuolumne Meadows is drawn directly from the Dana Fork of the Tuolumne upstream from Tuolumne Meadows Lodge. A minimum flows study (Waddle and Holmquist 2011) found that 60,000 gallons to 70,000 gallons of water per day can be withdrawn before negative impacts on aquatic species occur. Water demand is primarily associated with overnight accommodations, camping, and employee housing (see water demand calculations below and in chapter 7). Alternative 2 provides for the highest use levels of the action alternatives, which correspond to water withdrawals of approximately 70,000 gallons of water per day. The capacity associated with this alternative is a maximum of 4,325 day and overnight people at one time in Tuolumne Meadows.
- **Wilderness experience.** As described by the recreational outstandingly remarkable values, outdoor recreation opportunities in the Tuolumne River corridor are primarily oriented toward wilderness, where solitude and closeness to nature shape the experience. Too many other visitors can potentially reduce a visitor's ability to obtain these wilderness experiences along the river corridor and, therefore, might have a limiting effect on the amount of use that could be provided. Therefore, for the wilderness segments of the Tuolumne, the key constraint for user capacity is the recreational outstandingly remarkable value where wilderness-related recreation and opportunities for solitude experiences are emphasized. In these segments, use levels will be maintained at levels where encounters with other hiking groups would be at or below 10 groups per hour 80% of the time sampled.

The capacities proposed in the plan are within the constraints discussed above because all site constraints were factored into the development of each alternative. No alternative would remove more water from the Dana Fork than the minimum flows allow, and the anticipated wilderness encounter rates in every alternative would allow many opportunities to obtain solitary experiences.

Determining Alternative User Capacities

To address user capacity, all aspects of use and the effects of use on river values must be considered, including seasonal variation in conditions and the construction of infrastructure such as boardwalks to prevent resource damage. For example, alternative 2 provides for an increase over current use. Alternative 2 therefore requires additional of infrastructure and river protection measures (like boardwalks in parts of the meadows), whereas alternative 1 provides for a decrease from current use and includes much less infrastructure. Accordingly, each alternative emphasizes different factors, depending on the mix of use and related management actions proposed. However, each of the alternatives is protective of river values. A summary of each alternative's proposed user capacity is described in the Alternative User Capacities section below.

Alternative User Capacities

This section provides a summary of the proposed user capacities for each alternative analyzed in this environmental impact statement, including a description of the kinds and amounts of use each alternative would provide as well as the actions necessary to protect river values from these uses over time. The implications of the proposed capacities and related management actions are also discussed. Readers can refer to chapter 7 for a more detailed description of the user capacities and associated management actions contained in each plan alternative, including actions common to all alternatives to protect river values.

No-Action Alternative

As described in chapter 7, the no-action alternative provides a baseline from which to compare the environmental and other impacts of the action alternatives proposed in this environmental impact statement. For user capacity, this includes the current kinds and amounts of use available in the Tuolumne River corridor. These are summarized briefly below, while a more complete discussion of the kinds and amounts of use can be found in the Affected Environment section of chapter 8.

Summary of the Kinds and Amounts of Use

Current use of the Tuolumne River is oriented toward the wilderness values that are prevalent in significant portions of the river corridor. Recreational activities include day hiking, backpacking, camping, swimming, fishing, stock trips and day rides, interpretive and educational programs, rock climbing, and other similar activities. Current capacities are presented in table 6-1, below.

Table 6-1.
Maximum User Capacity, No-Action Alternative

Overnight Capacity		
Location	Overnight Capacities	Maximum Number of People per Night
Tuolumne Meadows Lodge	69 units	69 units × 4 people/unit = 276 people per night
Tuolumne Meadows campground	304 campsites, plus 7 group sites	304 campsites × 6 people/site = 1,824; plus 7 group sites × 30 people/site = 210; for a combined total of 2,034 people per night
Glen Aulin High Sierra Camp	8 tent cabins	8 cabins × 4 people per cabin = 32 people per night
Wilderness above Hetch Hetchy Reservoir	350 person capacity	# of people per wilderness zone (350)
Wilderness below O'Shaughnessy Dam	50 person capacity	# of people per wilderness zone (50)
Subtotal, Overnight		2,742 people
Day Use Capacity		
Location	Day Use Capacities	Maximum Number of People at One Time
Private vehicle access at Tuolumne Meadows ^a	530 parking spaces	530 parking spaces × 2.9 people/vehicle = 1,537 people
Bus riders to Tuolumne Meadows	5 buses	5 buses × 45 people/bus = 225 people
Access from below O'Shaughnessy Dam	4 spaces	4 parking spaces × 2.9 people/vehicle = 12 people
Subtotal, Day Use		1,774 people
Administrative Capacity		
Existing Use Calculation		Maximum Number of Employees
Approximately 9 concessioner employees based at Glen Aulin High Sierra Camp		9
Approximately 150 NPS employees based at Tuolumne Meadows		150
Approximately 103 concessioner employees based at Tuolumne Meadows		103
Subtotal, Administrative Use		262 people
GRAND TOTAL		4,778 people

a The peak number of vehicles observed during vehicle counts in 2011 (observed on August 13, 2011).

Abbreviation: NPS = National Park Service

Alternative 1: Emphasizing a Self-Reliant Experience

As explained in detail in chapter 7, alternative 1 would significantly reduce the kinds and amounts of use that would be allowed in the Tuolumne River corridor in an attempt to increase opportunities for self-reliant recreational experiences. The emphasis on self-reliance means that visitors would need to come prepared for their wilderness excursion and not have additional facilities and services readily available in Tuolumne Meadows to support their activities. For example, the store and grill, gas station, and Tuolumne Meadows Lodge would all be removed under this alternative.

Summary of the Kinds and Amounts of Use

The kinds of use under alternative 1 would include hiking, camping, backpacking, fishing, swimming, and rock climbing, and other similar activities. Under this alternative, all commercial visitor services, including lodging at Glen Aulin High Sierra Camp and the Tuolumne Meadows Lodge, would be removed along with concessioner stock day rides for visitors and commercial outfitter hiking and stock trips.

Based on the existing constraints in the Tuolumne River corridor and the kinds and amounts of used prescribed for this alternative, the maximum user capacity for alternative 1 is calculated at 3,167 people (table 6-2).

Table 6-2.
Maximum User Capacity, Alternative 1

Visitor Overnight Capacity		
Location	Overnight Capacities	Maximum Number of People per Night
Tuolumne Meadows Lodge	0 units	0 units × 4 people/unit = 0 people per night
Tuolumne Meadows campground	237 campsites, plus 7 group sites	237 campsites × 6 people/site = 1,422, plus 7 group sites × 30 people/site = 210, for a combined total of 1,632 people per night
Glen Aulin High Sierra Camp	0 tent cabins	0 cabins × 4 people per cabin = 0 people per night
Wilderness above Hetch Hetchy Reservoir	350 person capacity	# of people per wilderness zone (350)
Wilderness below O'Shaughnessy Dam	50 person capacity	# of people per wilderness zone (50)
Subtotal, Overnight		2,032 people
Visitor Day Use Capacity		
Type of Access	Day Use Capacities	Maximum Number of People at One Time
Private vehicle access from Tuolumne Meadows	305 spaces	305 parking spaces @ 90% occupancy ^a × 2.9 people/vehicle = 796 people
Bus riders to Tuolumne Meadows	5 buses	5 buses × 45 people/bus = 225 people
Private vehicle access from below O'Shaughnessy Dam	4 spaces	4 parking spaces × 2.9 people/vehicle = 12 people ^b
Subtotal, Day Use		1,033 people
Administrative Capacity		
Proposed Action	Units (Beds)	Maximum Number of Employees
Remove concessioner employees at Glen Aulin	0 beds	0
Meet NPS staffing need with 100 employees at Tuolumne Meadows	100 beds	100
Meet concessioner staffing need with 2 employees at Tuolumne Meadows	2 beds	2
Subtotal, Administrative Use		102 people
GRAND TOTAL		3,167 people

a The 90% factor is applied to account for the vacancy of a percentage of parking spaces after visitors leave and before new visitors find the empty spaces.

This is applied as the maximum capacity because no single parking area is feasibly used to 100% efficiency.

b Because the parking lot at Poopenaut Valley is so small, using the 90% figure is inappropriate because all empty stalls can be seen by a typical driver.
Abbreviation: NPS = National Park Service

Management of User Capacity

Visitor Overnight Use. Levels of overnight use in wild segments would continue to be managed through a system of zone capacities and related overnight trailhead quotas under alternative 1. The NPS would retain oversight of these and other concessioner activities. Overnight use levels in the scenic segment at Tuolumne Meadows would be managed by the facility capacity of the campground. Some campsites would continue to be available through a reservation system and some on a first-come, first-served basis.

Visitor Day Use. Day use levels would be managed by controlling day parking, which would be restricted to paved or otherwise authorized spaces. No undesignated roadside parking would be allowed through the Tuolumne Meadows area. Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows. Service levels of public transportation systems serving the Tuolumne Meadows area (the regional transit bus service, Yosemite Area Regional Transit Service [YARTS]) would remain under NPS control, with the number of visitors delivered into the corridor by such services managed according to the user capacity limits established for alternative 1. NPS may use any combination of limits on the numbers of buses, the stops they make, the number of passengers they accept, and/or the numbers of routes they run per day.

Administrative Use. Commensurate with the discontinuation of commercial services, the number of NPS and concessioner employees would be reduced. The levels of administrative use would be managed through the

allocation of housing in the Tuolumne Meadows area. Housing would be maintained at the levels specified in alternative 1.

Actions to Protect River Values given the Kinds and Amounts of Use in Alternative 1

Under alternative 1, river values would be protected based on the kind and amounts of use proposed because the associated capacities would be within the constraints for water consumption. Further, the following describes the actions that would ensure use would not adversely affect river values over time (see chapter 5 for a comprehensive listing of river protection measures; see chapter 7 for specific management actions associated with alternative 1).

Free-Flowing Condition of the River

As noted in chapter 5, the existing average water withdrawals of 60,000 to 70,000 gallons per day meet the standard of being at or below 10% of low flow (1 cubic foot per second). As shown in table 6-3, alternative 1 would reduce the estimated average water demand by approximately 44% due to reduced amounts and types of use, particularly overnight visitor use and employee housing. The average estimated water demand for alternative 1 is calculated as about 36,000 gallons per day, as shown in table 6-3. Based on these calculations, alternative 1 would be protective of river flow and downstream habitat. Even in years where low-flow durations occurred earlier in the summer, withdrawal levels would be well within the standard of no more than 10% of low flows presented in chapter 5.

Table 6-3.
Summary of Average Estimated Water Demand at Tuolumne Meadows, Alternative 1

Location	Current consumption per unit	Current consumption (gpd)	Alternative 1 consumption (gpd)
Campsites	100 gallons/site/day	30,400 gpd (304 sites)	23,700 gpd (237 sites)
Group Campsites	500/gallons/site/day	3,500 gpd (7 sites)	3,500 gpd (7 sites)
RV dump	50 gallons/use/day	1,600 gpd (32 dumps)	1,600 gpd (32 dumps)
Tuolumne Meadows Lodge	30 gallons/person/day	8,280 gpd (276 guests)	0
NPS housing	50 gallons/employee/day	5,200 gpd (104 employees)	5,000 gpd (100 employees)
Concessioner housing	50 gallons/employee/day	5,150 gpd (103 employees)	100 gpd (2 employees)
Cafeteria meals (two per concessioner employee)	6 gallons/person/day	1,236 gpd (206 meals)	0
Store/grill/fuel station	5 gallons/person/day	5,740 gpd (1,148 visitors)	0
Visitor center	5 gallons/visitor/day	3,035 gpd (607 visitors)	2,064 gpd (413 visitors)
Total		64,141 gpd	35,964 gpd

Abbreviations: gpd = gallons per day; NPS = National Park Service; RV = recreational vehicle

Management to Protect Water Quality

Reducing water withdrawals would reduce the amount of wastewater to be treated and disposed by nearly half, which would allow for the elimination of the wastewater ponds and sprayfields on the north side of Tioga Road and the crushing or removing of the wastewater line that runs beneath the river and the meadow. Further reductions in risks to water quality would be achieved by eliminating the fuel storage associated with the public fuel station and greatly reducing the size of the concessioner stable operation. Monitoring (detailed in chapter 5) would be ongoing to ensure that water quality remained excellent.

Management to Protect the Subalpine Meadow and Riparian Complex

Most of the actions to protect and enhance the subalpine meadow and riparian complex would be common to all the action alternatives. Alternative 1 would additionally reduce the maximum people at one time in the Tuolumne Meadows area by an estimated 34% (from a current maximum capacity of 4,778 users to a maximum capacity of 3,167 users) to reduce the effects of foot traffic. Although visitors would be allowed relatively unconfined access to the meadows and the river, the reduction in visitor numbers would be expected to keep impacts the associated with visitor use within the protective standard.

These actions would be expected to reduce the stresses on the subalpine meadow and riparian system and increase their ecological resistance to the kinds and levels of use that would continue. Conditions would be monitored to ensure that the protective management standards for meadow and riparian habitat would be achieved and maintained over time. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as identified in chapter 5.

Management to Protect Archeological Sites

Management of visitor use for alternative 1 would also reduce impacts on archeological sites in the Tuolumne Meadows and Lower Dana Fork segments. The NPS would conduct monitoring to ensure that site disturbance did not exceed the protective standard established for these sites. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as described in chapter 5.

Management to Protect and Enhance Scenic Values

Scenic views and viewpoints in the Tuolumne Meadows area and along the Tioga Road corridor would be protected and enhanced by managing unnatural features related to visitor and administrative use, such as facilities and parked cars, to minimize their intrusion into remarkable views.

Management to Protect and Enhance the Wilderness Experience along the River

Day use levels along trails in wild segments of the river corridor but within reach of a day hike from Tuolumne Meadows would be restricted to levels that resulted in encounters with no more than four other parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends. If required to achieve this standard, a day use trailhead quota system would be implemented for some trails under alternative 1. This management would protect visitors' opportunity to experience solitude throughout the wild segments of the river corridor, even on a day hike from Tuolumne Meadows. The wilderness experience would be enhanced by eliminating commercial stock use in the river corridor.

Alternative 2: Expanding Recreational Opportunities

As explained in greater detail in chapter 7, alternative 2 would expand the kinds and amounts of use within the constraints described above and using the measures to protect river values listed below. This alternative presents the highest use levels that may be accommodated across the range of action alternatives. The primary constraint to capacity with alternative 2 would be the consumption and treatment of water (as described below).

Summary of the Kinds and Amounts of Use

The various kinds of use proposed under alternative 2 would remain the same as are currently provided, with the addition of allowing limited private boating down the Grand Canyon of the Tuolumne. Additional opportunities for walk-in camping at the Tuolumne Meadows campground and picnic areas would be

expanded for day visitors with this alternative. Designated day parking would be increased and consolidated in resource appropriate areas that are protective of river values.

Based on the kinds and amounts of used prescribed for this alternative and consideration of the constraints described earlier in this chapter, the maximum user capacity for alternative 2 is calculated at 5,187 people (see table 6-4).

Table 6-4.
Maximum User Capacity, Alternative 2

Overnight Capacity		
Location	Overnight Capacities	Maximum Number of People per Night
Tuolumne Meadows Lodge	69 units	69 units × 4 people/unit = 276 people per night
Tuolumne Meadows campground	345 campsites, plus 7 group sites	345 campsites × 6 people/site = 2,070, plus 7 group sites × 30 people/site = 210, for a combined total of 2,280 people per night
Glen Aulin High Sierra Camp	8 tent cabins	8 cabins × 4 people per cabin = 32 people per night
Wilderness above Hetch Hetchy Reservoir	350 person capacity	# of people per wilderness zone (350)
Wilderness below O'Shaughnessy Dam	50 person capacity	# of people per wilderness zone (50)
Subtotal, Overnight		2,988 people
Day Use Capacity		
Type of Access	Day Use Capacities	Maximum Number of People at One Time
Private vehicle access from Tuolumne Meadows	642 spaces	642 parking spaces @ 90% occupancy ^a × 2.9 people/vehicle = 1,676 people
Bus riders to Tuolumne Meadows	5 buses	5 buses × 45 people/bus = 225 people
Private vehicle access from below O'Shaughnessy Dam	4 spaces	4 parking spaces × 2.9 people/vehicle = 12 people ^b
Subtotal, Day Use		1,913 people
Administrative Capacity		
Proposed Action	Units (Beds)	Maximum Number of Employees
Meet concessioner staffing need at Glen Aulin High Sierra Camp	9 beds	9
Meet NPS staffing need at Tuolumne Meadows	174 beds	174
Meet concessioner staffing need at Tuolumne Meadows	103 beds	103
Subtotal, Administrative Use		286 people
GRAND TOTAL		5,187 people

a The 90% factor is applied to account for the vacancy of a percentage of parking spaces after visitors leave and before new visitors find the empty spaces.

This is applied as the maximum capacity because no single parking area is feasibly used to 100% of its capacity.

b Because the parking lot at Poopenaut Valley is so small, using the 90% figure is inappropriate, as all empty stalls can easily be seen by a typical driver.

Abbreviation: NPS = National Park Service

Management of User Capacity

Visitor Overnight Use. Levels of overnight use in wild segments of the Tuolumne River corridor would continue to be managed through a system of zone capacities and related overnight trailhead quotas. In the wild segment below Tuolumne Meadows, recreational whitewater boating would be allowed and regulated through a permit system. The Glen Aulin High Sierra Camp would continue to be managed by a concession contract, with spaces allocated on an advanced reservation system. The NPS would retain oversight of these and other concessioner activities. Overnight use levels in the scenic segment of the river corridor under alternative 2 would be managed by the facility capacities of the Tuolumne Meadows campground and Tuolumne Meadows Lodge. These facilities would continue to be available through a reservation system, with some campsites also available on a first-come, first-served basis.

Visitor Day Use. Day use levels would be managed by controlling day parking, which would be restricted to paved or otherwise authorized spaces. No undesignated roadside parking would be allowed through the

Tuolumne Meadows area. Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows. Service levels of public transportation systems serving the Tuolumne Meadows area (YARTS, the hiker bus operated by the concessioner, and other transit services) would remain under NPS control, with the number of visitors delivered into the corridor by such services managed according to the user capacity limits established for alternative 2. The NPS may use any combination of limits on the numbers of buses, the stops they make, the number of passengers they accept, and/or the numbers of routes they run per day.

Administrative Use. NPS staffing would be increased to provide for increased visitor and resource protection needs (including management of the user capacity program, below), additional interpretive and educational services, resource management and monitoring, and maintenance. NPS employee housing or campsites would be increased to accommodate this staffing level; campsites would meet the need for incidental housing for employees on temporary duty in the Tuolumne Meadows area. Concessioner employee staffing and housing necessary to support commercial services would remain the same as under the no-action alternative. All housing would be maintained at the levels specified in alternative 2.

Actions to Protect River Values given the Kinds and Amounts of Use in Alternative 2

Alternative 2 would expand the kinds and amounts of use in the Tuolumne River corridor but would maintain uses within the constraints and management actions to protect river values described below. See chapter 5 for a comprehensive list of river protection measures, and see chapter 7 for a complete list of all management actions associated with alternative 2.

Free-Flowing Condition of the River

So long as Tuolumne River low flows remained around 1 cubic foot per second, and assuming the current timing and duration of low flows, average water withdrawals of 60,000 to 70,000 gallons per day would fall within the margin of error for meeting the standard of being at or below 10% of low flow. The average estimated water demand for alternative 2 is calculated as about 70,000 gallons per day, as shown in table 6-5. Intensive management effort, including water metering, replacing inefficient fixtures, and implementing educational programs, would be required to ensure that water use remained within the standard. If low-flow durations occurred earlier in the summer, alternative 2 would have the greatest potential for requiring reductions in service, including reducing the capacities at the Tuolumne Meadows Lodge and/or campground, to ensure that the level of water consumptions remained protective of river flows.

Table 6-5.
Summary of Average Estimated Water Demand at Tuolumne Meadows, Alternative 2

Location	Current consumption per unit	Current consumption (gpd)	Alternative 2 estimated consumption (gpd)
Campsites (drive-in)	100 gallons/site/day	30,400 gpd (304 sites)	30,400 (304 sites)
Campsites (walk-in)	50 gallons/site/day	0	2,050 gpd (41 sites)
Campsites (group)	500 gallons/site/day	3,500 gpd (7 sites)	3,500 gpd (7 sites)
RV dump	50 gallons/use/day	1,600 gpd (32 dumps)	1,600 gpd (32 dumps)
Tuolumne Meadows Lodge	30 gallons/person/day	8,280 gpd (276 guests)	8,280 gpd (276 guests)
Shower house	10 gallons/person/shower	0 gpd	350 gpd (35 showers)
NPS housing	50 gallons/employee/ day	5,200 gpd (104 employees)	7,200 gpd (144 employees)
	25 gallons/employee/day in campsites	0 gpd	500 gpd (30 employees in campsites)
Concessioner housing	50 gallons/employee/day	5,150 gpd (103 employees)	5,150 gpd (103 employees)
Cafeteria meals (two per concessioner employee)	6 gallons/person/day	1,236 gpd (206 meals)	1,236 gpd (206 meals)
Store/grill/ fuel station	5 gallons/person/day	5,740 gpd (1,148 visitors)	6,257 gpd (1,251 visitors)
Visitor center	5 gallons/visitor/day	3,035 gpd (607 visitors)	3,308 gpd (662 visitors)
Total		64,141 gpd	70,081 gpd

Abbreviation: gpd = gallons per day; NPS = National Park Service; RV = recreational vehicle

Management to Protect Water Quality

Risks to water quality in the Tuolumne Meadows area under alternative 2 would be mitigated by upgrading the wastewater treatment plant, wastewater ponds, and sprayfields. The improved utilities would be designed for loads commensurate with the estimate of domestic water use noted in table 6-5. Risks to water quality at Glen Aulin would be reduced by removing the current wastewater treatment system and leach mound and replacing it with a new composting toilet. Water used for meal preparation and sanitation would be screened before disposal in a wastewater sump. Monitoring would be ongoing (as described in chapter 5) to ensure that water quality remained excellent at both Tuolumne Meadows and Glen Aulin.

Management to Protect the Subalpine Meadow and Riparian Complex

Most of the actions to protect and enhance the subalpine meadow and riparian complex would be common to all the action alternatives. Although use levels could be higher, alternative 2 would direct visitors to designated trails and delineate or fence certain trail segments to facilitate ecological recovery of adjacent vegetation.

Management to Protect Archeological Sites

The same management of visitor use described above would also reduce impacts on archeological sites in the Tuolumne Meadows and Lower Dana Fork segments. Monitoring would be ongoing to ensure that site disturbance did not exceed the protective standard established for these sites.

Management to Protect and Enhance Scenic Values

Scenic views and viewpoints in the Tuolumne Meadows area and along the Tioga Road corridor would be protected and enhanced under alternative 2 by managing unnatural features related to visitor and administrative use, such as facilities and parked cars, to minimize their intrusion into remarkable views.

Management to Protect and Enhance the Wilderness Experience along the River

Day use levels along trails in wild segments of the river corridor but within reach of a day hike from Tuolumne Meadows would be restricted to levels that would result in encounters with no more than 10 other parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

Management to Protect and Enhance Tioga Road Access to the River through Tuolumne and Dana Meadows

Opportunities for scenic driving along Tioga Road would be enhanced under alternative 2 by eliminating roadside parking and the congestion currently caused by vehicles slowing to park and pedestrians crossing the road. Opportunities for people wishing to park and get out of their cars would be enhanced by increasing the number of designated parking spaces.

Alternative 3: Celebrating the Tuolumne Cultural Heritage

As explained in greater detail in chapter 7, alternative 3 would celebrate the cultural heritage of the Tuolumne experience by maintaining historic opportunities for recreation while providing for needed improvements to protect river values. Some restrictions on the levels of visitor services and reductions in overnight and day use capacities are proposed, although the overall traditional experience of the Tuolumne as expressed in public comments would be preserved.

Summary of the Kinds and Amounts of Use

The majority of the current kinds of use in the Tuolumne River corridor would be retained with alternative 3. However, some proposed changes could affect the kinds of use in specific areas. For example, meals-only service, wood stoves, and flush toilets would be discontinued or removed at the Glen Aulin High Sierra Camp. Similarly, concessioner day rides would be reduced.

The overnight and day use capacities would be lowered slightly with alternative 3. In particular, the overnight capacity of the Glen Aulin High Sierra Camp and Tuolumne Meadows Lodge would be reduced. Designated day parking would be increased and consolidated in resource appropriate areas that are protective of river values. Additional shuttle bus service would provide visitors with more opportunity to access their desired recreational activities in the Tuolumne Meadows area without the use of their private vehicle.

Based on the kinds and amounts of used prescribed for this alternative and consideration of the constraints described earlier in this chapter, the maximum user capacity for alternative 3 is calculated at 4,402 people (table 6-6).

Table 6-6.
Maximum User Capacity, Alternative 3

Overnight Capacity		
Location	Overnight Capacities	Maximum Number of People per Night
Tuolumne Meadows Lodge	34 units	34 units × 4 people/unit = 136 people per night
Tuolumne Meadows campground	304 campsites, plus 7 group sites	304 campsites × 6 people/site = 1,824, plus 7 group sites × 30 people/site = 210, for a combined total of 2,034 people per night
Glen Aulin High Sierra Camp	7 tent cabins	7 cabins × 4 people per cabin = 28 people per night
Wilderness above Hetch Hetchy Reservoir	350 person capacity	# of people per wilderness zone (350)
Wilderness below O'Shaughnessy Dam	50 person capacity	# of people per wilderness zone (50)
Subtotal, Overnight		2,598 people
Day Use Capacity		
Type of Access	Day Use Capacities	Maximum Number of People at One Time
Private vehicle access from Tuolumne Meadows	510 spaces	510 parking spaces @ 90% occupancy ^a × 2.9 people/vehicle = 1,331 people
Bus riders to Tuolumne Meadows	5 buses	5 buses × 45 people/bus = 225 people
Private vehicle access from below O'Shaughnessy Dam	4 spaces	4 parking spaces × 2.9 people/vehicle = 12 people ^b
Subtotal, Day Use		1,568 people
Administrative Capacity		
Proposed Action	Units (Beds)	Maximum Number of Employees
Retain all concessioner employees at Glen Aulin High Sierra Camp	9 beds	9
Meet NPS staffing need with 124 employees at Tuolumne Meadows	124 beds	124
Meet concessioner staffing need with 103 employees at Tuolumne Meadows	103 beds	103
Subtotal, Administrative Use		236 people
GRAND TOTAL		4,402 people

a The 90% factor is applied to account for the vacancy of a percentage of parking spaces after visitors leave and before new visitors find the empty spaces.

This is applied as the maximum capacity because no single parking area is feasibly used to 100% efficiency.

b Because the parking lot at Poopenaut Valley is so small, using the 90% figure is inappropriate because all empty stalls can easily be seen by a typical driver.

Abbreviation: NPS = National Park Service

Management of User Capacity

Visitor Overnight Use. Levels of overnight use in wild segments of the Tuolumne River corridor would continue to be managed through a system of zone capacities and related overnight trailhead quotas. The Glen Aulin High Sierra Camp would continue to be managed by concession contract, with spaces allocated on an advanced reservation system. The NPS would retain oversight of these and other concessioner activities. Overnight use levels in the scenic segments of the river corridor would be managed by the facility capacities of the Tuolumne Meadows campground and Tuolumne Meadows Lodge. These facilities would continue to be available through a reservation system, with some campsites also available on a first-come, first-served basis.

Visitor Day Use. Day use levels under alternative 3 would be managed by controlling day parking, which would be restricted to paved or otherwise authorized spaces. No undesignated roadside parking would be allowed through the Tuolumne Meadows area. Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows. Service levels of public transportation systems serving the Tuolumne Meadows area (YARTS, the hiker bus operated by the concessioner, and other transit services) would remain under NPS control, with the number of visitors delivered into the river corridor by such services managed according to the user capacity limits established for alternative 3. The NPS may use any combination of limits on the numbers of buses, the stops they make, the number of passengers they accept, and/or the numbers of routes they run per day.

Administrative Use. NPS staffing would be reduced under alternative 3. In addition to current housing, employee campsites would be provided to meet the need for incidental housing for employees on temporary duty in the Tuolumne Meadows area. Concessioner employee staffing and housing necessary to support commercial services would remain the same as under the no-action alternative. All housing would be maintained at the levels specified in alternative 3.

Actions to Protect River Values given the Kinds and Amounts of Use in Alternative 3

Under alternative 3, the NPS would reduce capacities while providing for traditional kinds of use in the Tuolumne River corridor. See chapter 5 for a more comprehensive list of river protection measures, and see chapter 7 for a complete list of all management actions associated with alternative 3.

Free-Flowing Condition of the River

So long as low flows remained around 1 cubic foot per second, and assuming the current timing and duration of low flows, average water withdrawals of 60,000 to 70,000 gallons per day would fall within the margin of error for meeting the standard of being at or below 10% of low flow. The average estimated water demand for alternative 3 is calculated as about 60,000 gallons per day, as shown in table 6-7. This level of water withdrawal would be expected to remain within the standard of no more than 10% of low flow.

Table 6-7.
Summary of Average Estimated Water Demand at Tuolumne Meadows, Alternative 3

Location	Current consumption per unit	Current consumption (gpd)	Alternative 3 estimated consumption (gpd)
Campsites (drive-in)	100 gallons/site/day	30,400 gpd (304 sites)	30,400 gpd (304 sites)
Campsites (group)	500 gallons/site/day	3,500 gpd (7 sites)	3,500 gpd (7 sites)
RV dump	50 gallons/use/day	1,600 gpd (32 dumps)	1,600 gpd (32 dumps)
Tuolumne Meadows Lodge	30 gallons/person/day	8,280 gpd (276 guests)	4,080 gpd (136 guests)
NPS housing	50 gallons/employee/day	5,200 gpd (104 employees)	5,200 gpd (104 employees)
	25 gallons/employee/day in campsites	0 employees in campsites	500 gpd (20 employees in campsites)
Concessioner housing	50 gallons/employee/day	5,150 gpd (103 employees)	5,150 gpd (103 employees)
Cafeteria meals (two per concessioner employee)	6 gallons/person/day	1,236 gpd (206 meals)	1,236 gpd (206 meals)
Store/grill/ fuel station	5 gallons/person/day	5,740 gpd (1,148 visitors)	5,281 gpd (1,056 visitors)
Visitor center	5 gallons/visitor/day	3,035 gpd (607 visitors)	2,792 gpd (558 visitors)
Total		64,141 gpd	59,739 gpd

Abbreviations: gpd = gallons per day; NPS = National Park Service; RV = recreational vehicle

Management to Protect Water Quality

Risks to water quality in the Tuolumne Meadows area would be mitigated by upgrading the wastewater treatment plant, wastewater ponds, and sprayfield. The improved utilities would be designed for loads commensurate with estimates of domestic water use. The risk to water quality at Tuolumne Meadows would be reduced by eliminating the fuel storage associated with the public fuel station. Risks to water quality at Glen Aulin would be reduced by removing the current wastewater treatment system and leach mound and replacing it with a new composting toilet. Monitoring (as described in chapter 5) would be ongoing to ensure that water quality remained excellent at both Tuolumne Meadows and Glen Aulin.

Management to Protect the Subalpine Meadow and Riparian Complex

Most of the actions to protect and enhance the subalpine meadow and riparian complex would be common to all the action alternatives. Alternative 3 would additionally reduce the maximum people at one time in the Tuolumne Meadows area by an estimated 9% (from an estimated maximum capacity of 4,778 visitors to a maximum capacity of 4,402 visitors). Although visitor access to the meadows and the river would not be as restricted as under alternative 2, the reduction in numbers of visitors would be expected to keep the impacts associated with visitor use within the protective standard.

Management to Protect Archeological Sites

The same management of visitor use described above would also reduce impacts on archeological sites in the Tuolumne Meadows and Lower Dana Fork segments under alternative 3. Monitoring would be ongoing to ensure that site disturbance did not exceed the protective standard established for these sites. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as described in chapter 5.

Management to Protect and Enhance Scenic Values

Scenic views and viewpoints in the Tuolumne Meadows area and along the Tioga Road corridor would be protected and enhanced by managing unnatural features associated with visitor and administrative use, such as facilities and parked cars, to minimize their intrusion into remarkable views.

Management to Protect and Enhance the Wilderness Experience along the River

Day use levels along trails in wild segments of the river corridor but within reach of a day hike from Tuolumne Meadows would be protected by restricting use to levels that resulted in encounters with no more than 10 other parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

Management to Protect and Enhance Tioga Road Access to the River through Tuolumne and Dana Meadows

Opportunities for scenic driving along Tioga Road would be enhanced under alternative 3 by eliminating roadside parking and the associated congestion currently caused by vehicles slowing to park and pedestrians crossing the road. Opportunities for people wishing to park and get out of their cars would be enhanced by increasing the number of formally designated parking spaces.

Alternative 4 (Preferred): Improving the Traditional Tuolumne Experience

As explained in greater detail in chapter 7, alternative 4 would maintain the traditional Tuolumne experience while making marked improvements to infrastructure to further connect visitors to the river while protecting its resources. The range of visitor and administrative activities would be similar to the no-action alternative.

Summary of the Kinds and Amounts of Use

Except for some services at the Glen Aulin High Sierra Camp, the kinds of use that currently exist in the Tuolumne River corridor would continue. The overnight and day capacity with alternative 4 would also be similar to existing conditions but reduced somewhat, especially at Glen Aulin, as shown in table 6-8.

Based on the kinds and amounts of used prescribed for this alternative and consideration of the constraints described earlier in this chapter, the maximum user capacity for alternative 4 is calculated at 4,843 people (see table 6-8).

Table 6-8.
Maximum User Capacity, Alternative 4

Overnight Capacity		
Location	Overnight Capacities	Maximum Number of People per Night
Tuolumne Meadows Lodge	69 units	69 units × 4 people/unit = 276 people per night
Tuolumne Meadows campground	304 campsites, plus 7 groups sites	304 campsites × 6 people/site = 1,824, plus 7 group sites × 30 people/site = 210, for a combined total of 2,034 people per night
Glen Aulin High Sierra Camp	5 tent cabins	5 cabins × 4 people per cabin = 20 people per night
Wilderness above Hetch Hetchy Reservoir	350 person capacity	# of people per wilderness zone (350)
Wilderness below O'Shaughnessy Dam	50 person capacity	# of people per wilderness zone (50)
Subtotal, Overnight		2,730 people
Day Use Capacity		
Location	Day Use Capacities	Maximum Number of People at One Time
Private vehicle access from Tuolumne Meadows	562 spaces	562 parking spaces @ 90% occupancy ^a × 2.9 people/vehicle = 1,467 people
Bus riders to Tuolumne Meadows	2 buses	8 buses × 45 people/bus = 360 people
Access from below O'Shaughnessy Dam	4 spaces	4 parking spaces × 2.9 people/vehicle = 12 people ^b
Subtotal, Day Use		1,839 people
Administrative Capacity		
Proposed Action	Units (Beds)	Maximum Number of Employees
Reduce concessioner staffing at Glen Aulin High Sierra Camp to 8 employees	8 beds	8
Meet NPS staffing need with 163 employees at Tuolumne Meadows	163 beds	163
Meet concessioner staffing need with 103 employees at Tuolumne Meadows	103 beds	103
Subtotal, Administrative Use		274 people
GRAND TOTAL		4,843 people

a The 90% factor is applied to account for the vacancy of a percentage of parking spaces after visitors leave and before new visitors find the empty spaces. This is applied as the maximum capacity because no single parking area is feasibly used to 100% efficiency.

b Because the parking lot at Poopenaut Valley is so small, using the 90% figure is inappropriate because all empty stalls can easily be seen by a typical driver.

Abbreviation: NPS = National Park Service

Management of User Capacity

Visitor Overnight Use. Levels of overnight use in wild segments of the Tuolumne River corridor would continue to be managed through a system of zone capacities and related overnight trailhead quotas. The Glen Aulin High Sierra Camp would continue to be managed by concession contract, with spaces allocated on an

advanced reservation system. The NPS would retain oversight of these and other concessioner activities. Overnight use levels in the scenic segments of the river corridor would be managed by the facility capacities of the Tuolumne Meadows campground and Tuolumne Meadows Lodge. These facilities would continue to be available through a reservation system, with some campsites also available on a first-come, first-served basis.

Visitor Day Use. Day use levels would be managed by controlling day parking, which would be restricted to paved or otherwise authorized spaces. No undesignated roadside parking would be allowed through the Tuolumne Meadows area under alternative 4. Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows. In addition, regional transit capacity would be increased by 135 people, the equivalent of three 45-passenger shuttle buses, to encourage use of regional transit and relieve traffic congestion at Tuolumne Meadows on peak days. These regional transit service levels (YARTS, the hiker bus operated by the concessioner, and other transit services) would remain under NPS control, with the number of visitors delivered into the river corridor by such services managed according to the user capacity limits established for alternative 4. The NPS may use any combination of limits on the numbers of buses, the stops they make, the number of passengers they accept, and/or the numbers of routes they run per day.

Administrative Use. NPS staffing would be increased for more resource protection needs (including management of the user capacity program), resource management, and monitoring. NPS employee housing or campsites would be increased. Campsites would meet the need for incidental housing for employees on temporary duty in the Tuolumne Meadows area, with a bunkhouse to be constructed as funds become available for these employees. Concessioner employee staffing and housing necessary to support commercial services would remain the same as under the no-action alternative. All housing would be maintained at the levels specified under alternative 4.

Actions to Protect River Values given the Kinds and Amounts of Use in Alternative 4

The kinds and amounts of use proposed with alternative 4 would be protective of river values because of the variety of management actions as listed below. For a more comprehensive list of river protection measures, see chapter 5. For the full list of management actions associated with alternative 4, see chapter 7.

Free-Flowing Condition of the River

So long as low flows remained around 1 cubic foot per second, and assuming the current timing and duration of low flows, average water withdrawals of 60,000 to 70,000 gallons per day would fall within the margin of error for meeting the standard of being at or below 10% of low flow. The average estimated water demand for alternative 4 is calculated as about 67,000 gallons per day; this amount would be due primarily to an increase in employee housing, as shown in table 6-9. This slightly increased level of water withdrawal would be expected to remain within the standard of no more than 10% of low flow unless climate change led to longer low-flow durations occurring earlier in the summer, in which case further reductions in water use would be required.

Table 6-9.
Summary of Average Estimated Water Demand at Tuolumne Meadows, Alternative 4

Location	Current consumption per unit	Current consumption (gpd)	Alternative 4 estimated consumption day (gpd)
Campsites (drive-in)	100 gallons/site/day	30,400 gpd (304 sites)	30,400 gpd (304 sites)
Campsites (group)	500 gallons/site/day	3,500 gpd (7 sites)	3,500 gpd (7 sites)
RV dump	50 gallons/use/day	1,600 gpd (32 dumps)	1,600 gpd (32 dumps)
Tuolumne Meadows Lodge	30 gallons/person/day	8,280 gpd (276 guests)	8,280 gpd (276 guests)
Shower house at Tuolumne Meadows Lodge	10 gallons/person/shower	closed	350 gpd (35 showers)
NPS housing	50 gallons/ employee/ day	5,200 gpd (104 employees)	6,650 gpd (133 employees)
	25 gallons/employee/day in campsites	0 employees in campsites	750 gpd (30 employees in campsites)
Concessioner housing	50 gallons/employee/day	5,150 gpd (103 employees)	5,150 gpd (103 employees)
Cafeteria meals (two per concessioner employee)	6 gallons/person/day	1,236 gpd (206 meals)	1,236 gpd (206 meals)
Store/grill/ fuel station	5 gallons/ person/ day	5,740 gpd (1,148 visitors)	5,797 gpd (1,159 visitors)
Visitor center	5 gallons/ visitor/ day	3,035 gpd (607 visitors)	3,065 gpd (613 visitors)
Total		64,141 gpd	66,778 gpd

Abbreviations: gpd = gallons per day; NPS = National Park Service; RV = recreational vehicle

Management to Protect Water Quality

Risks to water quality in the Tuolumne Meadows area would be mitigated by upgrading the wastewater treatment plant, treatment ponds, and sprayfields. The improved utilities would be designed for loads commensurate with estimates of domestic water use presented in table 6-9. Further reductions in risks to water quality would be achieved by eliminating the fuel storage associated with the public fuel station and by greatly reducing the size of the concessioner stable operation. Risks to water quality at Glen Aulin would be mitigated by replacing flush toilets with vault toilets. Monitoring would ensure that water quality remained excellent at Tuolumne Meadows and Glen Aulin.

Management to Protect the Subalpine Meadow and Riparian Complex

Most of the actions to protect and enhance the subalpine meadow and riparian complex would be common to all the action alternatives. Alternative 4 would additionally restrict visitor access to meadow and riparian areas and allow use only on designated trails and paths.

Management to Protect Archeological Sites

The same management of visitor use described above would also reduce impacts on archeological sites in the Tuolumne Meadows and Lower Dana Fork segments. Monitoring would ensure that site disturbance did not exceed the protective standard established for these sites. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as described in chapter 5.

Management to Protect and Enhance Scenic Values

Scenic views and viewpoints in the Tuolumne Meadows area and along the Tioga Road corridor would be protected and enhanced under all the action alternatives by managing unnatural features associated with visitor and administrative use, such as facilities and parked cars, to minimize their intrusion into remarkable views.

Management to Protect and Enhance the Wilderness Experience along the River

Day use levels along trails in wild segments of the river corridor but within reach of a day hike from Tuolumne Meadows would be protected by restricting use to levels that resulted in encounters with no more than 10 other parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

Management to Protect and Enhance Tioga Road Access to the River through Tuolumne and Dana Meadows

Opportunities for scenic driving along Tioga Road would be enhanced under alternative 4 by eliminating roadside parking and the associated congestion caused by vehicles slowing to park and pedestrians crossing the road. Opportunities for people wishing to park and get out of their cars would be enhanced by increasing the number of designated parking spaces.

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Chapter 7: Alternatives for River Management

Following the guidance in section 10(a) of the Wild and Scenic Rivers Act (WSRA) to “protect and enhance the values which caused [the river] to be included in the [wild and scenic rivers] system,” and giving primary emphasis to protecting the river’s “aesthetic, scenic, historic, archeologic and scientific [including biologic and geologic] features,” this *Tuolumne River Plan/Draft EIS* focuses on management to protect and enhance these values. As described in chapter 5, a number of actions have been identified to address management concerns about the river’s free-flowing condition, water quality, and outstandingly remarkable biological, geologic, cultural, recreational, and scenic values. Most of these actions would be common to all the action alternatives under consideration.

The alternatives presented in this chapter differ primarily in the kinds of visitor experiences that might be available at Tuolumne Meadows and Glen Aulin High Sierra Camp in the future, including different levels of services and facilities at those locations, and associated implications for user capacity. In earlier stages of planning, five distinctive action alternatives were developed based on public comments submitted during scoping for this *Tuolumne River Plan/Draft EIS*. Based on further analysis and review, some of the elements that had differed among the original five action alternatives were determined to be so important for protecting river values that they were included in all the action alternatives. Other elements were determined to be infeasible or inappropriate and were dismissed from further consideration (see “Alternatives Dismissed from Further Consideration” at the end of this chapter). The remaining elements of the original five action alternatives were consolidated into four action alternatives. A more complete description of the *Tuolumne River Plan/Draft EIS* alternatives development process is provided in appendix O.

The four action alternatives are compared in this chapter, and are contrasted with a fifth alternative (the no-action alternative), which retains current conditions with no change in management, use, or development. These five alternatives constitute a reasonable range of alternatives that reflects the consideration and integration of (1) applicable laws and policies, including the WSRA, the Secretaries’ Guidelines for River Areas implementing WSRA, the National Park Service (NPS) Organic Act, the Wilderness Act, the National Historic Preservation Act (NHPA), and the National Environmental Policy Act (NEPA); (2) the various, sometimes contradictory interests and concerns raised during internal and public scoping; (3) scientific and scholarly data and analyses; and (4) an evaluation of the current facilities and infrastructure in the river corridor.

The five draft alternatives are characterized as follows:

- no- action alternative
- alternative 1: Emphasizing a Self-Reliant Experience
- alternative 2: Expanding Recreational Opportunities
- alternative 3: Celebrating the Tuolumne Cultural Heritage
- alternative 4 (Preferred): Improving the Traditional Tuolumne Experience

Actions necessary to protect river values are common to all the action alternatives. Additional actions to enhance some river values are included in some, but not all, alternatives. A comprehensive evaluation of how river values would be protected and enhanced under each alternative is provided at the end of each alternative description. This evaluation, which addresses a management requirement under WSRA, is provided in addition to the evaluations required by NEPA and NHPA. The NEPA and NHPA evaluations are included in volume 2, chapter 8. Based on the evaluations required by NEPA, the preferred alternative is the environmentally preferable alternative (see “Environmentally Preferable Alternative,” near the end of this chapter).

How the Alternatives Are Organized

By River Segment and Classification

The management actions are organized by river segment and classification (see table 3-1 and figure 3-1 in chapter 3) because the management guidance under the WSRA differs for wild segments and scenic segments. (No recreational segments were designated.)

Wild Segments

The discussion of the wild segments (segments 1, 2, 5, and 7, see table 3-1) encompasses the Lyell Fork, Upper Dana Fork, Grand Canyon, and Poopenaut Valley segments. Almost all lands and waters in these segments are also designated wilderness. The one exception is the Glen Aulin High Sierra Camp in the Grand Canyon segment, which is a potential wilderness addition and is addressed in its own subsection.

Scenic Segments

The discussion of the scenic segments (segments 3, 4, and 6, see table 3-1) includes the Tioga Road corridor in the Lower Dana Fork segment, Tuolumne Meadows in the Tuolumne Meadows segment, and the dam administrative site in the Below O'Shaughnessy Dam segment. All these segments contain some lands that are included in designated wilderness, and those areas will be managed the same as the wild segments.

By Type of Action

The management actions for wild segments and scenic segments are further subdivided into the following categories:

- *resource management actions* to protect and enhance river values, organized by value
- actions to protect and enhance river values by *managing visitor use and user capacity*
- *site plans* (including site restoration) for the Glen Aulin High Sierra Camp (under “Wild Segments” subheadings) and for the Tuolumne Meadows area (under “Scenic Segments” subheadings)

Actions Common to Alternatives 1–4

Many of the actions intended to protect and enhance river values would be common to all the action alternatives. These actions are presented first, before alternative 1, and are referenced, but not repeated, in the descriptions of the action alternatives.

No-Action Alternative

The no-action alternative is required by NEPA to provide the baseline from which to compare the action alternatives. This alternative assumes that current trends in the conditions of natural and cultural resources and visitor experiences would continue, consistent with the management activities that are ongoing under currently approved plans. Future actions that would require additional planning and environmental compliance could still occur, independent of the *Tuolumne River Plan/Draft EIS*, but they are not considered part of the no-action alternative for the purposes of conducting environmental compliance for the *Tuolumne River Plan*.

The description of the no-action alternative does not attempt to list the many activities that are ongoing in the river corridor to manage natural and cultural resources and to provide opportunities for visitor use. These activities range from fire management to maintenance work on historic structures, from wilderness patrols to enforcing traffic regulations, from field research to interpretive talks, and everything else that contributes to the conditions that currently exist in the river corridor. Most of these activities will continue, regardless of which alternative is eventually selected for the *Tuolumne River Plan*. Rather, the no-action alternative focuses on the main differences between the new actions that might occur under alternatives 1–4 and the management that is occurring now.

The future management actions to protect or enhance river values that might occur under alternatives 1–4 are not considered part of the no-action alternative. Therefore, the no-action alternative does *not* include the technical correction to the river corridor boundary presented in chapter 3, the section 7 determination process for evaluating water resources projects presented in chapter 4, or the management actions to protect and enhance river values presented in chapter 5.

Concept

More than 90% of the Tuolumne River corridor inside Yosemite National Park flows through congressionally designated wilderness and is managed to protect wilderness qualities. In these areas (primarily river segments classified as wild, although scenic segments also include some lands in designated wilderness, as shown in table 3-2), natural river-related systems are sustained by natural ecological processes, archeological and American Indian traditional cultural resources characterize the cultural landscape, and recreational opportunities are primitive and unconfined.

Visitor services are consolidated at Tuolumne Meadows (within the scenic classification), which is easily accessible along the Tioga Road. This expansive, highly productive yet fragile subalpine meadow and riparian area has sustained American Indian traditional uses, was the location of nationally important historic events, and now supports abundant opportunities for distinctive high-country recreational experiences.

Tuolumne Meadows is a popular staging area for wilderness travelers. A segment of the Pacific Crest Trail, one of the country's 11 national scenic trails, passes through the river corridor, as does the John Muir Trail. Because the Tioga Road provides easy access (until it closes for winter), Tuolumne Meadows is also a destination for recreation that can be readily enjoyed by people of various ages and physical abilities. Visitors to Tuolumne Meadows can enjoy a wide variety of river-related outdoor recreational activities. Many visitors are through-travelers on the Tioga Road—one of only a handful of trans-Sierra highways—who enjoy motor touring and stop briefly to take advantage of the visitor services at Tuolumne Meadows. In winter, when Tioga Road is closed due to snow, a small number of visitors access the area by cross-country skiing and snowshoeing. There are no visitor services in the winter, although the campground office is available as a ski hut for the few skiers who make it all the way to the meadows area.

Visitor use patterns are changing, as more day visitors visit the park, and people with only a short time to spend in the area now comprise almost half of the visitor population at Tuolumne Meadows.

The Glen Aulin High Sierra Camp, 6 miles downriver from Tuolumne Meadows in the Grand Canyon segment, provides visitors, including those who are unable to carry a heavy pack or are mobility impaired, an opportunity to experience and enjoy the river in a remote, wilderness setting.

In summary, the no-action alternative would:

- Preserve and sustain wilderness character, including natural ecosystem function and opportunities for primitive, unconfined recreation, in the wild segments of the river.
- Retain existing opportunities for day and overnight use at Tuolumne Meadows and the Glen Aulin High Sierra Camp.
- Perpetuate the current resource conditions and management concerns for river values throughout the river corridor.
- Manage for a continuing upward trend in day use.

Wild Segments (Designated Wilderness and Glen Aulin)

Resource Management

As noted in the introduction to the no-action alternative, this section is not intended to summarize all the current management of resources in the river corridor. Rather, it focuses on the actions currently underway to address the management concerns identified in chapter 5. This provides a baseline for comparing the additional actions that might be taken under the action alternatives to further protect and enhance river values.

Free Flowing Condition

Management concerns about free flow in wild segments of the river relate to altered flow levels below O'Shaughnessy Dam. Under the no-action alternative, the NPS would continue to work cooperatively with the San Francisco Public Utilities Commission (SFPUC), Stanislaus National Forest, and others to inform releases from O'Shaughnessy Dam intended to more closely mimic natural flows for the benefit of river-dependent ecosystems below the dam.

Water Quality

Management concerns about water quality in wild segments of the river relate to wastewater disposal at the Glen Aulin High Sierra Camp and risks associated with stock use. Throughout the wild segments water quality would continue to be monitored and managed to meet NPS standards (which are higher than state water quality standards), through ongoing practices, including manure removal and other provisions outlined by the SFPUC to protect the Hetch Hetchy watershed. Water use at the Glen Aulin High Sierra Camp would continue to be restricted to 600 gallons per day to avoid saturation of the camp's leach mound (see "Glen Aulin," below).

Biological Value: Subalpine Meadow and Riparian Complex

Subalpine meadow and riparian areas would continue to be sustained by natural ecological processes. The management concern about subalpine meadows in wild segments of the river relates to localized impacts on meadow/riparian areas in Lyell Canyon, associated primarily with stock use. These impacts include high levels of bare ground in meadows with stock use when compared with meadows receiving low or no stock use (NPS, Ballenger et al. 2010j). Under the no-action alternative, commercial pack stock use would continue to be allowed by the concessioner under the concessions contract and by private pack stations under the provisions of current commercial use authorizations, the latter of which are renewed annually.

The majority of concessioner pack stock use in the river corridor is associated with the supply of the High Sierra Camps (see table 7-1). The concessioner generally operates one, sometimes two, strings of mules from Tuolumne Meadows to Vogelsang and Sunrise High Sierra Camps three times a week, and to May Lake and Glen Aulin High Sierra Camps two times a week (Boyers 2012). These concessioner stock trips do not involve any grazing because stock is kept in the corrals at Glen Aulin.

Currently three different pack stations operate in the river corridor under commercial use authorizations for overnight guided pack trips. Free-range grazing is allowed in wilderness where stock travel is permitted, with the exception of no-camping zones and areas near the High Sierra Camps. Between 2004 and 2010, commercial overnight stock use from these pack stations in Lyell Canyon ranged from 193 (2010) to 564 (2007) grazing-nights per year (1 grazing-night equals 1 animal grazing for 1 night; 2 grazing-nights could equal 2 animals grazing for 1 night or 1 animal grazing for 2 nights, and so on). There has been little private overnight stock use in the river corridor. (Additional discussion of commercial use in wilderness, including commercial stock overnight use, is included below, under “Recreational Value: Wilderness Experience along the River.”)

NPS administrative stock use occurs in wild segments in support of trail maintenance and utility operations at Glen Aulin. The level of use depends on where trail crews are working. In a busy summer, with two trail crews supplied from Tuolumne Meadows, an average of 15 head (and up to 30 head) of stock work out of the NPS corral, primarily supporting trail crew operations. Backcountry Utilities Division staff generally hike into Glen Aulin unless they have a project or need to pack compost. Their stock use averages 36 stock passes on the Glen Aulin trail over the course of an entire season (Boyers 2012); similar to the concessioner stock trips to Glen Aulin, this stock use does not involve any grazing because stock is kept in the corral at Glen Aulin.

Biological Value: Low-Elevation Riparian and Meadow Habitat

The management concern about low-elevation meadow and riparian habitat is that it might be transitioning in response to unnatural changes in the river’s hydrologic regime. Disruptions to natural flows caused by O’Shaughnessy Dam would be mitigated by science-based releases intended to more closely mimic natural flows and to provide maximum ecological benefits to the low-elevation riparian and meadow habitat in Poopenaut Valley.

Geologic Value: Stairstep River Morphology

No present or foreseeable management concerns are associated with the condition of stairstep river morphology in the river corridor. This river value is not affected by any ongoing or foreseeable use and does not require management or monitoring. Therefore, this river value is not considered further in the action alternatives.

Cultural Value: Archeological Landscape

Park staff would continue to identify, document, monitor, evaluate, and protect significant archeological sites in consultation with culturally associated American Indian tribes and groups through monitoring for changing site conditions, developing and implementing treatment measures, implementing visitor and employee education, and conducting research.

The primary management concern about prehistoric archeological sites in wilderness is the need to protect them from disturbance caused by visitor use. Under the no-action alternative, sites in the Lyell Fork, Upper Dana Fork, Grand Canyon, and Poopenaut segments would continue to be documented, monitored, and evaluated (where appropriate). Sites would continue to be protected by managing overnight use and campsites and by using natural features to conceal and divert foot traffic around sites.

Scenic Value: Scenery through Lyell Canyon and the Grand Canyon of the Tuolumne

Natural scenery would continue to evolve in response to natural ecological processes, with no management of scenic vistas. The primary management concerns are the visibility of the Glen Aulin High Sierra Camp structures from a few locations along the trail through this area, and the manure and other signs of stock use on trails, which are offensive to some hikers. Both of these management concerns would continue under the no-action alternative. Additional information about the amount of stock use on trails is provided under “Recreational Value: Wilderness Experience along the River,” below.

Recreational Value: Wilderness Experience along the River

The primary management concerns about the wilderness experience along the river is the increasing day use on wilderness trails within the first few miles of Tuolumne Meadows trailheads and the potential for conflicts between hikers and stock users traveling the same wilderness trails. Because day use in wilderness is not covered by the existing overnight trailhead quota system, this use would remain unrestricted under the no-action alternative. Commercial use (guided stock and hiking trips) would continue under current management, and the potential for conflict between stock users and other visitors would remain unchanged. The amount of pack stock on trail segments within the river corridor is shown in table 7-1.

Table 7-1.
2011 Total Stock Use per Trail, Tuolumne River Corridor

Trail	River Segment	Total Passes/ Stock Nights	Concessioner	NPS Administrative	Commercial Outfitter	Private Use
Cathedral Lakes	Tuolumne Meadows (500-foot segment in WSR corridor)	~340 passes	186 passes (~1–2 mule strings/week to service Sunrise HSC)	8 passes (sawyers and ranger patrols)	52 passes	94 passes
Glen Aulin	Tuolumne Meadows and Grand Canyon	~1,127 passes	801 passes (~ 768 passes to set up, take down, and service Glen Aulin HSC, 33 passes for half- and full-day rides)	50 passes (backcountry utilities, sawyers, trail crew, ranger patrols)	116 passes	160 passes
Lyell Canyon	Tuolumne Meadows and Lyell Canyon	~600 passes	208 passes (~6 mule strings/week to service Vogelsang HSC)	62 passes (backcountry utilities, sawyers, ranger patrols)	214 passes	116 passes
Parker/Mono Pass	Dana Fork	~8 passes	0 passes	8 passes (sawyers, ranger patrols)	0 passes	Few passes
Pate Valley within WSR	Grand Canyon	Unknown	0 passes	No data for 2011	0 passes	0 passes
Poopenaut (foot traffic only)	Poopenaut Valley	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Tuolumne Meadows Campground and Miscellaneous Trails	Tuolumne Meadows	Unknown (at least 44)	0 passes	44 passes for ranger patrols	0 passes	Unknown number of passes dispersed throughout Tuolumne Meadows trails
Unicorn Creek/Elizabeth Lake	Trailhead in Tuolumne Meadows	Unknown passes (at least 10)	0 passes	10 passes for ranger patrols	0 passes	Occasional passes expected as trailhead near stock campsites.
Young Lakes	Tuolumne Meadows	~1,232 passes	1,214 passes (three 2-hour trail rides per day)	18 passes (sawyers, ranger patrols)	0 passes	Unknown passes

Abbreviations: HSC = High Sierra Camp; WSR = wild and scenic river

Management of Visitor Use and User Capacity

Kinds of Visitor Use

Wild segments would continue to provide excellent opportunities for primitive, unconfined recreation. Management concerns about the quality of the visitor experience in wild segments relate to the increasing number of encounters with other parties on trails within a day hike of Tuolumne Meadows, and the potential for conflicts between hikers and stock users on trails.

Maximum Amounts of Visitor Use

Under the no-action alternative, visitor use capacity in wild segments would continue to be managed through an existing system of zone capacities and related overnight trailhead quotas, accommodating a total of 350 people per night in the Lyell Fork and Grand Canyon segments above Hetch Hetchy Reservoir (camping is prohibited along the Dana Fork). The zone capacity for the Poopenaut Valley segment below the reservoir would remain at 50 people per night. The capacity for each wilderness management zone in the river corridor is listed in table 7-2.

Table 7-2.
Existing Wilderness Management Zone Capacities

Wilderness Management Zone (Tuolumne River Segment)	Maximum Overnight Use per Zone
Lyell Canyon (Lyell Fork)	125
Glen Aulin (Grand Canyon)	50
Glen Aulin to Cold Canyon/Waterwheel Falls (Grand Canyon)	75
Pate Valley (Grand Canyon)	100
Miguel Meadow (Poopenaut Valley)	50
Total	400

The only restrictions on day use in wilderness would be restrictions on group size (8 people per group off trail and 35 people per group on trail). The encounter rate on the trail to Glen Aulin occasionally reached 8 encounters with other groups per hour in 2010 (Broom and Hall 2010). Encounter rates on other trails in the corridor were lower; below Glen Aulin hikers rarely encountered more than four other groups per hour. Based on past trends, the current levels of use would be expected to continue or increase. Concessioner stock day rides into wilderness would continue at current levels of service (3 two-hour rides per day, 2 four-hour rides, and occasional all-day rides). Generally, the two-hour rides quickly exit the river corridor from the stable at the north edge of the Tuolumne Meadows segment and follow the Dog Lake trail. A maximum of 12 visitors and 2 wranglers per ride take the two-hour rides, and all three rides are often booked during July and August, which is when most of this use occurs. The four-hour rides, which can accommodate 10 visitors per ride, follow the Glen Aulin Trail through the Tuolumne Meadows and Grand Canyon segments; these rides are less popular. The full-day rides, which can accommodate six visitors, follow the Glen Aulin trail beyond Glen Aulin to Waterwheel Falls; these rides are rare. The maximum daily capacity of all rides is 62 people per day.

Overnight commercial use in the wilderness portions of the Tuolumne River corridor averaged approximately 451 person-nights per year from 2005 to 2009. Of those nights, 263 (58%) were on stock trips and 188 (42%) were on hiking trips. Commercial day use was negligible, averaging only 65 use days for the whole season, most of which occurred on the Mono/Parker Pass trail. Commercial use in 2009 (475 person-nights) was slightly higher than the five-year average, while the percentage of stock use (240 person-nights or 51%) was slightly lower than the five-year average (NPS, Fincher 2009n).

Administrative Use

Administrative users in wild segments of the river corridor include NPS and concessioner staff, park partners, and volunteers. These individuals engage in a variety of functions, including resource protection and stewardship; trail and bridge maintenance; visitor protection; maintaining the utilities and foodservice at the Glen Aulin High Sierra Camp; and providing visitor recreation, interpretive, and educational opportunities. Administrative users engage in a variety of travel modes, including stock, helicopter, or foot travel to carry out their work. Nine concessioner employees are housed at the Glen Aulin High Sierra Camp.

Glen Aulin (Potential Wilderness Addition)

Glen Aulin High Sierra Camp

The Glen Aulin High Sierra Camp is a concessioner-operated camp that provides rustic lodging and meal service for up to 32 overnight guests. The High Sierra Camp was designated a potential wilderness addition within the Yosemite Wilderness by the 1984 California Wilderness Act. Under the no-action alternative, the Glen Aulin High Sierra Camp would be retained at the current capacity of 32 guests. Day use at Glen Aulin would remain at current levels of approximately 45 people per day, and limited meal service would remain available for hikers and backpackers who are not staying at the camp.

Management concerns about river values at Glen Aulin focus on a risk to water quality associated with wastewater treatment at the camp, a risk to water quality associated with the use of stock to transport guests and supplies to the camp, localized impacts on scenic quality associated with the visibility of camp structures and signs of stock use along the Glen Aulin trail, an impact on the wilderness experience of some visitors caused by conflicts between hikers and stock users, and a risk to archeological sites associated with potential future development or maintenance of camp facilities.

To mitigate the risk of leach-mound failure, water use is restricted to 600 gallons per day. A number of water conservation measures have already been implemented to achieve this reduction in water use, including installation of low-flow toilets, elimination of guest showers, elimination of towel and linen service, conversion to disposable tableware, and menu revisions to conserve water.

Measures have also been taken to reduce stock trips, including menu revisions to reduce required supplies. These measures would continue under the no-action alternative.

The risk to individual sites contributing to the outstandingly remarkable archeological value of the Tuolumne River would be reduced by evaluating the sites to determine their eligibility for the National Register of Historic Places (NRHP); reducing, minimizing, or mitigating ongoing site impacts; and avoiding new impacts to the greatest extent possible. Where it is not feasible to avoid, minimize, or eliminate impacts, the NPS would conduct data recovery excavations and perform other mitigative actions in consultation with culturally associated American Indian tribes.

The historic character of the Glen Aulin High Sierra Camp would be retained with no change in the layout or design of facilities. Utilities would remain limited to water and wastewater systems powered by solar energy and gas-powered generators; propane would continue to be used for cooking. Guest tent cabins have wood stoves, and wood would continue to be packed in by the concessioner; however, there is no electric power to the guest tent cabins. The following facilities would be retained (see figure 7-1):

- three permanent structures (cookhouse, toilet building with flush toilets, and storage shed)
- dining tent with concrete and stone foundation and footings
- storage tent with concrete and stone foundation and footings

- shower tent (for employees only) with concrete foundation
- guest tent cabins (eight units) with concrete foundations
- employee tent cabins (four units) with concrete foundations
- water and wastewater treatment facilities (including a water storage tank, a chlorinator located in a small permanent building, a filter tank, surge tanks, a belowground septic tank, a wastewater leach mound, and solar panels), many with concrete foundations

Backpacker Campground

The backpacker campground would be retained. The aging composting toilet at the campground would not be replaced under the no-action alternative. Overnight use at the backpacker camp would continue to be managed through the wilderness zone capacity for Glen Aulin, which is currently set at 50 people per night. Dispersed backpack camping is not allowed in the Glen Aulin vicinity, to mitigate impacts of overnight use at this popular destination.

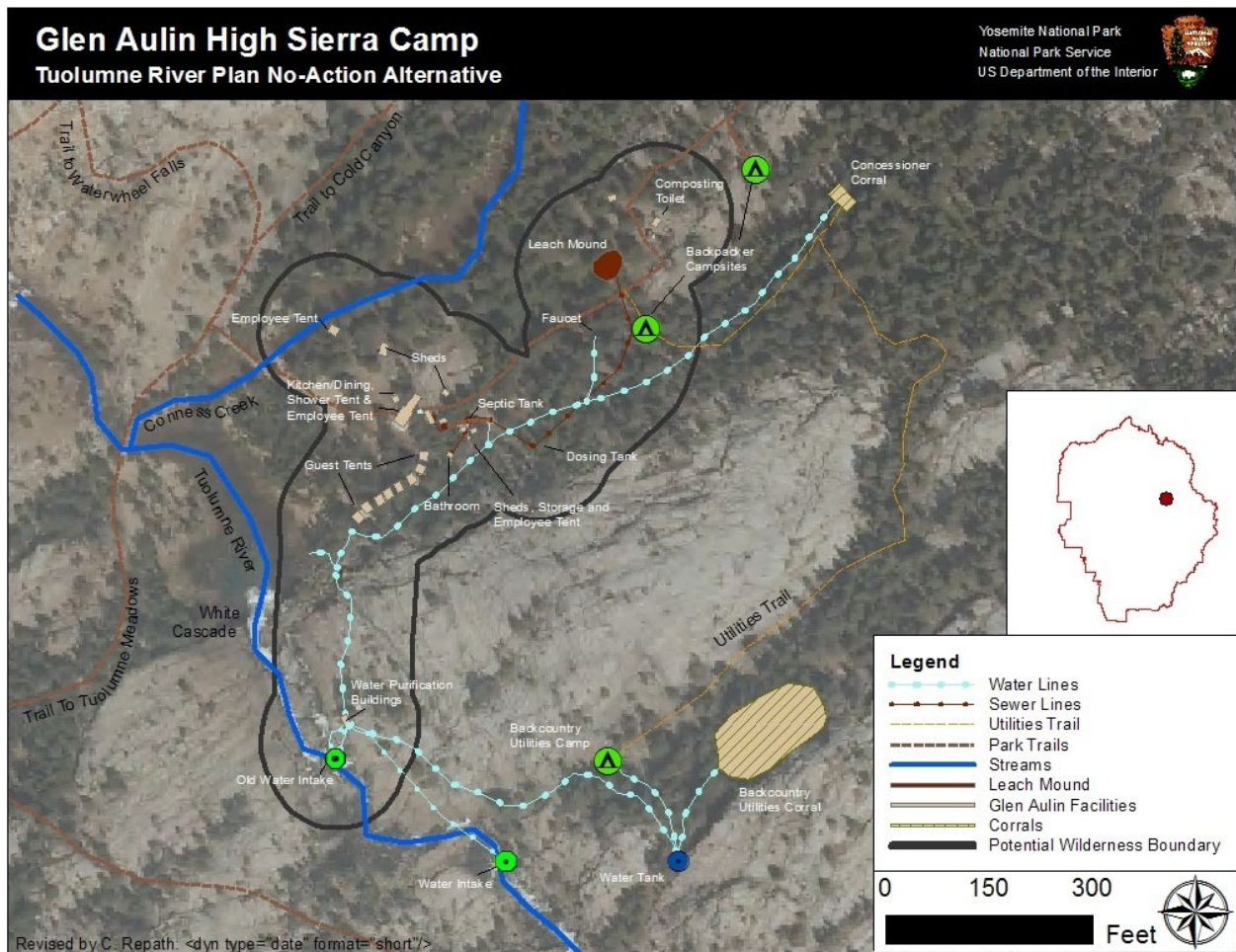


Figure 7-1. Glen Aulin Site Plan, No-Action Alternative.

Scenic Segments (Tuolumne Meadows and Tioga Road Corridor)

This discussion pertains only to the nonwilderness portions of the Tuolumne Meadows and Lower Dana Fork segments. Portions of these segments within designated wilderness would be managed the same as the wild segments. The discussion focuses on the actions currently underway to address the management concerns identified in chapter 5.

Resource Management

Free Flow

Management concerns about free flow in the Tuolumne Meadows/Tioga Road area relate to water withdrawals to support visitor and administrative use; an aging water intake, treatment, and distribution system; interference with high flows caused by bridge abutments; and interference with river flow caused by the short section (approximately 150 feet) of riprap placed to protect the campground A-loop road. The no-action alternative would continue existing management regarding these issues, as follows:

- Continue withdrawals averaging about 64,000 gallons per day to support visitor and administrative use (see table 7-6 later in this chapter, which compares current water consumption with consumption under alternative 1). If increasing use or prolonged periods of drought made withdrawals unsustainable in terms of impacts on downstream habitat, further water restrictions would be imposed through mandatory rationing or closures.
- Maintain existing domestic water and wastewater systems.
- Retain existing bridges with no action to mitigate impacts on river hydrology during high flow periods.
- Retain the boulder riprap along an approximately 150-foot-long section of riverbank, installed to protect the campground A-loop road.

Water Quality

Concerns about water quality in the Tuolumne Meadows/Tioga Road area relate to an unstable road cut (the “little blue slide”) along Tioga Road near the Dana Fork; an aging wastewater treatment and disposal system; stock use impacts; and underground fuel storage tanks. The no-action alternative would continue existing management regarding these issues, as follows:

- Maintain existing utilities.
- Take no action to stabilize the road cut along Tioga Road near the Dana Fork.
- Continue best management practices, including daily removal of manure from corrals and water courses within the first 0.25 mile of trails leading from stable operations, to mitigate the potential for impacts on water quality associated with stock use.
- Mitigate risks associated with aging utilities, stock use, and fuel tanks through water quality monitoring and continued compliance with state water quality regulations.

Biological Value: Subalpine Meadow and Riparian Complex

Management concerns for the subalpine meadow and riparian complex in the Tuolumne Meadows/Tioga Road area relate to

- informal trails across meadows, along riverbanks, and at popular attractions, associated primarily with undesignated roadside parking and facilities sited in meadow and riparian areas
- disruptions to sheet flow across meadows, associated with inadequate Tioga Road culverts and the historic Great Sierra Wagon Road
- diminishing riparian vegetation along riverbanks

- changes in meadow vegetation, suspected of being associated with historical sheep grazing, past and current visitor use and development, and climate change

The mechanical removal of lodgepole pine seedlings to inhibit their encroachment into open meadows was practiced from at least as early as 1933 (Cooper et al. 2006) through 2010. No management to mechanically remove lodgepole from the meadows has occurred since 2010, and it would not be resumed unless ongoing research indicated that it should be part of a comprehensive ecological restoration program for the meadows.

By definition, the no-action alternative would not include any new management actions to address concerns about changing meadow and riparian vegetation. However, actions to address these issues might still be taken as part of other planning and management projects, independent of the *Tuolumne River Plan*. The NPS continuously responds to resource management issues and has already initiated some projects that directly respond to the current issues summarized above. For example, trampled areas and informal trails at Tuolumne Meadows are being restored to natural conditions during the summer of 2012. Because these actions are being conducted independently of the *Tuolumne River Plan*, they are not considered part of the no-action alternative for the *Tuolumne River Plan/Draft EIS*, and they require separate compliance (such as NEPA analysis or consultations with other federal or state agencies or tribes).

For purposes of providing a baseline for comparison of action alternatives, the no-action alternative would continue the following ongoing management:

- Continue to allow undesignated roadside parking along Tioga Road and the road to the Tuolumne Meadows Lodge, which would continue to encourage informal trailing across meadows.
- Retain the following facilities in meadow and riparian areas: concessioner employee housing behind the store and grill, some concessioner and visitor tent cabins at Tuolumne Meadows Lodge, and several campsites near the river.
- Take no action to improve the Tioga Road culverts to mitigate effects on surface flow into Tuolumne Meadows.
- Continue to protect the remaining segments of the historic Great Sierra Wagon Road and use them for trails, with no management action to mitigate impacts on meadow hydrology.
- Take no action to reestablish riparian vegetation along riverbanks.
- Take no action to improve the Tioga Road bridge or the footbridge at Parsons Memorial Lodge to mitigate adverse impacts on river hydrology during periods of high flows.
- Continue research to determine the conditions necessary for the ecological recovery and long-term integrity of river-related habitats in Tuolumne Meadows.

Cultural Value: Archeological Landscape

Although the park staff would continue to identify, document, monitor, and evaluate significant archeological sites in consultation with culturally associated American Indian tribes, no new actions to protect sites would be initiated as part of the *Tuolumne River Plan*.

The primary management concern about archeological sites is ongoing disturbance associated with visitor use, primarily informal trails. Action to resolve this issue will require a comprehensive approach to address the causes of impacts on archeological sites. The no-action alternative would not include any new management actions to address these issues (although they might be addressed through other resource planning and management). For purposes of providing a baseline for comparison with action alternatives, management under the no-action alternative would strive to mitigate the impacts of informal trails through placement of logs or other natural objects to disguise the sites and divert foot traffic.

No new development is proposed under the no-action alternative. Effects on archeological sites from potential future actions (independent of the *Tuolumne River Plan*) would be addressed through procedures outlined in the park's programmatic agreement for section 106 of NHPA, potential new agreement(s), or by following the implementing regulations for NHPA section 106.

Cultural Value: Parsons Memorial Lodge

Parsons Memorial Lodge would continue to be preserved through periodic assessments and appropriate treatments. No management concerns have been identified for this value.

Scenic Value: Scenery through Dana and Tuolumne Meadows

The management concern identified for outstandingly remarkable scenic values in the Tuolumne Meadows/Tioga Road area are associated with the encroachment of undesignated roadside parking and conifers. These concerns would be addressed under the no-action alternative by continuing ongoing actions:

- Continue to allow the mechanical removal of conifers for scenic vista management.
- Take no action to manage scenic vista points.
- Take no action to eliminate undesignated roadside parking and the associated impact on scenic views.

Recreational Value: Tioga Road Access to the River through Tuolumne and Dana Meadows

The major management concern regarding this outstandingly remarkable recreational value is the potential for crowding and congestion—particularly vehicle congestion—to change the quality of the experience for visitors accessing the Tuolumne River through Tuolumne and Dana Meadows by way of Tioga Road. Under the no-action alternative, parking would not be restricted by any additional barriers to protect sensitive resources; however, no additional designated parking would be provided to reduce vehicle congestion and competition for parking spaces. It is estimated that the designated parking at Tuolumne Meadows currently can accommodate only about 60% of the maximum demand for day and overnight parking, so that almost 40% of all visitors must park along roadsides or squeeze into other undesignated spaces. Although most visitors who were recently surveyed responded that they were satisfied with their ability to find parking (White 2010), some were dissatisfied with the traffic congestion, the pedestrian/vehicle conflicts, and the intrusions into scenic views caused by undesignated roadside parking.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

A full range of orientation, interpretation, and education programs would continue to be conducted at the existing visitor center, wilderness center, and Parsons Memorial Lodge, and in the field. These programs would continue to help visitors understand, appreciate, and connect with the Tuolumne River and encourage visitor behaviors that are protective of resources.

Current commercial services (store/grill, public fuel station, mountaineering shop and school, concessioner stock day rides) would be retained. The U.S. Postal Service (USPS) would continue to contract with the park concessioner to provide incoming and outgoing mail service, including packages for through-hikers on the Pacific Crest and John Muir Trails. (This service would remain subject to future USPS level-of-service decisions beyond NPS control.)

Opportunities for overnight use would include camping and lodging at current capacities (2,034 people at the campground and 276 people at Tuolumne Meadows Lodge).

Shuttle bus service between destinations within the Tuolumne Meadows area would continue to operate at the current level of service (see “Tuolumne Meadows Shuttle Bus Service” under “Transportation” in chapter 8; existing shuttle bus stops are shown on the site plan map, figure 7-2). The Tuolumne Meadows shuttle bus currently runs from the Tuolumne Meadows Lodge west to Olmsted Point and back, making 12 stops and with departures every 30 minutes during the day. The Tioga Pass shuttle runs from the lodge east to Tioga Pass and back, with four departures in each direction daily).

Maximum Amounts of Visitor Use

Day Use

Current maximum day use in the Tuolumne Meadows area and adjacent wilderness is estimated at 1,762 people at one time. This number is reached only during peak periods (e.g., some weekends in July and August); at other times day use is less. This estimate of maximum day use is the sum of two factors:

- (1) the most current (2011) observed maximum number of parked cars counted on a peak day, presumed to belong to day visitors (530 total vehicles parked at the peak of the summer season) multiplied by an average of 2.9¹ persons per car, for 1,537 maximum people at one time, plus
- (2) the maximum number of day visitors who can arrive by in-park shuttles, tour bus, and regional public transportation (225 people per day)

Because only 340 designated parking spaces were available for day visitors in 2011, more than a third of these day visitors (an estimated 551 people in 190 vehicles on the day in 2011 with the highest parking counts) were parking along roadsides and crowding into the existing parking areas. A comparison of designated and undesignated parking is provided under “Site Development,” below.)

Overnight Use

The overnight capacity at Tuolumne Meadows is 2,310 people per night: 2,034 people are accommodated in the 304 sites (6 people per site) plus 7 group sites (30 people per site) in the campground, and 276 people are accommodated in the 69 guest tent cabins at Tuolumne Meadows Lodge. Actual overnight use levels are lower than these capacities because individual campsites and lodging units are not always occupied by the maximum number of people allowable. Some campsites are available through a reservation system, while the rest of the campsites are available on a first-come/first-served basis.

Administrative Use

Administrative uses are most concentrated in the river corridor at Tuolumne Meadows. Administrative activities in these segments include scientific study and resource monitoring, maintenance and facility operations functions, food service and hospitality, education and interpretation, and visitor protection, including emergency services. Staffing levels in the Tuolumne River corridor change annually, depending on operational needs.

Currently, housing is provided for 104 NPS employees at Tuolumne Meadows. However, up to 150 NPS employees currently work at Tuolumne Meadows in the summer, including NPS research and restoration crews, trail crews, and volunteers who work out of Tuolumne Meadows on an intermittent basis. The actual number of employees at Tuolumne Meadows at any one time fluctuates due to the different nature and

¹ The vehicle occupancy rate is 2.9 persons per vehicle, based on visitor studies conducted over the past 20 years that found an average vehicle occupancy ranging from 2.6 to 3.4 (Van Wagtenonk and Coho 1980; FHWA 1982; ORCA 1999; Littlejohn et al. 2005; Le et al. 2008). Based on this range, an average of 2.9 persons per vehicle is used for estimating visitor numbers for planning purposes in this document.

duration of employee assignments. However, even allowing for this fluctuation, the amount of housing is never sufficient to accommodate all of the NPS employees who are working in the area at any one time, resulting in some employees having to commute, double up, or camp in the campground.

Approximately 103 concessioner employees are housed at Tuolumne Meadows to support visitor services such as the store and grill, lodge, concessioner stable, and the mountaineering shop/school. Most employees park their personal vehicles near their residences, or occasionally, at the wilderness lot near Bug Camp or at Tuolumne Meadows Lodge.

Site Development at Tuolumne Meadows

Most development in the river corridor is situated south of Tioga Road at the edge of the lodgepole pine forest that surrounds Tuolumne Meadows. Most of the development at Tuolumne Meadows is inside the wild and scenic river corridor, with the exception of the western half of the campground, which is outside the corridor boundary. The development pattern is the result of a plan that was completed by the NPS in 1929 (NPS 2007t). Its purpose was to minimize impacts on the natural and scenic resources of Tuolumne Meadows by confining physical development to well-defined clusters along the meadow's southern margins in a way that avoided the need for cross-meadow traffic by vehicles, stock, and pedestrians. Circulation patterns were aligned according to similar principles. Much of the construction was implemented by the Civilian Conservation Corps (CCC), and the site retains some excellent examples of CCC design and handcraft.

In the 1930s the Tioga Road was reconstructed to mitigate its impact on the meadow and to take greater advantage of the panoramic views available to motorists traveling along the meadow's edge. Attention to views and vistas was identified as an important guiding principle, with vantage points carefully selected to maximize the aesthetic effect of varying views of broad open meadows, dark forests, and surrounding peaks.

Although the principles guiding the 1929 plan have clearly characterized ongoing development throughout the Tuolumne Meadows Historic District, the plan was never fully realized, and vestiges of earlier development patterns still exist. These include a cluster of structures that once formed the core of the Sierra Club's inholding at Soda Springs; the original NPS administrative area at Ranger Camp, which was supposed to be demolished when the development plan was fully realized; and the old Insect Research Station (Bug Camp), which was designed to be temporary but has remained a center for resource management and employee housing to the present (NPS 2007t). Furthermore, over the past decades aging utilities and increasing demand for parking and other facilities have resulted in a piecing together of historic and nonhistoric elements and localized impacts on the meadows.

Under the no-action alternative, all the existing facilities would be retained and the Tuolumne Meadows area would generally retain the character of a rustic, temporary outpost at the edge of the Sierra wilderness. The structures, mostly tent cabins that are taken down each fall and erected each summer, and their dispersed (rather than consolidated) placement would continue to reinforce a sense of minimal amenities and deference to the natural setting. Table 7-3 contains a summary of existing facilities for comparison with the facilities included in alternative site plans.

A comprehensive site plan to guide the future repair or replacement of aging utilities and infrastructure and the provision of appropriate visitor and administrative facilities is proposed and addressed as part of this *Tuolumne River Plan/Draft EIS*, but it is not included in this no-action alternative.

Table 7-3.
Current Facilities, Tuolumne Meadows

Facility Type	Description
Visitor Services	<ul style="list-style-type: none"> ▪ visitor center, restrooms ▪ wilderness center ▪ store and grill ▪ lodge (69 guest tent cabins [276 guests], hard-sided kitchen, hard-sided shower house, canvas-sided dining hall) ▪ public fuel station ▪ mountaineering shop/school ▪ post office ▪ recreational vehicle dump station
Campgrounds	<ul style="list-style-type: none"> ▪ 304 campsites (1,824 people) in seven loops, A–G, plus 7 group campsites (210 people) ▪ campground office
Picnic Areas	<ul style="list-style-type: none"> ▪ picnic area near Lembert Dome
Trails	<ul style="list-style-type: none"> ▪ Pothole Dome trail (hiking) ▪ Cathedral Lakes trail (hiking and stock use) ▪ Segments of the historic Great Sierra Wagon Road bed through the Tuolumne Meadows area (Now part of the Pacific Crest Trail): <ul style="list-style-type: none"> ▫ Segment from Tioga Road to Parsons Memorial Lodge and on to Glen Aulin (hiking and stock use) ▫ Segment from Parsons Memorial Lodge to Lembert Dome; hiking and stock use and administrative road) ▫ Segment from Lembert Dome to Tuolumne Meadows Lodge (hiking and stock use) ▪ Elizabeth Lakes trail (hiking) ▪ Lembert Dome trail (hiking) ▪ Dog Lake trail (hiking and stock use) ▪ John Muir Trail (merges with the Pacific Crest Trail through Lyell Canyon; hiking and stock use)
Stables	<ul style="list-style-type: none"> ▪ NPS stable (capacity up to 60 head of stock) ▪ concessioner stable (capacity up to 100 head of stock)
Park Operations	<ul style="list-style-type: none"> ▪ ranger station ▪ maintenance yard and offices ▪ aboveground diesel fuel tank for administrative use (currently used only by the concessioner) ▪ search-and-rescue cache ▪ helipad at Gaylor Pit
Housing (NPS Employees)	<ul style="list-style-type: none"> ▪ Road Camp (17 employees) ▪ Ranger Camp (54 employees), restrooms, shower house, laundry room ▪ Bug Camp (33 employees), restrooms, shower house
Housing (Concessioner Employees)	<ul style="list-style-type: none"> ▪ Tuolumne Meadows Lodge (48 employees) ▪ behind the store/grill and fuel station (42 employees) ▪ concessioner stable (13 employees)
Utility Systems	<ul style="list-style-type: none"> ▪ wastewater treatment plant and recreational vehicle dump station ▪ wastewater containment ponds and sprayfields ▪ domestic water intake, treatment, and storage tanks

Table 7-3.
Current Facilities, Tuolumne Meadows (continued)

Facility Type	Number of spaces	Description
Day Parking (Number of designated parking spaces in the Tuolumne Meadows area allotted to day visitors)	16	parking area at Pothole Dome
	50	parking area at the visitor center
	11	parking area at the campground office
	11	parking in the campground for the Elizabeth Lakes trailhead
	15	parking at the fuel station
	51	parking area at the store and grill
	58	parking area at the concessioner stable
	29	parking area at the base of Lumbert Dome
	7	parking area at the ranger station
	25	parking area at the Dog Lake/John Muir Trail trailhead
	67	parking areas in the road corridor east of Tuolumne Meadows, including the Mono Pass and Gaylor Peak trailheads and the Dana Meadows and other pullouts
Overnight Parking	340	total designated day parking space ^a
	+190	additional cars parked in undesignated spots during peak demand ^b
	102	Tuolumne Meadows Lodge
	58	parking area at the wilderness office
	33	parking area at the Dog Lakes/John Muir Trail trailhead
	0	parking at the Cathedral Lakes trailhead
	0	parking along the road to the concessioner stable
	193	total designated overnight parking spaces
	+147	additional cars parked in undesignated spots during peak demand ^b

a Parking for people who might ride the Tioga Pass shuttle to access Tuolumne Meadows from one of the parking areas to the east along Tioga Road are included in the parking figures for Tuolumne Meadows (67 spaces accommodating 194 people). Parking for people who might ride the Tuolumne Meadows shuttle from one of the parking areas west of Tuolumne Meadows (notably Tenaya Lake and Olmsted Point) are not included in the parking figures for Tuolumne Meadows, primarily because most of the parking in these areas is used by Tenaya Lake and Olmsted Point visitors who do not ride the shuttle. Only a small number of visitors ride the shuttle between Tenaya Lake and Tuolumne Meadows.

b More cars currently park in the Tuolumne Meadows area than can be accommodated in the available designated parking spaces. Parking counts conducted in 2011 indicate that a maximum of 870 cars were parked at Tuolumne Meadows at the peak of the summer season. This includes cars parking in the 533 designated day and overnight parking spaces listed above and an additional 337 cars that were crowding into established parking areas and along roadsides. It is assumed that 340 spaces are needed to accommodate existing overnight users; because only 193 spaces are currently designated for overnight users, it is estimated that 147 vehicles belonging to overnight users are currently parking in undesignated areas. The remainder of the cars parked in undesignated areas is assumed to belong to day visitors.

Scenic Segment (Below O'Shaughnessy Dam)

The Below O'Shaughnessy Dam segment is a 1-mile-long segment that begins approximately 500 feet below the dam and ends where the wilderness boundary crosses the river (see figure 3-1). It includes a portion of an administrative road and some structures associated with the operation of the dam. There are no public facilities, and visitor use is not encouraged for reasons of public safety and dam security. There is no employee housing in this segment. Beyond the road and developed site, the remainder of the segment is in designated wilderness. There would be no change in management or use of this segment under the no-action alternative.

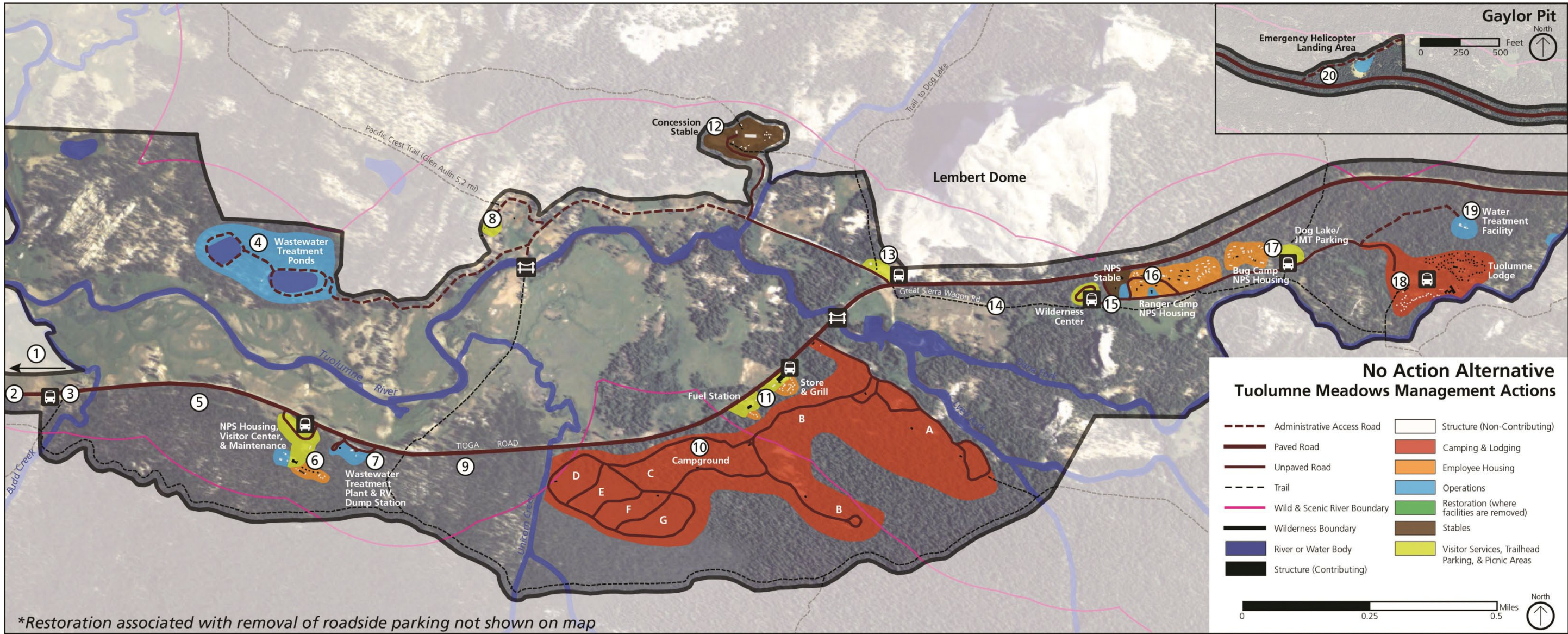


Figure 7-2. Tuolumne Meadows Site Plan, No-Action Alternative.

Key to figure 7-2 and List of Facilities Management Actions:

1. Pothole Dome scenic pullout/ parking areas	<ul style="list-style-type: none">Retain roadside pullout/day parking and trailhead on north side of road.Retain roadside pullout/day parking on south side of road.Retain trail to Pothole Dome.	6. Existing visitor center and Road Camp	<ul style="list-style-type: none">Retain visitor center and day parking.Retain NPS employee housing.Retain maintenance yard and office.	11. Existing commercial services core	<ul style="list-style-type: none">Retain store, grill, mountaineering shop/school, public fuel station, and day parking.Retain concessioner employee housing.	16. Existing ranger station and Ranger Camp	<ul style="list-style-type: none">Retain ranger station and day parking.Retain aboveground diesel fuel tank.Retain NPS employee housing
2. Tioga Road through the Tuolumne Meadows area	<ul style="list-style-type: none">Retain Tioga Road in its current alignment.Allow undesignated roadside parking.Retain vehicle bridge.	7. Wastewater treatment plant	<ul style="list-style-type: none">Retain wastewater treatment plant.Retain recreational vehicle dump station.	12. Existing concessioner stable	<ul style="list-style-type: none">Retain concessioner stable and day parking.Retain concessioner employee housing.	17. Bug Camp, Dog Lake/John Muir Trail parking	<ul style="list-style-type: none">Retain NPS employee housing.Retain day and overnight parking.
3. Existing Cathedral Lakes	<ul style="list-style-type: none">Allow undesignated roadside parking; retain trailhead.	8. Parsons Memorial Lodge	<ul style="list-style-type: none">Preserve Parsons Memorial Lodge and retain vehicle access.Retain footbridge.	13. Lembert Dome	<ul style="list-style-type: none">Retain day parking and trailheads for Lembert Dome and Parsons Memorial Lodge.Retain picnic area.	18. Tuolumne Meadows Lodge	<ul style="list-style-type: none">Retain lodge and overnight parking.Retain roadside parking along access road.Retain concessioner employee housing.
4. Existing wastewater ponds and sprayfields	<ul style="list-style-type: none">Retain ponds, sprayfields, and service road.	9. Area west of Unicorn Creek	<ul style="list-style-type: none">Retain as undeveloped natural area.	14. Old Tioga Road/Great Sierra Wagon Road	<ul style="list-style-type: none">Preserve as trails.	19. Water treatment facility	<ul style="list-style-type: none">Retain water treatment facility.
5. Area east of Budd Creek and west of existing visitor center	<ul style="list-style-type: none">Retain as undeveloped natural area.	10. Tuolumne Meadows campground	<ul style="list-style-type: none">Retain campground in current loop configuration (304 sites plus 7 group sites).Retain campground office and day parking.Retain Elizabeth Lakes trailhead and day parking.	15. Existing wilderness center and NPS stable	<ul style="list-style-type: none">Retain wilderness center and overnight parking.Retain NPS stable.	20. Gaylor Pit	<ul style="list-style-type: none">Retain helipad.Allow undesignated day parking.Retain day and overnight parking along access road.

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Actions Common to Alternatives 1–4

Many of the actions for protecting and enhancing river values would be common to all the action alternatives. These actions respond to the management concerns about river values, which are outlined in chapter 5. Since these actions would be common to all of the action alternatives, they are already incorporated into the body of the *Tuolumne River Plan*. They are described in detail in chapter 5, “River Values and Their Management.” They are also summarized here to emphasize that they would be integral parts of any of the action alternatives, although they are not repeated under each alternative.

Wild Segments (Designated Wilderness and Glen Aulin)

Resource Protection and Enhancement

Free Flow

- Continue to work cooperatively with the SFPUC and others to inform releases from O’Shaughnessy Dam intended to more closely mimic natural flows.

Water Quality

- Replace the composting toilet at the backpacker campground at Glen Aulin High Sierra Camp.

Biological Value: Subalpine Meadow and Riparian Complex

- Reduce the potential for stock-related impacts in Lyell Canyon by regulating stock use as follows:
 - Establish an opening date for stock to enter the high country that protects meadow and riparian areas during the wettest portions of the spring and early summer.
 - Manage stock use to not exceed 192 grazing-nights per year. This target grazing capacity for meadows in the Lyell Fork was based on recent meadow condition assessments and past research (Cole et al. 2004) to estimate the grazing levels that can be sustained without undesirable effects on meadow habitat (NPS, Ballenger 2010h). Meadows receiving high use would be monitored annually to ensure that the target grazing capacity was protective of river values (NPS, Ballenger et al. 2010j). This management action would apply only to stock grazing-nights; additional stock use nights could be accommodated and still be protective of river values if users packed in their own feed. (Additional limitations on commercial use in wilderness, including commercial overnight stock use, are described under “Management of Visitor Use and User Capacity,” below.)
 - Allow camping with stock only in two designated campsites that are located away from sensitive resources.
 - Restrict campsite access to only approved routes found suitable to protect natural and cultural resources.
 - Restrict grazing to certain locations found suitable to protect natural and cultural resources.
- Restore localized areas previously disturbed by human and pack stock use in Lyell Canyon, using techniques that meet the minimum-requirement criteria established under the Wilderness Act.

Biological Value: Low-Elevation Riparian and Meadow Habitat

- Make informed recommendations for water releases from the dam that would provide maximum ecological benefits to the river-dependent ecosystems below the dam.

Cultural Value: Archeological Landscape

- Protect prehistoric archeological sites by diverting use away from sensitive areas.
- Mitigate ecological restoration practices by using noninvasive techniques wherever possible, and undertake site-specific treatment actions, such as data recovery, where necessary to avoid resource loss through park actions or, where possible and practicable, through natural forces.

Scenic Value: Scenery through Lyell Canyon and the Grand Canyon of the Tuolumne

- Continue to allow the natural scenery to evolve in response to natural ecological processes, with no management of scenic vistas.

Recreational Value: Wilderness Experience along the River

- Continue to manage overnight use in wilderness through an overnight trailhead quota system (see “Maximum Amounts of Use,” below) to protect opportunities for solitude.
- Continue to maintain the formal trails through Lyell Canyon, the Grand Canyon of the Tuolumne, and Poopenaut Valley.

Management of Visitor Use and User Capacity

User capacity for the river corridor has two components: visitor use and administrative use. The corridor must be able to accommodate both capacities within the management standards for river values presented in chapter 5. In the discussion that follows, visitor use and associated visitor capacity is described first, followed by administrative use and associated employee capacity.

Kinds of Visitor Use

Individuals would continue to have opportunities for all the kinds of recreational activities that currently occur in wild segments of the corridor. (Commercial support for recreational activities, including guided day hikes, overnight hikes, and overnight stock trips, and concessioner stock day rides would vary among the alternatives.)

Maximum Amounts of Visitor Use and Management of Visitor Use Capacity

The day use capacity in wild segments of the river corridor would vary among the alternatives. Day visitors in the wild segments above Hetch Hetchy Reservoir access these segments from parking in the Tuolumne Meadows area; therefore, changes in use levels in the Tuolumne Meadows and Lower Dana Fork segments have the potential to affect use levels in the wild segments. Under all alternatives, the amount of day use in wild segments would be managed to stay within a management standard established to protect a wilderness experience along the river; the suite of potential management actions could include additional management of day parking or implementation of a day trailhead quota system (see chapter 5).

Overnight user capacity would continue to be managed through a system of zone capacities and related overnight trailhead quotas that currently accommodate a maximum of 350 backpackers per night above Hetch Hetchy Reservoir and a maximum of 50 backpackers per night below the reservoir (see table 7-2). Under any of the action alternatives, the zone capacities might be reduced in the future if it was determined that reductions were needed to protect wilderness character; however, they would not be increased above the current levels, which have been determined to be protective of river values.

The kinds and amounts of overnight use associated with the Glen Aulin High Sierra Camp would vary among the alternatives.

Administrative Use

Administrative use is a separate user capacity issue that primarily relates to employee housing and associated implications for water consumption and wastewater treatment within the corridor. The only employee housing in wild segments would be at the Glen Aulin High Sierra Camp. The number of employees housed at Glen Aulin would vary by alternative, depending on the levels of visitor use and water consumption prescribed by each alternative.

Glen Aulin (Potential Wilderness Addition)

The Glen Aulin High Sierra Camp would be managed differently under alternatives 1–4; however, whether the camp remained, was reduced in size, or was completely removed (these are the management options considered in the alternatives), ecological restoration would be undertaken to mitigate current impacts on wetlands and riverbanks. Although the habitats at Glen Aulin have not been identified as an outstandingly remarkable value of the river, all federal land managers are directed to protect wetlands under Executive Order 11990. In addition, riverbank restoration would help to enhance the free-flowing character of the river. Detailed direction for this work is provided in the *Ecological Restoration Planning Report*, which is summarized in chapter 5 and appended to this document as appendix H. The actions that would occur under any of the action alternatives are summarized below:

- Remove any impacts on wetlands and restore currently affected areas to natural conditions.
- Reroute the heavily used trail out of the fragmented wetland to a less-sensitive upland area.
- Revegetate the historic corral on the granite bench that once was an extension of a delineated wetland.
- Revegetate, stabilize, and protect denuded riverbanks on the Tuolumne River.

The following management of the backpacker campground would be common to all the action alternatives:

- Retain the backpacker campground to accommodate no more than 50 people per night (based on the capacity of the Glen Aulin wilderness zone).¹ This zone capacity, which would be protective of river values, would be managed through the trailhead quota system. The capacity might be reduced (but not increased) in the future if it was determined that a reduction was needed to protect wilderness character.
- Replace the aging composting toilet at the campground to adequately handle waste loads and reduce the risk to water quality.

¹ Because Yosemite restricts backcountry use by trailhead, not by site, it is difficult to estimate the capacity of this campground. However, because the majority of Glen Aulin zone users stay at the campground, while few who enter the river corridor from other trailheads pass through the Glen Aulin area, the Glen Aulin zone capacity suffices for a reasonable estimate of this campground's capacity.

Scenic Segments (Tuolumne Meadows and Tioga Road Corridor)

Note that this discussion pertains only to the nonwilderness portions of the Tuolumne Meadows and Lower Dana Fork segments. The portions of these segments within designated wilderness would be managed the same as the wild segments.

Resource Protection and Enhancement

Free Flow

- Continue to improve water conservation and sustainability practices, including installation of water meters, use of low-flow fixtures, and visitor and employee education, and identify and implement additional long-term water conservation measures.
- Improve the Tioga Road bridge at Tuolumne Meadows and the footbridge at Parsons Memorial Lodge to mitigate impacts on river hydrology during periods of high flows. Improvements to both bridges would be compatible with their historic character, and would require additional planning and compliance.
- Remove approximately 150 feet of boulder riprap from the riverbank near the campground A-loop road to allow the river to flow more freely.

Water Quality

- Upgrade utility systems to conserve water and protect water quality.
- Stabilize the road cut east of Tuolumne Meadows along Tioga Road to reduce erosion into the Dana Fork.
- Continue best management practices to mitigate the potential for impacts on water quality associated with administrative and private stock use.

Biological Value: Subalpine Meadow and Riparian Complex

Alternatives 1–4 would protect subalpine meadow and riparian areas from visitor-related impacts by removing informal trails; mitigating the hydrologic impacts caused by historic trail segments; and eliminating all facilities except roads, trails, and some underground utilities from meadow and riparian areas. Detailed direction for this work is provided in the *Ecological Restoration Planning Report*, which is summarized in chapter 5 and included as appendix H. Referenced locations are shown on the Ecological Restoration map (figure 5-11) in chapter 5. Meadow and riparian areas would be further enhanced by ecological restoration projects designed to restore riparian vegetation to riverbanks; direction for this work is also provided in the *Ecological Restoration Planning Report*. Research would continue to identify and protect or reestablish the conditions necessary for the ecological recovery and long-term integrity of river-related habitats suspected of disruption by historic and contemporary human use, climate change, and other disturbances. Actions common to alternatives 1–4 are summarized below and described in greater detail in chapter 5 and appendix H:

- Eliminate undesignated roadside parking and associated informal trails at Tuolumne Meadows.
- Remove structures inappropriately sited near the riverbank or in wet areas.
- Restore riparian vegetation along riverbanks.
- Mitigate effects of Tioga Road culverts.
- Mitigate effects of the Great Sierra Wagon Road.
- Conduct additional research to determine causes of altered riparian and meadow condition in Tuolumne Meadows.
- Increase interpretive programming to educate visitors about the fragility of meadow/riparian areas.

Cultural Value: Archeological Landscape

- Protect prehistoric archeological sites by removing informal trails and managing visitor use to avoid sensitive areas.
- Avoid, reduce, or mitigate the potential effects of ecological restoration by using noninvasive techniques wherever possible, and undertake site-specific treatments and data recovery where necessary to avoid resource loss through park actions, or where possible and practicable to avoid resource loss through natural forces.

Cultural Value: Parsons Memorial Lodge

- Preserve Parsons Memorial Lodge through periodic assessments and appropriate treatments directed by the guidance for properties included on the List of Classified Structures.

Scenic Value: Scenery through Dana and Tuolumne Meadows

- Continue to allow the natural scenery to evolve in response to natural ecological processes. Vegetation removal for scenic vista management at specific vista points (see appendix J) would occur under some, but not all, of the action alternatives. However, the general mechanical removal of conifers to enhance meadow scenery would not occur under any alternative. (Mechanical removal of conifers to protect the meadows has recently been suspended and would not be resumed unless called for in ongoing studies in support of ecological restoration.)
- Mitigate human intrusions into views by eliminating undesignated roadside parking, removing informal trails, and restoring more natural conditions to many currently disturbed sites.

Recreational Value: Tioga Road Access to the River through Tuolumne and Dana Meadows

- Retain seasonal (generally late May or early June through October) recreational access to the river through Tuolumne and Dana Meadows by way of Tioga Road. Recreational opportunities afforded by this access include both scenic driving along the river and the opportunity to park and get out of cars to enjoy recreational experiences in a river-related landscape.
- Retain Tioga Road on its current alignment.
- Enhance the scenic driving experience by eliminating undesignated roadside parking.

(The alternatives of maintaining Tioga Road for year-round access and/or realigning Tioga Road through the Tuolumne Meadows area were considered but dismissed. See “Alternatives Dismissed from Further Consideration” at the end of this chapter for a discussion of these decisions.)

Management of Visitor Use and User Capacity

The following paragraphs discuss the management of visitor use and user capacity, which were introduced in chapter 5 (as part of the discussion of management standards for river values) and chapter 6 (as part of the discussion of visitor use and user capacity).

Kinds of Visitor Use

The primary differences among the alternatives involve the kinds and amounts of visitor use. These are discussed for each alternative and followed by a discussion of how that particular alternative would protect each river value.

Facilities and services are integral components of different kinds of visitor use and critical to managing user capacities because they can influence the way that public access to the river affects river values. The following examples illustrate how the character of visitor use is shaped by facilities and services, and how facilities and services in turn affect the protection of river values: Domestic water is a basic campground and lodging service; however, withdrawing too much water from the river to support these visitor services has the potential to

adversely affect river flows. Providing designated parking lots and prohibiting undesignated roadside parking can protect subalpine meadows from damage associated with indiscriminate parking and informal trails; however, the ability to provide designated parking spaces is constrained by the limited land area outside the boundary of the Yosemite Wilderness and the requirement to avoid adversely affecting natural, archeological, and scenic values through site development. Providing boardwalks can prevent visitors from creating informal trails in riparian areas; however, such facilities may change the character of the visitor experience. The availability of concessioner stock day rides may enhance the recreational experience for some visitors but detract from the experience of others.

The alternatives under consideration for the *Tuolumne River Plan* explore a reasonable range of services and facilities and associated visitor capacities for the Tuolumne Meadows and Lower Dana Fork segments, related primarily to balancing the following considerations in ways that would be protective of river values:

- amount of water withdrawal from the Dana Fork
- number of day parking spaces
- number of campsites at the Tuolumne Meadows campground
- number of tent lodging units at Tuolumne Meadows Lodge
- number of concessioner stock day rides

Winter Use

Regardless of which alternative is selected, visitor use of the river corridor during the winter will remain unchanged. It is Yosemite National Park policy to close the Tioga Road each winter after the first major snowfall and to manage the Tuolumne Meadows area and Glen Aulin as de facto wilderness. The alternative of keeping the Tioga Road open during the winter, or of extending the use season, has been dismissed as infeasible (see “Alternatives Dismissed from Further Consideration,” at the end of this chapter). In the winter, the recreational value of the Tuolumne Meadows and Lower Dana Forks segments shifts from river access via Tioga Road to a wilderness experience along the river. The snow season, which in the Yosemite high country usually extends from November to late May or early June, is a quiet time to enjoy solitude in the raw elements of winter. Visitor access to the high country in the winter is limited to cross-country skiing and snowshoeing. Snowmobiling as a mode of visitor access is not consistent with wilderness management and is prohibited by Yosemite National Park policy. Winter camping is regulated according to the wilderness overnight permit system.

Maximum Amounts of Visitor Use

The maximum number of people at one time in the river corridor would depend largely on the number of people entering the corridor in the Tuolumne Meadows and Lower Dana Fork segments via Tioga Road. As noted above, day visitors in the wild segments above Hetch Hetchy Reservoir access these segments from parking in the Tuolumne Meadows area. The number of visitors below the dam is minimal compared to the number of visitors above the reservoir. This section addresses the elements of user capacity that are common to alternatives 1–4 as they relate to the Tuolumne Meadows and Lower Dana Fork segments. A corridorwide user capacity for each alternative, which combines both the maximum day use and the maximum overnight use for both the scenic and the wild segments, is presented as part of the detailed description of each alternative (see tables 7-5, 7-7, 7-9, and 7-11 later in this chapter). A comparison summary of all the alternative user capacities is presented at the end of this chapter (table 7-14).

The maximum number of people at one time in the river corridor would vary among the alternatives. However, the method for calculating the maximum number of people at one time would be the same under all the alternatives and is summarized below.

Maximum Visitor Day Use

The NPS selected a vehicle-based measure of the maximum number of people at one time who could be parked and out of their vehicles to express the standard for the maximum number of day visitors in the Tuolumne River corridor. Vehicle-based measures are widely accepted in scientific literature as an efficient and effective method for documenting and managing visitor use levels (Gramman 1992; ORCA 1999; Littlejohn et al. 2005; Le et al. 2008). They are particularly applicable to the Tuolumne Meadows area because (1) the primary means of access is by automobile and (2) the vast majority of visitors arrive in personal vehicles.

As a baseline for comparison with the action alternatives, the NPS estimated the maximum day use for the no-action alternative by starting with an actual vehicle count on a peak day during the peak season in 2011 and multiplying the number of parked cars attributed to day visitors by 2.9 persons per vehicle. The maximum number of visitors who currently arrive by tour bus, in-park shuttle, or regional transit was added to this number to reflect the current maximum day use. Maximum day use for alternatives 1–4 was computed by multiplying the number of day parking spaces that would be provided under each alternative by 90%, then multiplying that number of spaces by 2.9 persons per vehicle. The 90% factor is applied to account for the vacancy of a percentage of parking spaces after visitors leave and before new visitors find the empty spaces. The numbers of visitors who arrive by tour bus, in-park shuttle, or regional transit were also included in the total maximum day use for each alternative.

The maximum visitor day use is a capacity figure; the actual day use levels at any one time could be lower, depending on other factors, including time of day or day of the week.

Maximum Visitor Overnight Use

The overnight capacity of the Tuolumne Meadows and Lower Dana Fork segments is based on the combined capacities of the campground and the Tuolumne Meadows Lodge. These capacities would vary among the alternatives. Actual overnight use levels would be lower than these capacities because not all individual campsites and lodging units would be occupied by the maximum number of people allowable.

Management of Visitor Use Capacity

Under all the action alternatives, maximum day use capacity would be managed by restricting day parking to designated parking spaces and by managing the service levels of public transportation that delivers day visitors to the river corridor. The number of day parking spaces would differ among the alternatives, consistent with the differences in the proposed user capacity among the alternatives. Overnight user capacity in the Tuolumne Meadows area would be managed by controlling the number of campsites/people per site in the campground, and the number of lodge units at Tuolumne Meadows Lodge. The amount of parking made available for overnight users would *not* be a mechanism for enforcing overnight user capacity, and the number of spaces related to the number of overnight visitors would be computed using a different set of criteria and assumptions from those used to compute the number of day parking spaces.

General information about parking and traffic conditions would be provided to visitors via the forthcoming parkwide traffic management and information system (see “Appendix M: Cumulative Projects”). Parking areas would be designed to separate day and overnight visitors (either in separate or shared lots). Signs, discussions with staff at entrance stations and visitor contact stations, and notices in park literature would explain the rationale for changes in visitor use management and direct day and overnight visitors to appropriate parking. If no day parking spots were available, day visitors would be directed to another day use location outside the corridor.

If park visitation continued to increase, a parking reservation system would likely be needed at some point in the future. However, because such a system would have to be implemented on a parkwide basis, planning and compliance for this management action would be deferred until comprehensive management planning has been completed for the Tuolumne and Merced Wild and Scenic Rivers. If needed, more detailed planning for a reservation system would occur after the capacities had been established for the Tuolumne and Merced River corridors and the park staff had gained some experience with managing for the user capacities established through those plans. In the meantime, park staff would monitor how well the designated parking at Tuolumne Meadows was serving to manage the day visitor capacity in the Tuolumne River corridor.

In enforcing the visitor use capacities established under the *Tuolumne River Plan*, tactics that were least intrusive on the visitor experience (site design, orientation, education) would be implemented first; however, more intrusive tactics, including issuing and checking parking permits and ticketing illegally parked vehicles, would be implemented if determined necessary to ensure that visitor use remained within the established capacity.

Service levels of public transportation systems serving the Tuolumne Meadows area (the regional transit bus [YARTS], the hiker bus operated by the concessioner, and other transit services) would remain under NPS control, with the number of visitors delivered into the corridor by such services managed according to the user capacity limits established for each alternative. NPS may use any combination of limits on the numbers of buses, the stops they make, the number of passengers they accept, and/or the numbers of routes they run per day.

Kinds and Maximum Amounts of Administrative Use

Total maximum administrative use is expressed in terms of the number of employees (and related administrative personnel, such as partners and volunteers) who would be housed in the Tuolumne River corridor. Housing would vary by alternative, based on the level of visitor services to be provided and on-site development constraints. Before constructing new housing, park managers would examine the efficiency of using existing housing stock. Employees with temporary assignments at Tuolumne Meadows, but who had permanent housing assigned at White Wolf, Crane Flat, or Hodgdon Meadow, would be required to commute or be assigned to the Tuolumne Meadows housing designed for temporary, high-turnover occupancy. In some alternatives, campsites would meet the need for incidental “housing” for employees on temporary duty in the Tuolumne Meadows area.

The amount of employee parking for each alternative would be directly proportionate to the amount of housing provided, with about one parking space provided for each employee. Employees would be expected to park in their designated locations, within the housing areas shown for each alternative. Whenever employees were recreational visitors to the Tuolumne corridor, they and their vehicles would be subject to the overall visitor user capacity and parking restrictions.

Tuolumne Meadows Site Plan

The *Tuolumne River Plan* addresses site planning for Tuolumne Meadows by (1) identifying what facilities would be necessary to provide for public use or to protect river values under each alternative; (2) determining the feasibility of locating those facilities outside the river corridor; (3) for those facilities that must be located inside the corridor, identifying suitable locations that would be protective of river values; (4) establishing the allowable facility capacities (for example, the number of parking spaces, number of employee beds, or amount of water or wastewater to be treated); and (5) providing direction for site design based on protection of river values and desired visitor experiences.

The feasibility of locating the facilities necessary for visitor use and resource protection of the Tuolumne River in areas outside the river corridor boundary is severely constrained by the boundaries of the Yosemite Wilderness, which generally overlaps into the scenic segments of the river corridor. The only locations within the Tuolumne Meadows area that are outside both the river corridor and the designated wilderness are shown on the Site Analysis map (see figure 7-3); the most suitable (for development) of these sites is currently occupied by the B–G loops of the campground.

All visitor facilities would comply with NPS and Yosemite policies and design guidelines governing protection of natural and cultural resources, functionality, energy and water efficiency, and accessibility. The following additional general direction about facilities and site design would be common to all the action alternatives.

Visitor Facilities

The following visitor facilities have been determined to be necessary under all the alternatives (except as noted):

- Visitor contact facilities (whether a visitor center or a visitor contact station) are necessary to help visitors plan their visit and to educate visitors about resource protection.
- A wilderness center is necessary to more specifically support wilderness use and protection.
- A campground is necessary because Tuolumne Meadows is a major visitor destination that is far enough from most visitors' homes to necessitate an overnight stay in the vicinity. Camping is an integral part of a national park experience for many visitors, and the Tuolumne Meadows campground is an integral part of the campground system of Yosemite National Park.
- A campground office near the entrance to the campground is necessary to support campground management (camper check-in, fee collection, basic orientation).
- The Tuolumne Meadows Lodge is necessary to provide affordable accommodations for visitors who choose not to camp or who are unable to camp (for lack of equipment or experience). (As an exception to this determination, the lodge would be removed under alternative 1 to allow for a particular kind of visitor experience characterized by self-reliance and solitude. User capacities under alternative 1 would be substantially lower than the other alternatives, and no commercial services would be available.)
- The Glen Aulin High Sierra Camp is necessary to allow visitors with a broader range of physical abilities to enjoy a wilderness experience along the river. (As an exception to this determination, the camp would be removed under alternative 1 to allow for a particular kind of visitor experience characterized by self-reliance and solitude.)

Campground

The campground would be rehabilitated under all the action alternatives. Campground Design Guidelines have been developed to guide campground improvements needed to enhance the recreational camping experience. These guidelines, included in appendix K, address campground circulation, campsite delineation, and restoration of a more natural setting within the campground. Such improvements would occur regardless of which alternative for campground capacity or general configuration was selected.

Trails and Trailheads

Trails and trailheads are necessary to provide access while protecting resources. The following management of trails and trailheads would be common to alternatives 1–4:

- Retain Pothole Dome parking and trailhead on north side of Tioga Road, with no overnight parking at the trailhead. Designate a trail from the trailhead to the top of the cascade (where the river leaves the meadow); restrict trail use to foot traffic by small groups.

- Restore the Cathedral Lakes trailhead to natural conditions and reroute the trail to a new trailhead near the parking at the location of the existing visitor center.
- Maintain the following sections of the Great Sierra Wagon Road bed through the Tuolumne Meadows area for trail use (now part of the Pacific Crest Trail); manage the trails to restore more natural meadow hydrology while protecting the historic character of the road bed:
 - Section from Tioga Road to Parsons Memorial Lodge
 - Section between Parsons Memorial Lodge and Lembert Dome
 - Section from Lembert Dome to Tuolumne Meadows Lodge
- Maintain the trailhead at the base of Lembert Dome, which provides access to both the Lembert Dome trail and the trail to Parsons Memorial Lodge.
- Retain the trailhead for the Dog Lake and John Muir Trail and expand parking.
- Retain the Elizabeth Lakes trailhead.
- Provide a new trail connecting the campground with the area currently occupied by the store and grill (although the use of this location varies among the alternatives, it remains a visitor service area warranting trail access from the campground).
- Formalize the trail connecting the campground with the John Muir Trail.
- Maintain the formal trails radiating from Tuolumne Meadows trailheads through the Tuolumne Meadows, Upper and Lower Dana Forks, Lyell Fork, and Grand Canyon segments.

Parking

Day Parking

Day parking is necessary to provide access to trailheads and visitor facilities.

All day parking in the Tuolumne Meadows area would be confined to designated parking areas under alternatives 1–4. Curbing or other physical barriers that are consistent with the historic cultural landscape would be installed along the shoulders of Tioga Road through Tuolumne Meadows to prevent undesigned roadside parking and associated informal trails across the meadows.

Formal parking to replace some of the eliminated undesigned roadside parking would be consolidated in locations determined to be protective of river values, primarily in upland areas away from the river and meadows, out of primary viewsheds, and without known archeological sites. In general, the amount of designated parking areas would be expanded to replace some of the shoulder parking being eliminated from Tioga Road and the road to Tuolumne Meadows Lodge.

In addition to formal parking areas, four additional parking pullouts would be delineated along Tioga Road within the Tuolumne Meadows area to accommodate scenic viewing and traffic safety operations. The pullouts would be well-delineated to prevent encroachment of vehicles or foot traffic into the adjacent meadows. These pullouts would be posted for brief stops only and would not be counted as part of the day parking for Tuolumne Meadows. The pullouts would be on both the north and south sides of Tioga Road at locations west of the existing visitor center and near the campground D-loop road, in locations that have historically been used for this purpose.

Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows.

Overnight Parking

Overnight parking is necessary to support overnight camping, lodging, and wilderness permit holders. Parking for people staying in the Tuolumne Meadows campground would be provided at the campground; parking for guests at the Tuolumne Meadows Lodge would be provided at the lodge. Overnight parking for the Glen Aulin High Sierra Camp and for wilderness backpackers with overnight permits for trailheads above Hetch Hetchy Reservoir would be provided in designated parking areas at various locations in the Tuolumne Meadows area.

Employee Parking

Employee parking is necessary to support visitor and administrative use. Under all alternatives, employee parking would be restricted to spaces designated for employees in housing and administrative/maintenance areas, and these spaces would be counted and managed separately from visitor parking. Employee parking would be sized to accommodate the small number of employees (5–10) on temporary duty at Tuolumne Meadows.

Stables

An NPS stable is necessary to support wilderness patrol and trail maintenance. A concessioner stable is necessary to support the High Sierra Camps. Even if the Glen Aulin High Sierra Camp was closed (as proposed in alternative 1), other High Sierra Camps outside the corridor would continue to be supplied from the Tuolumne Meadows stable.

Park Operations

At this relatively remote location, administrative offices and maintenance facilities are necessary to support basic park operations, and the helipad at Gaylor Pit is necessary to support visitor protection operations.

Employee Housing

NPS employee housing is necessary to provide essential personnel for visitor and resource protection, interpretive and educational services, administration, and maintenance. Concessioner employee housing is necessary to support commercial services. The amount of housing needed would vary among the alternatives, depending upon the management of visitor use and user capacity.

For reasons described earlier, it would not be feasible to place the housing determined to be necessary in the Tuolumne Meadows area in a location outside the river corridor; however, housing retained would be limited to no more than the amounts specified in each alternative. Any additional housing for employees working in the Tuolumne Meadows area would have to be located elsewhere, either inside or outside the park. Decisions about any additional housing would require separate planning and NEPA/NHPA compliance.

To be consistent with the scenic river segment classification, new housing in the river corridor would be modest in scale and consistent with the Tuolumne Meadows Employee Housing Design Guidelines (see appendix K). New employee housing units would meet Occupational Safety and Health Administration (OSHA) regulations and NPS standards for being “safe, sanitary, sited to avoid natural hazards, integrated into the park environment, and, to the best extent possible, energy efficient and cost-effective to maintain.”

Utility Systems

Domestic water and wastewater treatment systems are necessary to support visitor use at Tuolumne Meadows. The required capacity of the systems would vary, depending upon the management of visitor use and user capacity.

Future site-specific planning would be required for a new water collection, treatment, and distribution system and new wastewater collection, treatment, and disposal system. Future facility design and capacity would adhere to the land use assignments and capacity decisions outlined in the *Tuolumne River Plan*. The following actions would be common to alternatives 1–4.

Tuolumne Meadows Wastewater Collection, Treatment, and Disposal

- Upgrade the wastewater treatment plant to modern treatment codes, on the south side of Tioga Road in the area currently used for wastewater collection and treatment, which has been determined to be protective of river values. Even though the location is not within the 100-year floodplain, design the plant to resist damage from flooding.

Tuolumne Meadows Water Collection, Treatment, and Distribution

- Upgrade the water treatment facility in the existing location, which has been determined to be protective of river values.
- Upgrade water distribution system to eliminate leaks and conserve water.
- If a suitable alternate source of water were to be determined in the future, remove the Dana Fork collection diversion and restore the river to natural conditions at that location.

Site Restoration

Under all alternatives, all facilities except roads, trails, and some underground utilities would be removed from meadow and riparian areas, and the sites would be restored to natural conditions, following the applicable recommendations in the *Ecological Restoration Planning Report* (described in greater detail in chapter 5 and appendix H). Specific sites that would be restored under all the action alternatives are listed below:

- sites disturbed by undesignated roadside parking and informal trails
- the site of the concessioner employee housing behind the store and grill
- the site of the concessioner employee housing near the river at Tuolumne Meadows Lodge
- the sites of three visitor tent cabins closest to the river at the Tuolumne Meadows Lodge

Scenic Segment (Below O'Shaughnessy Dam)

Except for the effect of the dam on the river's free flow, no management concerns related to river values have been identified for this segment of the river. The effect of the dam is addressed under the Poopenaut Valley segment as it relates to the outstandingly remarkable biological values below the dam. No outstandingly remarkable biological, geologic, scenic, or recreational values have been identified in the Below O'Shaughnessy Dam segment. One archeological site that might contribute to outstandingly remarkable cultural values of the river corridor is within the segment boundary. The site has been affected by road construction and is potentially at risk from impacts related to construction or maintenance projects, which would be subject to compliance with the 1999 programmatic agreement between Yosemite National Park, the Advisory Council on Historic Preservation (ACHP), and the California state historic preservation officer (SHPO) (included in appendix D) or other consultation procedures consistent with NHPA section 106, as agreed to through consultation with the SHPO and other interested parties. Because no change in the management of this segment is anticipated, it is not included in any further discussion of the alternatives.

Site Suitability: Tuolumne Meadows

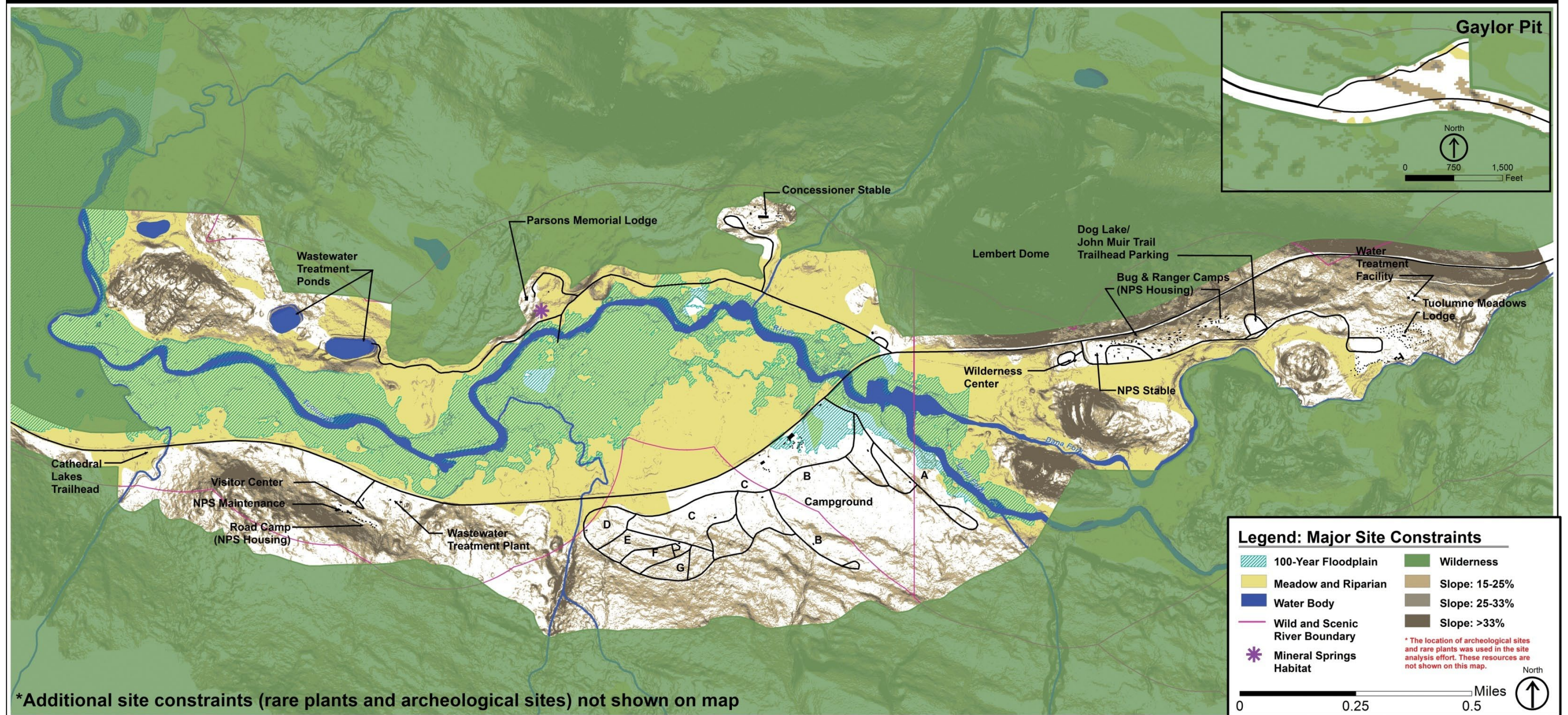


Figure 7-3. Site Analysis: Tuolumne Meadows.

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Summary of Protection and Enhancement of River Values under All Action Alternatives

Section 10(a) of WSRA requires managers to “protect and enhance the values which caused [the river] to be included in [the wild and scenic rivers] system.” The 1982 Secretaries’ Guidelines for River Areas (USDI and USDA 1982) indicate that the nondegradation and enhancement standard for the outstandingly remarkable values of a wild and scenic river is initiated at time of designation. If the value was protected at the time of designation and the trend associated with the impacts of the alternative would maintain or improve a high-quality condition, the value would be protected or enhanced. If the condition at the time of designation was threatened, then the value would be protected or enhanced if the alternative would result in an upward trend in quality that would eventually result in a high-quality condition being achieved.

Consistent with section 10(a) of the Wild and Scenic Rivers Act, the alternatives give primary emphasis to protecting the river’s “aesthetic, scenic, historic, archeological and scientific [biological, geologic, and hydrologic] features” by proposing actions that would be taken to address the management concerns identified for these values and to meet the management objectives established for them. Such actions would include both management of natural and cultural resources and management of visitor use and development to protect river values. Generally, the resource management actions are common to all alternatives, while the management of visitor use and development differs among the alternatives.

Major constraints on kinds and amounts of visitor use in the Tuolumne River corridor are (1) the protection of the free-flowing condition of the river, which constrains the amount of water that can be withdrawn for domestic use at Tuolumne Meadows; (2) protection of water quality, which constrains the disposal of wastewater and other risks to water quality at Tuolumne Meadows and Glen Aulin; (3) protection of subalpine meadow and riparian habitat, which constrains facility development, foot traffic, and stock use in these sensitive habitats; (4) protection of archeological sites, which constrains facility development and foot traffic in areas where sites are located; and (5) protection of river-related recreational experiences, which constrains the character of services and facilities and the amount of use that can be accommodated before crowding is perceived.

Resource management actions that would be taken under all of the action alternatives to protect or enhance river values are summarized below and in table 7-4 at the end of this section. See also table 7-13 at the end of this chapter, which compares and contrasts all of the actions that would be taken under each alternative to protect and enhance river values.

Free-Flowing Condition of the River

Tuolumne River flows below O’Shaughnessy Dam were altered by the dam at the time of designation and would remain altered by dam operations under all the alternatives. However, the NPS is working with the SPPUC and others to make informed recommendations for water releases from the dam that would more closely mimic natural flows while meeting the City of San Francisco’s mandates for water supply and power generation. Draft recommendations for water releases from the dam have been reviewed by stakeholders, but the final recommendations have not yet been completed, nor have they been adopted by the SFPUC. When recommendations are approved, this action is expected to result in an upward trend in, and enhancement of, the currently altered free-flowing condition of the river below O’Shaughnessy Dam. Monitoring of river and groundwater levels and river-associated habitats would continue to inform this management.

The recent study of the effect of water withdrawals in the Tuolumne Meadows area on low flows and downstream habitat concludes that withdrawals of no more than 10% of low flow would have only a minimal

impact on downstream habitat (Waddle and Holmquist 2011). Based on the conclusions of this study, the standard for protecting river flows has been set at withdrawals of no more than 10% of minimum flows. Withdrawals of 65,000 gallons per day would approximate 10% of flow at 1 cubic foot per second, and average demands of no more than 60,000–70,000 gallons per day would fall within the margin of error of meeting a standard of no more than 10% of low flow when low flow equals 1 cubic foot per second (see chapter 5). All the action alternatives would be required to meet this standard. Long-term monitoring of river flows would identify whether flows were declining from current levels as a result of natural cycles or climate change, in which case water withdrawals would be adjusted as necessary, with associated adjustments in visitor services, to ensure that they stayed below 10% of minimum flows.

The impediments caused by the abutments for the Tuolumne Road bridge and the footbridge at Parsons Memorial Lodge would be removed to allow the river to flow freely through these sections, even during periods of high flows. This action would result in an upward trend in, and protection of, the currently high-quality free-flowing condition of the river above Hetch Hetchy Reservoir. Additional site-specific planning and compliance would be required to implement this action.

The boulder riprap would be removed from an approximately 150-foot length of riverbank near the campground A-loop road to allow the river to flow more freely.

Water Quality

Risks to water quality in the Tuolumne Meadows area would be reduced under all the action alternatives by upgrading the utility systems, including upgrading the wastewater treatment plant to modern treatment codes; the amount of wastewater treated and the associated facility design would vary by alternative. The road cut east of Tuolumne Meadows along Tioga Road would be stabilized to reduce erosion into the river, which creates high levels of turbidity at the Dana Fork intake. Best management practices to mitigate the potential for impacts on water quality associated with stock use, including manure removal, would be continued under any alternative; the kinds and levels of stock use would vary by alternative. Long-term monitoring would continue to test for nutrients, *E. coli*, and petroleum hydrocarbons, and any decrease in water quality associated with any of these indicators would trigger action to address the concern before an adverse impact occurred.

Biological Value: Subalpine Meadow and Riparian Complex

The subalpine meadow and riparian complex was undergoing changes in ecological integrity at the time of designation that continue today. As described in chapter 5, the impacts of historical sheep grazing, coupled with the emerging stress of global climate change and more frequent periods of low precipitation, and exacerbated by foot traffic and pack stock use in sensitive meadow habitats, appear to be resulting in diminished ecosystem function in the subalpine meadow and riparian habitats in the Tuolumne Meadows area.

Resource management activities in the subalpine meadow and riparian complex under all the action alternatives would focus on improving the ecological resistance and adaptive capacity of the meadows by mitigating past and ongoing disturbances to hydrology, vegetation, geomorphology, and soils:

- Establishing willows along the riverbanks would help stabilize the banks and reduce unnatural shoreline erosion, which is likely causing widening of the river channel. A more natural, narrower, and deeper channel would maintain a higher river stage for any given flow volume and sustain the relatively high water table critical to meadow vegetation.
- Improving Tioga Road culverts and restoring more natural contours to the trails that follow the roadbed of the historic Great Sierra Wagon Road would allow more natural sheet flows across the meadows, thus improving the distribution of nutrients and increasing soil moisture and groundwater levels.

- Removing, crushing, or filling old, unused underground utility lines would mitigate or eliminate their potential impact on subsurface water flow beneath the meadows.
- Continuing research to support possible additional restoration of vegetative communities disrupted by historic uses, if determined to be feasible and appropriate, would address issues such as potential restoration techniques to restore belowground biomass, soil-forming processes, and stability of the prehistoric meadow vegetation.

The intent of this management would be to facilitate the recovery of more natural hydrologic and biological processes needed to sustain the subalpine meadow and riparian complex within the river corridor. These actions would result in an upward trend in, and enhancement of, the meadow and riparian habitats in the Tuolumne Meadows area.

In addition to the above resource management actions, visitor use would be managed under all the action alternatives to reduce the stress on the meadow and riparian complex. Visitor use accommodated in portions of the Tuolumne River corridor that have subalpine meadow and riparian habitats currently reaches a maximum of about 4,000 people at one time during the peak use period. This use is concentrated in the Tuolumne Meadows area, from which visitors disperse to the Lyell Fork, the Dana Fork, and the Grand Canyon segments. Subalpine habitats in less heavily used portions of the corridor, principally along the Lyell and Dana Forks, are experiencing some localized, minor impacts associated with foot traffic and stock use in Lyell Canyon. In the Tuolumne Meadows area, the current kinds and amounts of use are causing numerous informal trails, which result in vegetation trampling, soil compaction, and fragmentation of subalpine meadow and riparian habitat. These impacts likely contribute to the unusually high levels of bare ground, changes in vegetation, and loss of willows along riverbanks.

Foot traffic in sensitive meadow and riparian areas would be greatly reduced under all the action alternatives by prohibiting undesignated roadside parking, removing informal trails and restoring disturbed areas to natural conditions, directing visitors to formal trailheads and trails adjacent to designated parking areas, and prohibiting high-impact activities in meadows and along riverbanks. All facilities except roads, trails, and some underground utilities would be removed from sensitive meadow/riparian areas, and all retained or new facilities would be located in upland areas to reduce the trampling pressure on sensitive wet soils and associated vegetation.

Reducing informal trails and achieving and maintaining a protective standard for unfragmented expanses of meadow habitat (as measured through a *largest patches index*) is considered critical to achieving the management objectives for the subalpine meadow and riparian complex. Therefore, this measure has been chosen as a key indicator of whether user capacity is protective of this river value (see chapter 5).

In Lyell Canyon, the amount and locations of stock use would be regulated under all the action alternatives to protect meadow and riparian vegetation. Resource managers have used meadow condition assessments and past research to identify a grazing capacity of no more than 192 grazing-nights per year for meadows along the Lyell Fork. Meadows receiving high stock use would continue to be monitored, and the capacity would be adjusted if necessary to ensure meadow protection.

These actions would be expected to reduce the stresses on the subalpine meadow and riparian system and, in conjunction with the resource management activities that would be common to all the action alternatives, to mitigate most of the ongoing disturbances to the subalpine meadow and riparian habitats at Tuolumne Meadows, thereby increasing their ecological resistance to the kinds and levels of use that would continue.

Monitoring would be ongoing to ensure that the protective standards for meadow and riparian habitat would be achieved and maintained over time. A suite of three indicators would be used to monitor the health and potential for impact on this complex river value. If conditions were declining for any one of these indicators, additional actions would be taken, including possible further management of visitor use, as described in chapter 5.

Biological Value: Low-Elevation Riparian and Meadow Habitat

At the time of designation, river-dependent riparian and meadow habitat in Poopenaut Valley had been largely spared the severe impacts seen downstream of other dams because of several factors unique to this setting, and they remain some of the most diverse and productive communities in the park. These high-quality communities would be protected over the long term by mitigating the ongoing disturbance to hydrology caused by O'Shaughnessy Dam. The intent of this management would be to provide maximum ecological benefits to the river-dependent ecosystems downstream of the dam, within the bounds of the Raker Act and NPS authority. Long-term monitoring of river and groundwater levels and river-associated habitats would continue to inform this management.

Cultural Value: Archeological Landscape

More comprehensive information is now available about the current condition of archeological sites than was available at the time of designation. Because the condition of archeological sites cannot be enhanced, they would have been in the same or better condition at the time of designation compared to the current condition. As described in chapter 5, archeological sites in developed areas continue to be at high risk for ongoing visitor- and construction-related impacts (including impacts from facility maintenance and repair). Almost all the sites in the meadows and along the river are affected by informal trails, many of which emanate from undesignated roadside parking and bring visitors close to sensitive archeological sites. Several sites have evidence of camping and campfires. Many sites in Dana and Tuolumne Meadows are at risk of losing some of their integrity from ongoing visitor use impacts associated with nearby informal trails.

Under all the action alternatives, the potential for impacts related to informal trails would be reduced by eliminating undesignated roadside parking in the Tuolumne Meadows area and directing use to designated trailheads and trails. These actions would be expected to result in the protection of archeological sites at their current levels of integrity, which for most sites has been evaluated as being in good or fair condition. As stated above, the condition of an archeological site cannot be enhanced (an upward trend in condition is not possible; only an upward trend in the level of protection). Periodic site condition assessments would be conducted as part of long-term monitoring and protective management. Any future downward trend in site conditions associated with human use would trigger a required management response to counteract or minimize the effect before an adverse impact occurred, as described in chapter 5.

Any sites that would be disturbed by construction activities would undergo archeological survey, data recovery, and/or mitigations (see the discussions of the archeological landscape in chapter 5 and impacts on archeological resources in chapter 8).

Cultural Value: Parsons Memorial Lodge

Parsons Memorial Lodge had a high level of historic integrity at the time of designation, as it continues to have today. This national historic landmark would continue to be managed through periodic assessments and appropriate treatments directed by the List of Classified Structures. This management would protect its high-quality condition. If future monitoring under the List of Classified Structures assessment program detected

deterioration or damage, repairs would be undertaken to correct the deficiency while the structure was still in an overall good condition.

Scenic Values

Scenic views were of high quality at the time of designation, and they retain a high quality today, although some views in the Tuolumne Meadows and Lower Dana Fork scenic segments are being intruded upon by cars parked along Tioga Road and by encroaching vegetation. The outstandingly remarkable scenic values of the river corridor would be protected under all alternatives by protecting or enhancing the natural processes that have created them and by ensuring that development and undesignated roadside parking would not intrude into highly visible areas. The NPS would conduct a contrast analysis for all new structures and/or modifications of existing structures proposed for the Tuolumne River corridor to ensure that they remained within the established standards for protecting scenic values, as described in chapter 5.

Recreational Value: Wilderness Experience along the River

The wilderness overnight trailhead quota system would continue to help protect this outstandingly remarkable value, particularly on trail segments out of reach of day hikers entering the wilderness from Tuolumne Meadows. Encounter rates would be monitored over the life of the plan, and trailhead quotas would be modified or expanded to cover day use if necessary to protect the wilderness experience on popular day hiking and backpacking trails in wild river segments.

Recreational Value: Tioga Road Access to the River through Tuolumne and Dana Meadows

Opportunities for scenic driving along Tioga Road would be enhanced by eliminating undesignated roadside parking and the congestion currently caused by vehicles slowing to park and pedestrians crossing the road. The effectiveness of using the day parking supply at Tuolumne Meadows to manage the day use capacity in all the river segments above Hetch Hetchy Reservoir would be monitored over time, and additional management action would be triggered if needed to enforce designated parking, as described in chapter 5.

Table 7-4.
Summary of Actions to Protect and Enhance River Values Common to Alternatives 1–4

WILD SEGMENTS	
Value	Action
Free Flow	<ul style="list-style-type: none"> Continue to work cooperatively with the San Francisco Public Utilities Commission and others to inform releases from O'Shaughnessy Dam intended to more closely mimic natural flows.
Water Quality	<ul style="list-style-type: none"> Eliminate or mitigate the risk associated with wastewater disposal at the Glen Aulin High Sierra Camp. Replace the composting toilet at the backpacker campground at Glen Aulin.
Biological Values	Subalpine Meadow and Riparian Complex: <ul style="list-style-type: none"> Discontinue or reduce commercial pack stock use to reduce impacts on subalpine meadow/riparian areas. Restore localized areas previously disturbed by human use in Lyell Canyon using techniques that meet the minimum-requirement criteria established under the Wilderness Act.
	Low-Elevation Riparian and Meadow Habitat: <ul style="list-style-type: none"> Make informed recommendations for water releases from O'Shaughnessy Dam that would provide maximum ecological benefits to the river-dependent ecosystems below the dam.
Cultural Values	Archeological Landscape: <ul style="list-style-type: none"> Protect prehistoric archeological sites by diverting use away from sensitive areas. Mitigate ecological restoration practices by using noninvasive techniques wherever possible, and undertake site-specific treatment actions, such as data recovery, where necessary to avoid resource loss through park actions or natural forces.
Scenic Values	Scenery through Lyell Canyon and the Grand Canyon of the Tuolumne: <ul style="list-style-type: none"> Continue to allow the natural scenery to evolve in response to natural ecological processes, with no management of scenic vistas.
Recreational Value	Wilderness Experience Along the River: <ul style="list-style-type: none"> Continue to manage overnight use in wilderness through an overnight trailhead quota system (see "Maximum Amounts of Use," below) to protect opportunities for solitude. Manage day use levels along wilderness trails within reach of day hikes from Tioga Road to achieve an encounter rate that is protective of a wilderness experience along the river (the maximum encounter rate would vary among the alternatives).
SCENIC SEGMENTS	
Value	Action
Free Flow	<ul style="list-style-type: none"> Continue to improve water conservation and sustainability practices, including installation of water meters, use of low-flow fixtures, and visitor and employee education and identify and implement additional long-term water conservation measures. Improve the Tioga Road bridge at Tuolumne Meadows and the footbridge at Parsons Memorial Lodge to mitigate impacts on river hydrology during periods of high flows. Improvements to the footbridge would be compatible with its historic character. Remove the boulder riprap from approximately 150 feet of riverbank near the campground A-loop road to allow the river to flow more freely.
Water Quality	<ul style="list-style-type: none"> Upgrade utility systems to conserve water and protect water quality. Stabilize the road cut east of Tuolumne Meadows along Tioga Road to reduce erosion into the Dana Fork. Continue best management practices to mitigate the potential for impacts on water quality associated with stock use.
Biological Values	Subalpine Meadow and Riparian Complex: <ul style="list-style-type: none"> Eliminate undesignated roadside parking and associated informal trails. Remove structures inappropriately sited near the riverbank or in wet areas. Restore riparian vegetation along riverbanks. Mitigate effects of Tioga Road culverts on surface flows into Tuolumne Meadows. Mitigate the effects of the Great Sierra Wagon Road bed on sheet flow across Tuolumne Meadows. Conduct additional research to determine causes of altered riparian and meadow condition in Tuolumne Meadows. Increase interpretive programming to educate visitors about the fragility of meadow/riparian areas.
Cultural Values	Archeological Landscape: <ul style="list-style-type: none"> Protect prehistoric archeological sites by removing informal trails and managing visitor use to avoid sensitive areas. Avoid, reduce, or mitigate the potential effects of ecological restoration by using noninvasive techniques wherever possible, and undertake site-specific treatment actions, such as data recovery, where necessary to avoid resource loss through park actions or, where possible and practicable, through natural forces.
	Parsons Memorial Lodge: <ul style="list-style-type: none"> Continue to preserve Parsons Memorial Lodge through periodic assessments and appropriate treatments directed by the List of Classified Structures.
Scenic Value	Scenery through Dana and Tuolumne Meadows: <ul style="list-style-type: none"> Mitigate human intrusions into views by eliminating undesignated roadside parking, removing informal trails, and restoring more natural conditions to many currently disturbed sites.
Recreational Value	Tioga Road Access to the River through Tuolumne and Dana Meadows: <ul style="list-style-type: none"> Retain seasonal (generally late May or early June through October) recreational access to the river through Tuolumne and Dana Meadows by way of Tioga Road. Recreational opportunities afforded by this access include both scenic driving along the river and the opportunity to park and get out of cars to enjoy recreational experiences in a river-related landscape. Retain Tioga Road on its current alignment. Enhance the scenic driving experiences by eliminating undesignated roadside parking.

Alternative 1: Emphasizing a Self-Reliant Experience

Alternative 1 builds upon all the major elements included in the *Tuolumne River Plan* to identify a set of management actions that would work together to protect river values while providing for a self-reliant visitor experience in a more natural setting.

Alternative 1 includes the technical correction to the river corridor boundary (presented in chapter 3), the section 7 determination process for evaluating water resources projects (presented in chapter 4), the management standards and actions for protecting and enhancing river values (presented in chapter 5), and the guidance for identifying an appropriate visitor experience and associated user capacity (presented in chapter 6).

Concept

Alternative 1 responds to those members of the public who expressed a desire for more wilderness-like management throughout the river corridor. It would restore conditions for primitive, unconfined recreation in an undeveloped natural area to much of Tuolumne Meadows and Glen Aulin.

The Tuolumne Meadows area would be the largely undeveloped gateway to a diversity of wilderness experiences characterized by self-reliance and unconfined exploration. Visitors could enjoy the unspoiled scenery from the roadside; participate in an interpretive program; go for a stroll along the river; have an informal picnic on a granite slab; go rock climbing, fishing, wading, or swimming; enjoy a day hike to a subalpine lake; camp in the campground; or embark on a multiday backpacking or stock packing trip. Parking, trailheads for staging wilderness trips, and the facilities needed to support a variety of interpretive and educational programs would be provided in upland areas beyond the periphery of the meadows; however, most commercial services, including the Tuolumne Meadows Lodge, grill, mountaineering shop, and public fuel station, would no longer be available, thus requiring visitors to be self-reliant and prepared in advance for a trip to Tuolumne Meadows. The meadows themselves would remain wild, providing opportunities for primitive, unconfined enjoyment of the river and its surroundings.

In comparison to no action, alternative 1 would include the following actions:

- Restore previously disturbed ecological conditions to subalpine meadow and riparian areas.
- Reduce risks to stream flow and water quality.
- Increase protection of archeological sites and resources important to American Indians.
- Retain all current recreation opportunities except concessioner day rides and commercial use.
- Remove all lodging and commercial services and reduce the size of the Tuolumne Meadows campground.
- Remove the Glen Aulin High Sierra Camp.

The Glen Aulin High Sierra Camp (a potential wilderness addition) would be removed; the area would be restored to natural conditions and would be eligible for inclusion in the Yosemite Wilderness. The backpacker camp would remain.

River values would be protected and enhanced by greatly reducing the footprint of development, by restoring ecological conditions to meadow and riparian areas at Tuolumne Meadows, by greatly reducing demands for water supply and wastewater treatment, and by eliminating most risks to water quality (see “Summary of Protection and Enhancement of River Values under Alternative 1” at the end of this alternative section).

The visitor use capacity under alternative 1 would be reduced to a maximum of 3,065 people at one time, as shown in table 7-5. Actual day use levels would be lower during nonpeak periods, and actual overnight use levels would be lower even during peak periods because not all individual campsites and lodging units would be occupied by the maximum number of people allowable. Administrative use capacity under alternative 1 would be reduced to a maximum of 102 employees at one time (table 7-5).

Table 7-5.
Corridorwide Visitor and Administrative Use Capacity, Alternative 1

Visitor Overnight Capacity					
River Segment	Existing Use Calculation	Current Maximum Overnight Visitors	Proposed Action	Units	Maximum Overnight Visitors, Alternative 1
Scenic Segments					
Tuolumne Meadows Lodge	# of lodging units (69) × max of 4 people per unit	276	Remove lodge (minus 69 guest tent cabins)	0 guest cabins	0
Tuolumne Meadows Campground	# of campsites (304 sites × max of 6 people per site, 7 group sites × max 30 people per site)	2,034	Remove A-loop campsites (minus 67 campsites)	237 sites, 7 group sites	1,632
Wild Segments					
Glen Aulin HSC	# of lodging units (8) × max of 4 people per unit	32	Remove Glen Aulin HSC (minus 8 guest tent cabins)	0 guest cabins	0
Wilderness	Maximum capacity of wilderness zones (400)	400	Retain current wilderness zone capacities	–	400
Subtotal, Visitor Overnight Capacity		2,742			2,032
Visitor Day Use Capacity					
River Segment	Existing Use Calculation	Maximum Observed People At One Time, 2011^a	Proposed Action	Proposed Units	Maximum People At One Time, Alt. 1
Scenic Segments					
Access from Tuolumne Meadows	# of cars parking in designated parking spaces (340) × 2.9 ^b	986	Reduce designated day parking (minus 35 spaces)	305 spaces at 90% occupancy × 2.9 ^b	796
	# cars parking in undesignated spaces (190) × 2.9 ^b	551	Eliminate undesignated roadside parking	–	0
	Maximum people arriving by in-park shuttles, tour buses, and regional public transit	225	Maintain current level of arrivals via tour bus and regional public transit	–	225
Access from Below O'Shaughnessy Dam	# of cars parking in designated spaces (4) × 2.9 ^b	12	Retain existing parking	4 spaces × 2.9 ^b	12
Subtotal, Visitor Day Use Capacity		1,774			1,033
Total Visitor People At One Time		4,516			3,065
Administrative Capacity					
River Segment	Existing Use Calculation	Maximum Employees (existing)	Proposed Action	Units	Maximum Employees, Alt. 1
Wild Segments					
Concessioner	Approximately 9 employees at Glen Aulin HSC	9	Remove Glen Aulin HSC	0	0
Scenic Segments					
NPS	Approximately 150 employees based at Tuolumne Meadows	150	Meet staffing need with 100 employees at Tuolumne Meadows	100 employees	100
Concessioner	Approximately 103 employees based at Tuolumne Meadows	103	Meet staffing need with 2 employees at Tuolumne Meadows	2 employees	2
Total Administrative People At One Time		262			102
Total People at One Time		4,778 (existing)			3,167 (proposed)

^a The peak number of vehicles observed during vehicle counts in 2011 (observed on August 13, 2011).

^b The vehicle occupancy rate is 2.9 people per vehicle, based on visitor studies conducted over the past 20 years that found an average vehicle occupancy ranging from 2.6 to 3.4 (Van Wagtenonk and Coho 1980; FHWA 1982; ORCA 1999; Littlejohn et al. 2005; Le et al. 2008). Based on this range, an average of 2.9 persons per vehicle is used for estimating visitor numbers for planning purposes in this document.

Abbreviations: HSC = High Sierra Camp; max = maximum; # = number.

Wild Segments (Designated Wilderness and Glen Aulin)

Resource Protection and Enhancement

Free Flow

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Water Quality

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Close the Glen Aulin High Sierra Camp and restore the site to natural conditions, thereby eliminating the risk to water quality associated with the wastewater leach mound (see “Glen Aulin,” below).

Biological Value: Subalpine Meadow and Riparian Complex

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Discontinue all commercial use (except as needed for the concessioner to supply the High Sierra Camps outside the river corridor, see table 7-1) to reduce impacts on subalpine meadow/riparian areas. (Additional limitations on commercial use in wilderness are described under “Management of Visitor Use and User Capacity,” below).

Biological Value: Low-Elevation Riparian and Meadow Habitat

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Cultural Value: Archeological Landscape

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Protect the archeological site at Glen Aulin from impacts associated with the removal of the High Sierra Camp by conducting an NRHP site evaluation and data recovery if deemed necessary.

Scenic Value: Scenery through Lyell Canyon and the Grand Canyon of the Tuolumne

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Greatly reduce the signs of stock use on trails in wild segments by removing Glen Aulin High Sierra Camp (which would eliminate the need for stock to set up, take down, transport visitors to, and resupply the camp), eliminating concessioner stock day rides, and eliminating commercial outfitter stock trips in the river corridor. The concessioner would still be able to use stock on the Cathedral Lakes and Lyell Canyon trails to supply the High Sierra Camps outside the river corridor (see table 7-1).

Recreational Value: Wilderness Experience along the River

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Reduce the day use levels along popular wilderness trails within reach of day hikes from Tioga Road so that visitors encounter no more than four other groups per hour (80% of the time, sampled over the entire season, including weekdays and weekends). This encounter rate would be more protective of solitude than the standard adopted for this river value (which would be no more than 10 encounters with other groups per hour, as described in chapter 5) in keeping with the greater emphasis on solitude and self-reliance under this alternative. If monitoring determined that this level of use was being exceeded on some trails, day use wilderness trailhead quotas would be implemented for major trail segments, including Lyell

Fork, Glen Aulin, Cathedral Lakes, and Dog Lake, using a mixed first-come/first-served and advanced reservation system.

- Discontinue all commercial use in wilderness. Under this alternative, all concessioner stock day rides and all commercial outfitter day hikes, overnight hikes, and overnight stock trips would be eliminated to enhance opportunities for self-reliance and solitude in a wilderness setting and to reduce the rate of contacts between parties and with stock on trails.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

All commercial use would be discontinued in wild segments of the river corridor. This would include the Glen Aulin High Sierra Camp (see below), all concessioner stock day rides, and all commercial day hikes, overnight hikes, and overnight stock trips. All other existing activities would continue.

Maximum Amounts of Visitor Use

The overnight capacity for wild segments would be retained at 400 persons per night (350 persons per night above the reservoir and 50 persons per night below the reservoir). This capacity might be reduced in the future if determined necessary to protect wilderness values; however, it would not be increased above this amount, which has been determined to be protective of river values. Overnight use at the Glen Aulin High Sierra Camp would be eliminated.

Management of Visitor Use Capacity

The current overnight trailhead quota system would be retained to regulate overnight use in wild segments. If monitoring determined that the new standard for day use was not being met, a day trailhead quota system would be implemented for some trails.

Administrative Use

There would be no employees housed at Glen Aulin High Sierra Camp because the camp would be removed.

Glen Aulin (Potential Wilderness Addition)

The Glen Aulin High Sierra Camp and all infrastructure associated with it would be removed, and its site would be restored to natural conditions, following the direction for removal of facilities provided in the *Ecological Restoration Planning Report* (see figure 7-4 and appendix H). Water would no longer be diverted from the Tuolumne River to support the camp, and no wastewater treatment or disposal facilities would be needed. The NPS would recommend to the Secretary of the Interior that the Glen Aulin potential wilderness addition be declared part of the Yosemite Wilderness, as provided for in section 108 of the 1984 California Wilderness Act.

The wilderness character of the area would be protected as required by the Wilderness Act. The visitor experience in the Glen Aulin area would be like that in the rest of the Yosemite Wilderness, characterized by self-reliance and primitive and unconfined recreation. Day use would be expected to decrease commensurate with an overall reduction in day use in the Tuolumne Meadows area. Overnight use would be limited to camping in the backpacker campground and managed through the wilderness trailhead quota system, as described under “Actions Common to Alternatives 1-4.”

The estimated net construction costs for Glen Aulin under alternative 1 (including camp removal and replacement of the composting toilet at the backpacker campground) would be approximately \$0.9 million (see appendix L).

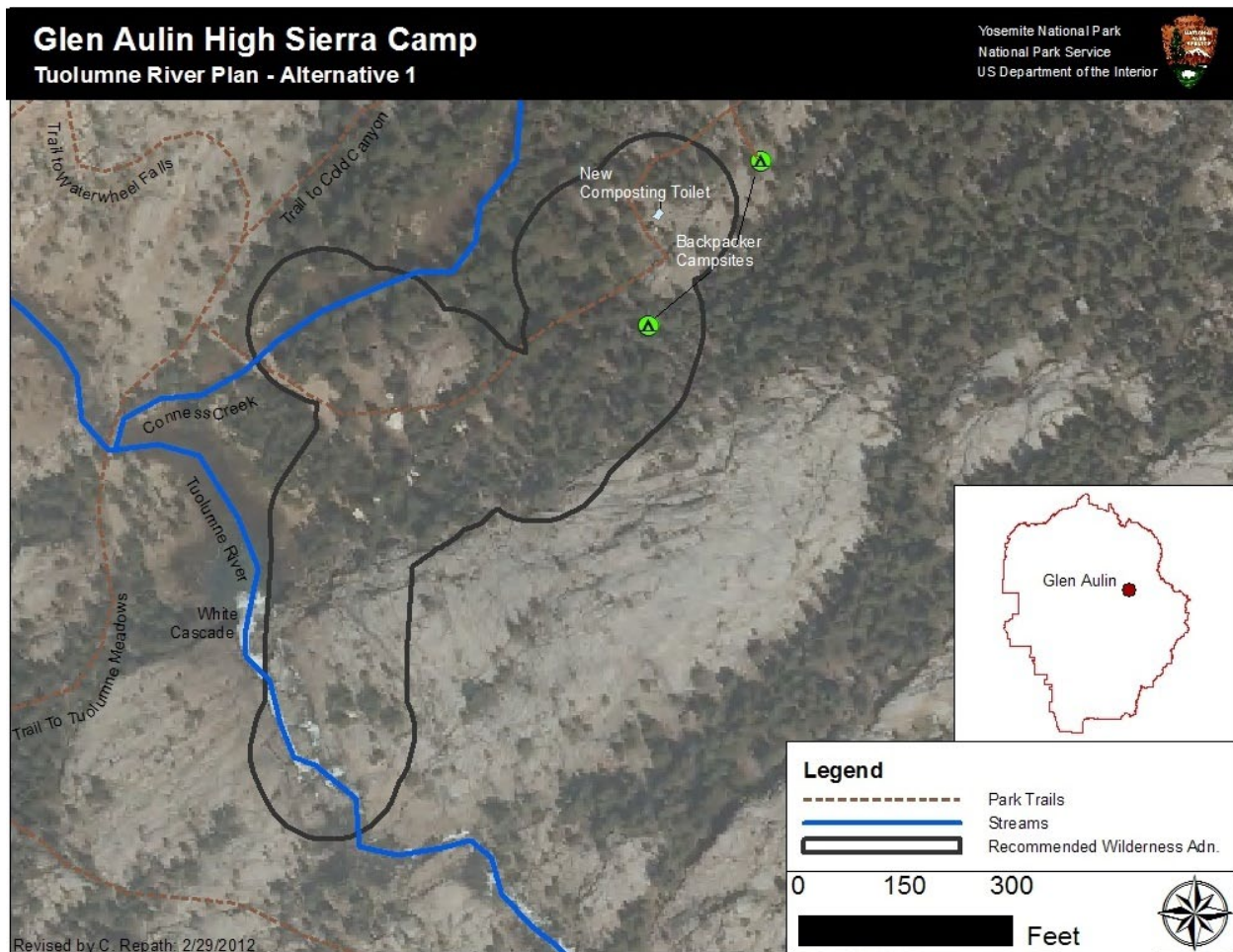


Figure 7-4. Glen Aulin Site Plan, Alternative 1.

Scenic Segments (Tuolumne Meadows and Tioga Road Corridor)

Note that this discussion pertains only to the nonwilderness portions of the Tuolumne Meadows and Lower Dana Fork segments. The portions of these segments within designated wilderness would be managed the same as the wild segments.

Resource Protection and Enhancement

Free Flow

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Eliminate or reduce visitor services and related employee housing (notably the Tuolumne Meadows Lodge, concessioner employee housing, and some campsites) that would otherwise require water consumption, thus reducing the estimated average water demand to approximately 36,000 gallons per day. As discussed in chapter 5, this level of water withdrawal would be expected to remain well within the standard of no more than 10% of low flow, even if climate change led to longer low-flow durations occurring earlier in the summer.

Water Quality

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Remove the wastewater containment ponds and sprayfields and replace them with new facilities (for serving the campground and the reduced employee housing) on the south side of Tioga Road to eliminate risk to water quality posed by these facilities. Eliminate the need to pump wastewater beneath the meadow from the treatment plant to the ponds and sprayfields.
- Discontinue concessioner stock day rides to reduce risks to water quality associated with stock use. Compared to current service levels, the amount of stock use on trails could be reduced by 3 two-hour and 2 four-hour rides per day, which might otherwise involve up to 14 head of stock per ride on the trails. Full-day rides, which occur only occasionally, would also be eliminated.
- Remove the public fuel station to eliminate the risk to water quality posed by this facility.

Biological Value: Subalpine Meadow and Riparian Complex

In addition to ‘Actions Common to Alternatives 1–4,’ beginning on page 7-19:

- Crush or remove the existing wastewater line that runs beneath the meadow from the treatment plant to the containment ponds.

Cultural Value: Archeological Landscape

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Cultural Value: Parsons Memorial Lodge

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Scenic Value: Scenery through Dana and Tuolumne Meadows

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Recreational Value: Tioga Road Access to the River through Tuolumne and Dana Meadows

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

Some kinds of use, particularly those supported by commercial services (including the Tuolumne Meadows Lodge), would be discontinued. The level of use would be reduced to enhance opportunities for solitude and to allow for unconfined travel in meadow and riparian areas that are easily accessible from Tioga Road, while being protective of river values. Educational messages would focus on the importance of protecting river values and Leave-No-Trace practices.

Visitor services would be managed as follows:

- Conduct orientation, interpretation, and education programs, with increased emphasis on education about the need to protect river values, at a combined visitor contact station and wilderness center, at Parsons Memorial Lodge, and in the field.
- Eliminate commercial services (lodge, store, grill, public fuel station, mountaineering shop and school, concessioner stock day rides) to enhance a visitor experience characterized by self-reliance. The post office function would be discontinued. Vending machines for ice and firewood would be provided at the campground office.

- Limit opportunities for overnight use to camping only (no lodging). Remove the A-loop of the campground, thereby reducing the size of the campground to 237 sites plus 7 group campsites, to allow for the restoration of the campground A-loop road nearest the river and to reduce demands for water supply and wastewater disposal.
- Discontinue shuttle bus service between destinations within the Tuolumne Meadows area to enhance an experience characterized by self-reliance.

Maximum Amounts of Visitor Use

- Reduce maximum day use above the Hetch Hetchy Reservoir from 1,762 people at one time to a maximum of 1,021 people at one time to reduce the effects of dispersed foot traffic on sensitive resources, including meadow and riparian areas and archeological sites, and to avoid perceptions of crowding along wilderness trails close to Tioga Road trailheads (see table 7-5; in this table, the total maximum day use number includes the maximum day use below O'Shaughnessy Dam, which would remain at 12 people at one time).
- Reduce the overnight capacity from 2,310 people per night to a maximum of 1,632 people per night (the reduced capacity of the campground) to allow for the restoration of the campground A-loop road nearest the river and to reduce demands for water supply and wastewater disposal (see table 7-5). Actual overnight use levels would be lower than these capacities because individual campsites would not always be occupied by the maximum number of people allowable.

Management of Visitor Use Capacity

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

Day Use

Day use levels would be managed by controlling day parking, which would be restricted to paved or otherwise authorized spaces. The amount of designated day parking in the Tuolumne Meadows area would be reduced from 340 to 305 spaces. No undesignated roadside parking would be allowed through the Tuolumne Meadows area. Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows. (See parking details under “Site Planning,” below.)

Overnight Use

Overnight use levels would be managed by the facility capacity of the campground. Some campsites would continue to be available through a reservation system and some on a first-come, first-served basis.

Administrative Use

Commensurate with the discontinuation of commercial services, the number of NPS employees in the Tuolumne Meadows area would be reduced to a maximum of 100 people at one time, and the number of concessioner employees would be reduced to 2 people at one time (see table 7-5).

Tuolumne Meadows Site Plan

The locations identified below are illustrated on the site plan map (figure 7-5) at the end of this section. The estimated net construction costs for Tuolumne Meadows under alternative 1 would be approximately \$46 million, based on calculations included in appendix L.

Visitor Facilities

- Combine a new visitor contact station (to replace the existing visitor center) with the existing wilderness center. The facility analysis conducted for this plan (see appendix A) determined that there is no feasible location for the wilderness center outside the river corridor. Consolidating a small visitor contact station with the wilderness center would make it possible for visitors to access NPS services at a single location and provide better separation between visitor services and operational functions.
- Remove all commercial facilities.
- Retain only those shuttle stops needed to serve passengers arriving on the regional transit bus [YARTS], the hiker bus operated by the concessioner, and other transit services.

Campground

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Design for a capacity of 237 sites (6 people per site) plus 7 group sites (30 people per site) for a maximum of 1,632 people.
- Remove the campground A-loop road and restore the area to natural conditions for day use.
- Retain the campground office and add vending machines for ice and firewood. Vending machines would not operate during quiet hours.
- Relocate the existing campground entrance road out of the floodplain.
- Formalize a trail connection between the campground and the John Muir Trail.

Trails and Trailheads

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Eliminate vehicle access to Parsons Memorial Lodge, and convert the administrative access road to a trail for stock and hiking use only, to enhance the recreational experience characterized by self-reliance and to enhance meadow conditions.

Picnic Areas

- Retain the picnic area at Lembert Dome.
- Provide a small picnic area in association with the day parking at the site of the former store and grill.

Parking

The total number of designated parking spaces in the Tuolumne Meadows area (day and overnight) would be decreased from 533 to 481 spaces.

Table 7-5a.
Number of Parking Spaces in Designated Parking Areas, Alternative 1

Type of Parking	Current	Alternative 1	Description
Day Parking	16	16	existing parking area at Pothole Dome
	0	4	existing roadside pullout south of Pothole Dome
	50	50	existing parking area at the current visitor center (new Cathedral Lakes trailhead)
	11	13	existing parking area at the campground office
	0	10	A-loop day use parking
	11	11	existing parking in the campground for the Elizabeth Lakes trailhead
	15	0	existing parking area at the fuel station
	51	50	existing parking area at the store and grill
	58	0	existing parking area at the concessioner stable
	29	25	existing parking area at the base of Lember Dome
	7	7	existing parking area at the ranger station
	25	52	existing parking area at the Dog Lake/John Muir Trail trailhead
	67	67	existing parking areas in the road corridor east of Tuolumne Meadows, including the Mono Pass and Gaylor Peak trailheads and the Dana Meadows and other pullouts
	340	305	Total day parking
Overnight Parking (excluding cars parked in the Tuolumne Meadows campground)	58	89	existing parking area at the wilderness office
	33	68	existing parking area at the Dog Lakes/John Muir Trail trailhead
	0	19	relocated parking area for the Cathedral Lakes trailhead
	102	0	Tuolumne Meadows Lodge
	193	176	Total overnight parking

NPS and Concessioner Stables

- Co-locate the NPS and concessioner stables at the current site of the concessioner stable. Because day rides would be discontinued, concessioner use of the facilities would be limited to pack stock needed to supply the Vogelsang, May Lake, and Sunrise High Sierra Camps. Although the amount of concessioner stock would be greatly reduced, concessioner use of the stable would remain necessary to avoid a safety hazard associated with frequently trucking the animals. Housing for all but two stable employees would be removed under this alternative.
- Reserve the current site of the NPS stable for NPS employee housing.

Park Operations

In addition to "Actions Common to Alternatives 1–4," beginning on page 7-19:

- Adapt the CCC mess hall building (current site of the visitor center) for park operations, to provide the administrative facilities determined to be necessary to support visitor use and resource protection, but which would be infeasible to locate outside the river corridor.
- Retain the ranger station.
- Retain the aboveground diesel fuel tank at the ranger station for concessioner and NPS use.
- Adapt the current site of the NPS stable for expansion of NPS employee housing at Ranger Camp.

Employee Housing

- Reduce NPS employee housing to accommodate 100 employees, which is the number determined to be necessary in the Tuolumne Meadows area to support the kinds and levels of visitor use included in this alternative. It would be infeasible to locate this housing outside the river corridor due to site constraints; therefore, it must be inside the corridor. To protect river values, the housing would be provided at the following locations determined not to contain river-related or sensitive resources:
 - Road Camp (30 employees)
 - Ranger Camp (70 employees)
- Eliminate all concessioner services and most concessioner employee housing; provide hard-sided cabin for two concessioner stable employees at the stable.

Utility Systems

The general direction for site-specific planning for utility systems under alternative 1, intended to protect and enhance the river's free flowing condition, water quality, and outstandingly remarkable values, is outlined below. Pending additional site-specific planning, it is currently projected that with known technology, the amount of wastewater to be treated under this alternative could be treated and disposed through new facilities on the south side of Tioga Road, thereby allowing the removal of the ponds and sprayfields on the north side of the road. This would eliminate the need to pump wastewater beneath the river and meadow to treatment and disposal facilities on the north side of Tioga Road.

Tuolumne Meadows Wastewater Collection, Treatment, and Disposal

- Design for an average water demand of 36,000 gallons per day.
- Remove the wastewater containment ponds and sprayfields from the north side of Tioga Road and replace with facilities on the south side of the road, to be designed in conjunction with the new wastewater treatment plant. If additional space was needed, site analysis of the location east of the existing facility has determined that this would be a suitable location.
- Remove the administrative access road to the containment ponds and restore the site to natural conditions.
- Crush or remove the wastewater line that runs beneath the river and meadow between the existing wastewater treatment plant and the containment ponds.

Tuolumne Meadows Water Collection, Treatment, and Distribution

In addition to "Actions Common to Alternatives 1–4," beginning on page 7-19:

- Design for an average water demand of 36,000 gallons per day.

Site Restoration

In addition to "Actions Common to Alternatives 1–4," beginning on page 7-19:

- Restore the following additional sites to natural conditions:
 - the site of the entire Tuolumne Meadows Lodge, including the entrance road
 - the sites of all eliminated or relocated concessioner employee housing
 - A portion of Bug Camp not needed for parking expansion
 - the site of the public fuel station and mountaineering shop
 - the sites of the wastewater containment ponds, sprayfields, and access road

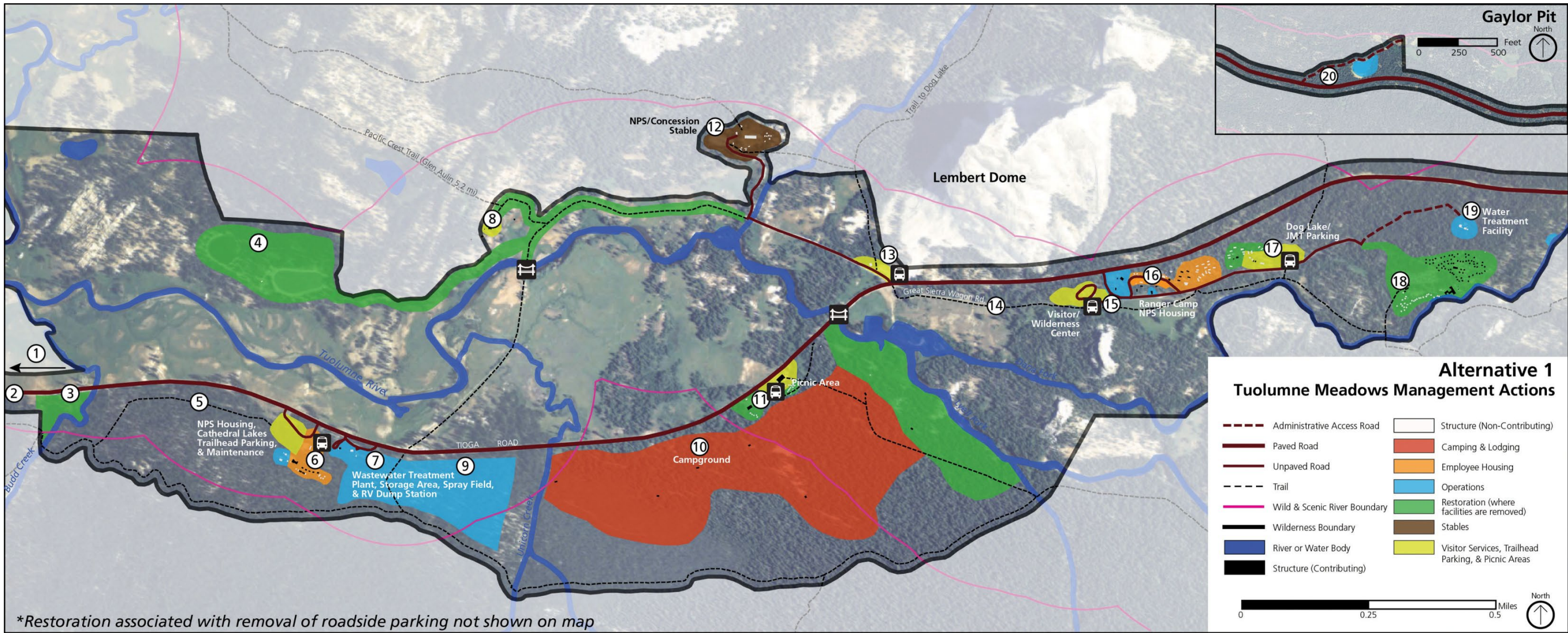


Figure 7-5. Tuolumne Meadows Site Plan, Alternative 1.

Key to figure 7-5 and List of Facilities Management Actions (actions marked with an asterisk (*) are specific to this alternative. All other actions are common to alternatives 1–4):

1. Pothole Dome scenic pullout/ parking areas	<ul style="list-style-type: none">Designate day parking with trailhead on north side of road.Improve trail to Pothole Dome.Formalize roadside pullout (four vehicles) on south side of road.	6. Existing visitor center and Road Camp	<ul style="list-style-type: none">Relocate visitor contact station to location #15; convert building to park operations.Construct new Cathedral Lakes trailhead with day and overnight parking.Retain maintenance yard and office.Increase NPS employee housing.	11. Existing commercial services core	<ul style="list-style-type: none">Remove store, grill, mountaineering shop/school, public fuel station, and post office.Convert area to day use parking and picnic area.Add new public restroom.Add trail connector to campground.Remove concessioner employee housing.	15. Existing wilderness center and NPS stable	<ul style="list-style-type: none">Combine new, small visitor contact station with existing wilderness center; expand parking.Relocate NPS stable to location #12; use site for expansion of NPS employee housing.
2. Tioga Road through the Tuolumne Meadows area	<ul style="list-style-type: none">Retain the Tioga Road in its current alignment.Add roadside curbing to eliminate undesignted roadside parking and associated informal trails.Add approximately four viewing turnouts (four vehicles each; no parking).Upgrade Tioga Road bridge to improve free flow of river.	7. Wastewater treatment plant	<ul style="list-style-type: none">Upgrade wastewater treatment plant.Retain recreational vehicle dump station.	12. Existing concessioner stable	<ul style="list-style-type: none">Co-locate NPS stable with existing concessioner stable (for administrative use only).Remove most concessioner employee housing except for one hard-sided cabin for two stable employees; restore to natural conditions.Eliminate parking along access road.	16. Existing ranger station and Ranger Camp	<ul style="list-style-type: none">Retain ranger station and day parking.Retain diesel fuel tank.Replace NPS employee housing with hard-sided cabins.
3. Existing Cathedral Lakes trailhead	<ul style="list-style-type: none">Relocate trailhead and parking to location #6; restore to natural conditions.	8. Parsons Memorial Lodge	<ul style="list-style-type: none">Preserve lodge; eliminate vehicle access.Upgrade footbridge to improve free flow of river.	13. Lumbert Dome	<ul style="list-style-type: none">Retain picnic area.Retain day parking and trailheads for Lumbert Dome and Parsons Memorial Lodge.Add shuttle stop.	17. Bug Camp, Dog Lake/John Muir Trail parking	<ul style="list-style-type: none">Increase day and overnight parking.Remove NPS housing.
4. Existing wastewater ponds and sprayfields	<ul style="list-style-type: none">Pending additional planning, replace with upgraded wastewater treatment plant at locations #7 and #9; restore to natural conditions.	9. Area west of Unicorn Creek	<ul style="list-style-type: none">Retain as undeveloped natural area; if needed, use area for future wastewater treatment facilities.	14. Old Tioga Road/Great Sierra Wagon Road	<ul style="list-style-type: none">Preserve as trails; mitigate impacts of historic roads to meadow hydrology while protecting historic character.	18. Tuolumne Meadows Lodge	<ul style="list-style-type: none">Remove Tuolumne Meadows Lodge, parking, and employee housing; restore area to natural conditions.
5. Area east of Budd Creek and west of existing visitor center	<ul style="list-style-type: none">Construct new Cathedral Lakes trailhead connector.Retain as undeveloped natural area except for trail segment.	10. Tuolumne Meadows campground	<ul style="list-style-type: none">Retain smaller campground; remove the A-loop road and all 67 A-loop campsites.Retain campground office and day parking.Add vending machine for ice and firewood.Relocate entrance road outside of floodplain.Formalize John Muir Trail connection.Retain Elizabeth Lakes trailhead and day parking.Remove riprap from riverbank.			19. Water treatment facility	<ul style="list-style-type: none">Upgrade water treatment facility.
						20. Gaylor Pit	<ul style="list-style-type: none">Retain helipad.

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Summary of Protection and Enhancement of River Values under Alternative 1

The *Tuolumne River Plan* will be evaluated in terms of four legal requirements: (1) the WSRA requirement that it protect and enhance river values; (2) the NEPA requirement that it fully consider the effects on the human environment; (3) the NHPA requirement that it consider effects on historic properties; and (4) the requirement of the Wilderness Act that it consider the effects on wilderness character. Guidelines for each of these requirements describe the criteria to be used in determining the effects of the plan. This section focuses directly on how the plan would meet the WSRA requirement to protect and enhance river values if alternative 1 was selected. The NEPA, NHPA, and Wilderness Act analyses are presented in chapter 8.

All the action alternatives, including alternative 1, would protect and enhance river values as described in detail in chapter 5 and summarized in this chapter under “Summary of Protection and Enhancement of River Values under All Action Alternatives,” earlier in this chapter. In addition, alternative 1 would take the following additional actions, primarily related to management of visitor use, user capacity, and development, to further protect or enhance river values.

Free-Flowing Condition of the River

So long as low flows remained around or above 1.0 cubic foot per second, average water withdrawals of 60,000 to 70,000 gallons per day would ensure that management could maintain consumption at no more than 10% of flow during low-flow periods and impose additional temporary conservation measures if necessary, as discussed in chapter 5. The average estimated water demand for alternative 1 has been calculated as shown in table 7-6.

Table 7-6.
Summary of Average Estimated Water Demand, Alternative 1

Facility	Current consumption per unit	No-Action		Alternative 1	
		Number of units	Gallons per day	Number of units	Gallons per day
Campsites	100 gallons/site/day	304 sites	30,400	237 sites	23,700
	500 gallons/group site/day	7 group sites	3,500	7 group sites	3,500
Recreational vehicle dump station	50 gallons/use/day	32 dumps	1,600	32 dumps	1,600
Tuolumne Meadows Lodge	30 gallons/person/day	276 guests	8,280	Removed	0
Camper showers	10 gallons/person/shower	0	0	0	0
NPS housing	50 gallons/employee/ day in housing	104 employees in housing	5,200	100 employees in housing	5,000
	25/gallons/employee/ day in campsites	0 employees in campsites	0	0 employees in campsites	0
Concessioner employee housing	50 gallons/employee/ day	103 employees	5,150	2 employees	100
Cafeteria meals (2 per concessioner employee)	6 gallons/person/day	206 meals	1,236	0 meals	0
Store/grill	5 gallons/person/day	1,148 visitors	5,740	Removed	0
Visitor center /visitor contact station	5 gallons/visitor/day	607 visitors	3,035	Total visitor capacity reduced by 32%	2,064
Total consumption			64,141		35,964

Based on the calculations in table 7-6, alternative 1 would be protective of river flow and downstream habitat under the current flow conditions. Decreases in all kinds of use, but particularly overnight visitor use and employee housing, would decrease the demand for domestic water in the Tuolumne Meadows area by approximately 44% to about 36,000 gallons per day. Even if climate change led to longer low-flow durations starting earlier in the summer, withdrawal levels would be expected to remain well within the limits of no more than 10% of low flows. If withdrawals ever did approach 10% of low flows, additional water conservation measures, including possible changes in levels of service, would be implemented.

Management to Protect Water Quality

Risks to water quality in the Tuolumne Meadows area would be reduced by reducing the amount of wastewater to be treated and disposed by about a third, which would allow for the elimination of the wastewater ponds and sprayfields on the north side of Tioga Road and the crushing or removing of the wastewater line that runs beneath the river and the meadow. The risk to water quality from fuel storage at the public fuel station would be eliminated. A further reduction in risks to water quality would be achieved by greatly reducing the size of the concessioner stable operation. Monitoring would be ongoing to ensure that water quality remained excellent. Risks to water quality at Glen Aulin would be eliminated by eliminating the High Sierra Camp and commercial stock use.

Management to Protect the Subalpine Meadow and Riparian Complex

Most of the actions to protect and enhance the subalpine meadow and riparian complex would be common to all the action alternatives. Alternative 1 would additionally reduce the maximum people at one time in the river corridor (almost all of whom would access through the Tuolumne Meadows area) by an estimated 34% (from a current estimated maximum user capacity of 4,778 people, including both visitors and employees, to a maximum capacity of 3,167 people). Most of this reduction would be attributed to a reduction in visitor use to allow for relatively unconfined access to the meadows and the river, while keeping meadow fragmentation associated with foot traffic within the protective standard discussed in chapter 5.

Subalpine meadows in Lyell Canyon would be further protected by eliminating commercial stock use (grazing and camping).

These actions would be expected to reduce the stresses on the subalpine meadow and riparian system and, in conjunction with the resource management activities that would be common to all the action alternatives, to mitigate most of the ongoing disturbances to the subalpine meadow and riparian habitats at Tuolumne Meadows, thereby increasing their ecological resistance to the kinds and levels of use that would continue. Monitoring would be ongoing to ensure that the protective standards for meadow and riparian habitat would be achieved and maintained over time. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as identified in chapter 5.

Management to Protect Archeological Sites

The same management of visitor use described above would also reduce impacts on archeological sites in the Tuolumne Meadows and Lower Dana Fork segments. Monitoring would be ongoing to ensure that site disturbance did not exceed the protective standard established for these sites. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as described in chapter 5.

Management to Protect and Enhance Scenic Values

Scenic views and viewpoints in the Tuolumne Meadows area and along the Tioga Road corridor would be protected and enhanced by managing unnatural features, such as facilities and parked cars, to minimize their intrusion into remarkable views.

Scenic values in wilderness would be enhanced by removing the Glen Aulin High Sierra Camp and by eliminating commercial stock use in wilderness, both of which currently caused localized adverse effects on scenic values along the Glen Aulin trail.

Management to Protect and Enhance Tioga Road Access to the River through Tuolumne and Dana Meadows

Opportunities for scenic driving along Tioga Road would be enhanced by eliminating roadside parking and the resulting congestion currently caused by vehicles slowing to park and pedestrians crossing the road.

Management to Protect and Enhance the Wilderness Experience along the River

The wilderness experience for hikers along trails in wild segments within reach of a day hike from Tuolumne Meadows would be enhanced by restricting use to levels that resulted in encounters with no more than four other parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends. If required to achieve this encounter rate, a day use trailhead quota system would be implemented for some trails. This management would protect the opportunity to experience solitude throughout the wild segments of the river corridor, even on a day hike from Tuolumne Meadows. This benefit would be offset by an infringement on unconfined use if a quota system was imposed.

The wilderness experience for some hikers would be enhanced by eliminating commercial stock use in the corridor.

Alternative 2: Expanding Recreational Opportunities

Alternative 2 builds upon all the major elements included in the *Tuolumne River Plan* to identify a set of management actions that would work together to protect river values while expanding opportunities for day and overnight visitors.

Alternative 2 includes the technical correction to the river corridor boundary (presented in chapter 3), the section 7 determination process for evaluating water resources projects (presented in chapter 4), the management standards and actions for protecting and enhancing river values (presented in chapter 5), and the guidance for identifying an appropriate visitor experience and associated user capacity (presented in chapter 6).

Concept

Alternative 2 would respond to those members of the public who expressed a desire for more recreational opportunities. It would facilitate resource enjoyment and stewardship by a broad spectrum of visitors.

As in all alternatives, most of the river corridor would be managed as wilderness. In these areas, natural river-related systems would be sustained by natural ecological processes, archeological and American Indian traditional cultural resources would characterize the cultural landscape, and recreational opportunities would be primitive and unconfined. Consistent with the concept of expanding recreational opportunities to connect with the river, a limited portion of the river (west of Tuolumne Meadows and into the Grand Canyon of the Tuolumne) would be opened to recreational whitewater boating.

In comparison to no action, alternative 2 would include the following actions:

- Restore previously disturbed ecological conditions to subalpine meadow and riparian areas.
- Reduce risks to stream flow and water quality.
- Increase protection of archeological sites and resources important to American Indians.
- Allow a moderate increase in overall use levels.
- Allow whitewater boating on limited portions of the river.
- Increase opportunities for camping at Tuolumne Meadows.

At Tuolumne Meadows, visitors would be encouraged to get out of their cars and take walks or short hikes to sites of natural and cultural interest or to places along the river, where they could enjoy activities such as sightseeing and participation in interpretive and educational programs, fishing, swimming, and picnicking. Such opportunities would encourage people to forge connections with the Tuolumne River and to appreciate the importance of protecting its natural, cultural, and recreational values. Potential parking locations would be fully used to maximize opportunities for day use. Opportunities for overnight camping would be slightly increased, and the current lodging at Tuolumne Meadows Lodge would be retained at its current capacity, along with modest commercial services. Although this alternative would provide the greatest range of recreational opportunities, Tuolumne Meadows would still retain its distinctive character as a threshold to the wilderness, and staging for wilderness trips would remain a major visitor activity at Tuolumne Meadows.

The Glen Aulin High Sierra Camp would remain open at its current capacity but would be converted to a seasonal outfitter camp with no permanent structures. Managed in this way, the Glen Aulin High Sierra Camp would be eligible for inclusion in the Yosemite Wilderness.

River values would be protected and enhanced by restoring ecological conditions to meadow and riparian areas, by directing use in scenic segments to resilient areas, and by restricting access to meadows and the river in the Tuolumne Meadows area to formally maintained trails (see “Summary of Protection and Enhancement of River Values under Alternative 2” at the end of this section).

Table 7-7.
Corridorwide Visitor and Administrative Use Capacity, Alternative 2

Visitor Overnight Capacity					
River Segment	Existing Use Calculation	Current Overnight Visitors	Proposed Action	Units	Maximum Overnight Visitors, Alt. 2
Scenic Segments					
Tuolumne Meadows Lodge	# of lodging units (69) × max of 4 people per unit	276	Retain lodge capacity	69 guest tent cabins	276
Tuolumne Meadows Campground	# of campsites (304 sites × max of 6 people per site, 7 group sites × max 30 people per site)	2,034	Add walk-in loop (plus 41 campsites)	345 sites, 7 group sites	2,280
Wild Segments					
Glen Aulin HSC	# of lodging units (8) × max of 4 people per unit	32	Convert HSC to seasonal camp; no capacity change	8 guest tent cabins	32
Wilderness	Maximum capacity of wilderness zones (400)	400	Retain current wilderness zone capacities	–	400
Subtotal, Overnight		2,742			2,988
Visitor Day Use Capacity					
River Segment	Existing Use Calculation	Maximum Observed People At One Time, 2011^a	Proposed Action	Proposed Units	Maximum People At One Time, Alt. 2
Scenic Segments					
Access from Tuolumne Meadows	# of cars parking in designated parking spaces (340) × 2.9 ^b	986	Increase designated day parking (plus 302 spaces)	642 spaces at 90% occupancy × 2.9 ^b	1,676
	# cars parking in undesignated spaces (190) × 2.9 ^b	551	Eliminate undesignated roadside parking	–	0
	Maximum people arriving by in-park shuttles, tour buses, and regional public transit	225	Maintain current level of arrivals via by in-park shuttles, tour buses, and regional public transit	–	225
Access from below O'Shaughnessy Dam	# of cars parking in designated spaces (4) × 2.9 ^b	12	Retain existing parking	4 spaces × 2.9 ^b	12
Subtotal, Day Use		1,774			1,913
Total Visitor People At One Time		4,516			4,901
Administrative Capacity					
River Segment	Existing Use Calculation	Maximum employees (existing)	Proposed Action	Units	Maximum employees
Wild Segments					
Concessioner	Approximately 9 employees at Glen Aulin HSC	9	Retain all employees at Glen Aulin HSC	9	9
Scenic Segments					
NPS	Approximately 150 employees based at Tuolumne Meadows	150	Meet staffing need with 174 employees at Tuolumne Meadows	174 employees	174
Concessioner	103 employees based at Tuolumne Meadows	103	Meet staffing need with 103 employees at Tuolumne Meadows	103 employees	103
Total Administrative People At One Time		262			286
Total Capacity Corridorwide		4,778 (existing)			5,187 (proposed)

^a The peak number of vehicles observed during vehicle counts in 2011 (observed on August 13, 2011).

^b The vehicle occupancy rate is 2.9 people per vehicle, based on visitor studies conducted over the past 20 years that found an average vehicle occupancy ranging from 2.6 to 3.4 (Van Wagtenonk and Coho 1980; FHWA 1982; ORCA 1999; Littlejohn et al. 2005; Le et al. 2008). Based on this range, an average of 2.9 persons per vehicle is used for estimating visitor numbers for planning purposes in this document.

Abbreviations: HSC = High Sierra Camp; max = maximum; # = number

The visitor use capacity under alternative 2 would be increased to a maximum of 4,901 people at one time, as shown in table 7-7. Actual day use levels would be lower during nonpeak periods, and actual overnight use levels would be lower even during peak periods because not all individual campsites and lodging units would be occupied by the maximum number of people allowable. The administrative use capacity under alternative 2 would be increased to a maximum of 286 employees at one time (table 7-7).

Wild Segments (Designated Wilderness and Glen Aulin)

Resource Protection and Enhancement

Free Flow

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Water Quality

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Greatly reduce water use at the Glen Aulin High Sierra Camp to reduce the risk to water quality (see “Glen Aulin,” below).

Biological Value: Subalpine Meadow and Riparian Complex

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Biological Value: Low-Elevation Riparian and Meadow Habitat

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Cultural Value: Archeological Landscape

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Scenic Value: Scenery through Lyell Canyon and the Grand Canyon of the Tuolumne

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Recreational Value: Wilderness Experience along the River

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Manage day use levels along wilderness trails within reach of day hikes from Tioga Road to achieve a standard of no more than 10 encounters with other parties per hour (80% of the time, sampled over the entire season, including weekdays and weekends). As described in chapter 5, this standard would be consistent with studies of wilderness user preferences (Broom and Hall 2009; Cole and Hall 2008).
- Continue concessioner stock day rides into wilderness but at a lowered capacity to reduce conflicts on trails (four-hour and all-day rides eliminated; two-hour rides reduced from 3 to 2 per day, accommodating a maximum of 24 people per day).
- Allow commercial use in wilderness, with restrictions on types and levels of use based on a determination of extent necessary (see appendix C) that gives priority to noncommercial use and restricts commercial use to no more than two overnight groups per zone per night and no more than two day groups per trail per day. Additional restrictions would include the following:
 - *Restrictions on types of use, Glen Aulin zone, peak months only:* During the peak use months of July and August, commercial groups having only a recreational purpose would no longer have access to the Glen Aulin zone; groups having an educational or scenic, as well as recreational, purpose (as defined in

appendix C) would continue to have access consistent with limitations on total use levels, described above.

- *Restrictions on types of use, Lyell Canyon zone, peak months only:* During the peak use months of July and August, commercial use in the Lyell Canyon zone by groups with only a recreational purpose would be restricted to Monday–Thursday only; groups having an educational or scenic, as well as a recreational, purpose would continue to have access to the Lyell Canyon zone on weekends, as well as weekdays, consistent with limitations on total use levels, described above.
- Allow limited recreational whitewater boating on portions of the river to provide opportunities for people with expert paddling skills to experience and connect with the Tuolumne in an adventurous pursuit. To prevent resource impacts and address visitor safety concerns, this use would be regulated by a permit system to eight trips per year (and a maximum of six people/boats per trip). Boaters would pack in their boats and put in just below Tuolumne Meadows. All paddlers would be required to take out at Pate Valley because the Raker Act prohibits water contact within 1 mile of the Hetch Hetchy Reservoir. Additional permit conditions would be developed to protect park resources and provide for visitor safety.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

All ongoing uses would continue. In addition, limited recreational whitewater boating would be allowed on portions of the river from below Tuolumne Meadows to Poopenaut Valley.

Maximum Amounts of Visitor Use

Maximum day use along popular wilderness trails would be limited as necessary to achieve the standard of encounters with no more than ten parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

The overnight capacity for backpacker camping in wild segments would be retained at 400 persons per night (350 persons per night above the reservoir and 50 persons per night below the reservoir). This capacity might be reduced in the future if determined necessary to protect wilderness values; however, it would not be increased above this amount, which has been determined to be protective of river values. The Glen Aulin High Sierra Camp (converted to an outfitter camp) would continue to have an overnight capacity of 32 guests.

Because of the extreme skills required, the high potential for search and rescue, and concerns about environmental impacts along the shore, recreational whitewater boating would be limited to eight trips per year, with a maximum of six people/boats per trip.

Management of Visitor Use Capacity

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Recreational whitewater boating would be regulated through a permit system.

Administrative Use

The types and levels of administrative use in wild segments would remain the same as existing conditions. Nine concessioner employees would be housed at the Glen Aulin High Sierra Camp.

Glen Aulin (Potential Wilderness Addition)

Glen Aulin High Sierra Camp

The Glen Aulin High Sierra Camp would be converted to a seasonal outfitter camp, with a capacity accommodating 32 guests (the same number as at present) (see figure 7-6). All permanent structures and infrastructure would be removed, and all remaining structures would be temporary in nature, to be taken down and removed from the area in the fall and packed in and reassembled in the spring. Guest tents would be provided, as would cots in the tents and some services, listed below. The sole permanent structure would be a composting toilet. Trash receptacles and bear lockers would be available. Overall, the camp would look and function much like a seasonal outfitter camp allowed under commercial use authorizations for designated wilderness areas, except that this one would remain in place at Glen Aulin for the summer season.

Specifically, the level of service at the High Sierra Camp under this alternative would be as follows:

- Eliminate all permanent structures, including three stone buildings, concrete floors in the tent cabins, all components of the water treatment system, and the wastewater treatment system and leach mound.
- Provide unheated tents (up to eight) with cots and simple camp chairs for up to 32 guests.
- Provide four unheated tents for nine concessioner employees.
- Require domestic water used for sanitation and meal preparation to be filtered and/or treated in compliance with NPS Director's Order (DO)-83, "NPS Public Health Guidelines." The operators would collect and screen wastewater and dispose of it in a wastewater sump.
- Construct a new composting toilet for guests between the granite slab behind the existing kitchen and septic tank. Also, improve the composting toilet in the nearby backpacker campground to adequately handle demand.
- Provide hot suppers but cold breakfasts and lunches (except for hot drinks). A separate dining tent—still temporary in nature—could be provided as desired, along with a fire pit for evening use. Camp operators would be required to submit plans to the Park Public Health Officer for review and approval.
- Discontinue overnight saddle trips and concessioner day rides to the camp.
- Require all tents and camp structures to be packed out at the end of the season in fall, with the camp area cleaned to an appearance similar to that of the nearby backpacker campground. No overwinter storage would be provided.

The NPS would recommend to the Secretary of the Interior that the Glen Aulin potential wilderness addition be declared part of the Yosemite Wilderness, as provided for in section 108 of the 1984 California Wilderness Act.

The determination of how the components of the permanent buildings would be removed to frontcountry dump areas would be based on the minimum-requirement criteria established under the Wilderness Act. The estimated net construction/demolition costs for Glen Aulin under alternative 2 would be approximately \$1.1 million (see appendix L).

Backpacker Campground

See "Actions Common to Alternatives 1–4," earlier in this chapter.

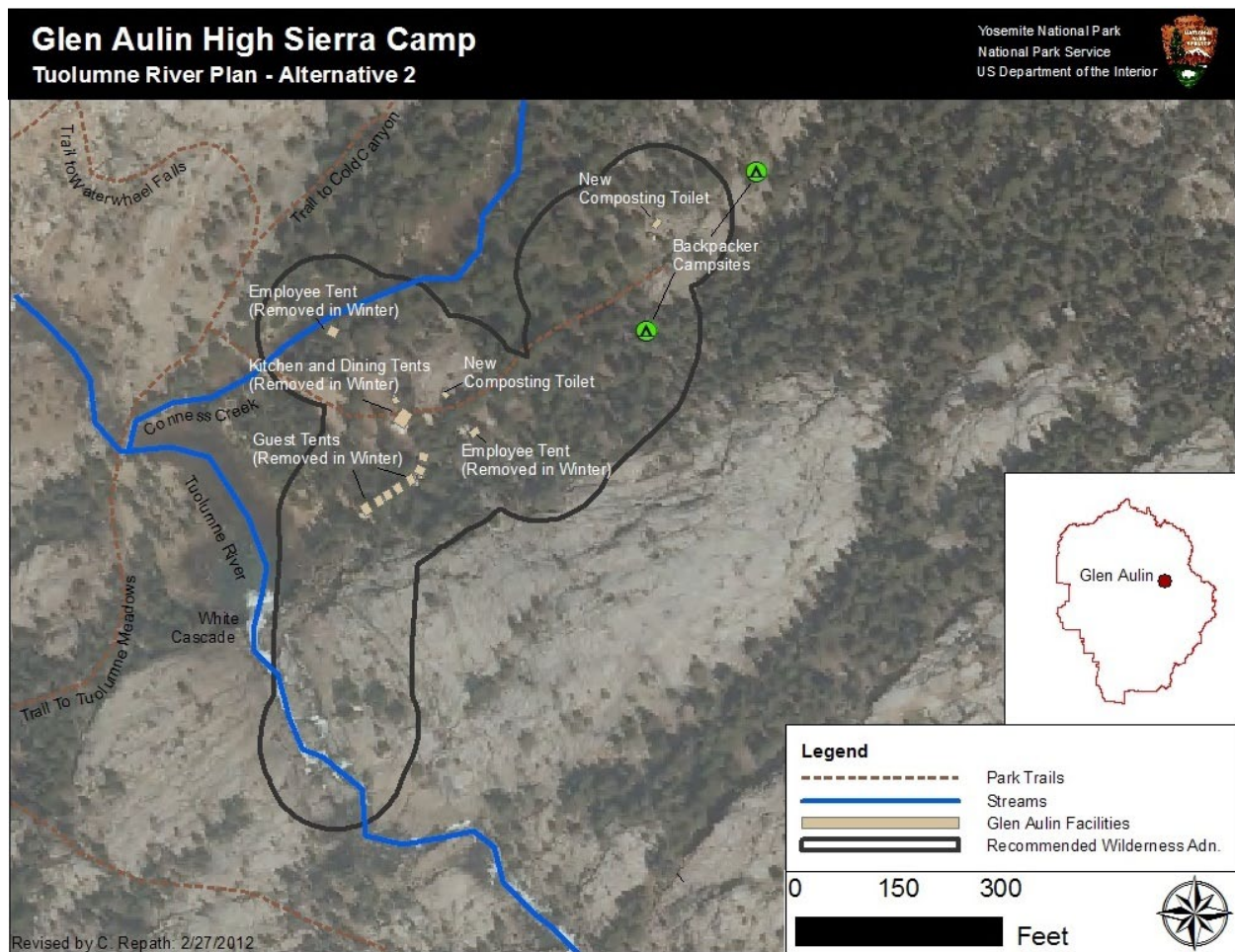


Figure 7-6. Glen Aulin Site Plan, Alternative 2.

Scenic Segments (Tuolumne Meadows and Tioga Road Corridor)

Note that this discussion pertains only to the nonwilderness portions of the Tuolumne Meadows and Lower Dana Fork segments. The portions of these segments within designated wilderness would be managed the same as the wild segments.

Resource Protection and Enhancement

Free Flow

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Immediately implement water metering, ensure that all fixtures are as water-efficient as possible, and emphasize to visitors and employees the importance of conserving water. Because increases in camping and employee housing under this alternative would increase the estimated average water demand to approximately 70,000 gallons per day, intensive effort would be required to ensure that water use remained within the standard of no more than 10% of low flow. Because water consumption would be at the upper limit of the range determined to be protective of river flow at current levels, the potential for having to reduce services if climate changes resulted in lower flow levels would be greater under this alternative than under any of the other alternatives.

Water Quality

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Reduce concessioner stock day rides to reduce stock use and risks to water quality. Compared to current service levels, the amount of stock use on trails would be reduced by 1 two-hour and 2 four-hour rides per day, which might otherwise involve up to 14 head of stock per ride on the trails. Full-day rides, which occur only occasionally, would also be eliminated.

Biological Value: Subalpine Meadow and Riparian Complex

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Cultural Value: Archeological Landscape

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Cultural Value: Parsons Memorial Lodge

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

Scenic Value: Scenery through Dana and Tuolumne Meadows

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Maintain views from eight scenic vista points (identified in chapter 5) by controlling the encroachment of vegetation in a manner that was protective of ecological conditions and archeological values at each vista point. Each particular vista point would be managed in accordance with an individual work plan based on evaluations of river values and other resources at that specific location. The work plans are included in appendix J. No other vegetation management would be conducted to enhance scenery or viewing opportunities.

Recreational Value: Tioga Road Access to the River through Tuolumne and Dana Meadows

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Increase the amount of designated parking available to visitors wishing to get out of cars to enjoy recreational experiences in a river-related landscape.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

To allow for a modest expansion of opportunities for recreational use in the Tuolumne Meadows area, visitor services, facilities, and management strategies would be adjusted to direct visitors to resilient locations where they could enjoy recreational activities without adversely affecting river values. For example, rather than dispersing across the meadows, visitors would be directed from trailheads at designated parking lots to trails and boardwalks, some with fencing or other forms of delineation to discourage dispersed foot traffic through these sensitive environments; rather than picnicking informally on the banks of the river, visitors would have access to new formal picnic areas. With this management strategy, the social interaction at Tuolumne Meadows would be greater than at present; however, congestion would be mitigated with improved parking and trailhead conditions and better visitor information and orientation. Opportunities for day visitors with only a short time to spend would be enhanced by a new day parking and picnic area near the trailhead for Parsons Memorial Lodge, where visitors could connect with the river, the meadows, and the historic significance of the area during a brief visit.

Visitor services would be managed as follows:

- Conduct a full range of orientation, interpretation, and education programs, with increased emphasis on education about the need to protect river values, at a visitor contact station, wilderness center, and Parsons Memorial Lodge, and in the field.
- Retain most existing commercial services (store/grill, public fuel station, concessioner stock day rides) and the postal service (subject to future USPS level of service decisions beyond NPS control). Although the public fuel station was not identified as a necessary facility in the other alternatives, retaining it would be consistent with the higher level of visitor use and service that characterizes this alternative, and allow for a full evaluation in that context. The mountaineering shop and school would be eliminated.
- Add a public shower/restroom facility in the commercial service area.
- Reduce concessioner stock day rides to 2 two-hour rides per day (maximum of 24 people per day); eliminate the four-hour and full-day rides.
- Expand the capacity of the campground to 345 sites plus 7 group campsites.
- Retain the Tuolumne Meadows Lodge at its current capacity.
- Continue the current level of shuttle bus service among destinations within the Tuolumne Meadows area.

Maximum Amounts of Visitor Use

- Increase the maximum day use capacity above the Hetch Hetchy Reservoir from an estimated 1,762 to a maximum of 1,901 people at one time (see table 7-7; in this table, the total maximum day use number includes the maximum day use below O'Shaughnessy Dam, which would remain at 12 people at one time).
- Increase the overnight capacity at Tuolumne Meadows to 2,556 people per night: 2,280 people accommodated by the expanded campground, and 276 people accommodated by the 69 guest tent cabins at Tuolumne Meadows Lodge (see table 7-7). Actual overnight use levels would be lower than these capacities because individual campsites and lodging units would not always be occupied by the maximum number of people allowable.

Management of Visitor Use Capacity

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

Day Use

Day use capacity would be managed by controlling day parking, which would be restricted to paved or otherwise authorized spaces. No undesignated roadside parking would be allowed through the Tuolumne Meadows area. Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows. The amount of formal, designated day parking in the Tuolumne Meadows area would be increased from 340 to 642 spaces. (See parking details under “Tuolumne Meadows Site Plan,” below.)

Overnight Use

Overnight user capacity would be managed by the facility capacities of the campground and lodge. These facilities would continue to be available through a reservation system, with some campsites also available on a first-come, first-served basis.

Administrative Use

NPS staffing would be increased to a maximum of 174 employees to provide for increased visitor and resource protection needs (including management of the user capacity program, below), additional interpretive and educational services, resource management and monitoring, and maintenance (see table 7-7). NPS Employee housing or campsites would be increased by 70 additional units to accommodate this staffing level; campsites would meet the need for incidental “housing” for employees on temporary duty in the Tuolumne Meadows

area. Concessioner employee staffing and housing necessary to support commercial services would remain the same as under the no-action alternative (103 employee employees). (See “Tuolumne Meadows Site Plan,” below for the locations of proposed employee housing.)

Tuolumne Meadows Site Plan

The locations identified below are illustrated on the site plan map (figure 7-7) at the end of this section. The estimated net construction costs for Tuolumne Meadows under alternative 2 would be approximately \$70 million, based on calculations included in appendix L.

Visitor Facilities

- Retain the store, grill, post office, and public fuel station in their current locations. No feasible location exists for relocating the fuel station outside the river corridor; it would remain at its current location where the existing underground fuel tanks have been upgraded to mitigate risk to water quality. Provide a new visitor contact station, picnic area, and public shower/restroom facility in this commercial service area. Consolidating NPS and commercial visitor services would provide better separation between visitor services and operational functions than what exists at the current visitor center location, facilitate visitor access to services, and improve operational efficiency.
- Expand the campground (see below).
- Retain the Tuolumne Meadows Lodge at its current capacity, while relocating the three guest tent cabins nearest the river to protect adjacent riparian habitat.
- Readjust the shuttle bus stops to reflect site-development changes. (Shuttle buses would no longer stop at location 3 on the site plan map [figure 7-7] once the trailhead for the Cathedral Lakes trail was relocated. A new stop would be provided at location 12 to serve the new picnic area.)

Campground

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Design for a capacity of 345 sites, including 41 additional walk-in sites (6 people per site), plus 7 group sites (30 people per site) for a maximum of 2,280 people). All walk-in sites would be on the same loop, located west of loop A, and served by composting toilets, to minimize additional water consumption.
- Retain the campground office.
- Retain the existing entrance road alignment.
- Retain the campground A-loop road. Relocate the A-loop sites that are closest to the Lyell Fork away from the river.
- Formalize a trail connection between the campground and the John Muir Trail.

Trails and Trailheads

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Delineate or fence the Cathedral Lakes trail to facilitate ecological restoration while allowing for use by pack stock and hikers.
- Move the Tioga Road trailhead for Parsons Memorial Lodge to the new day parking area south of Tioga Road and provide a trail connection to the existing trail; install protective fencing on either side of the trail from Tioga Road to Parsons Memorial Lodge to facilitate meadow recovery.
- Install protective fencing on either side of the trail/access road between Lumbert Dome and Tuolumne Meadows Lodge to facilitate recovery.
- Provide a new formal trail connecting the visitor services core with the existing Parsons Memorial Lodge footbridge and trail.

- Provide a new hiking trail connecting facilities along Tioga Road; tie into the section of the Great Sierra Wagon Road east of Lembert Dome.

Picnic Areas

- Retain the picnic area at Lembert Dome.
- Provide new picnic areas
 - east of Pothole Dome
 - in the consolidated visitor services area
 - in association with the new day parking area near the Parsons Memorial Lodge trailhead
 - at the site overlooking the meadow that is currently occupied by the concessioner stable

Parking

The total number of designated parking spaces in the Tuolumne Meadows area (day and overnight) would be increased from 533 to 982 spaces.

Table 7-7a.
Number of Parking Spaces in Designated Parking Areas, Alternative 2

Type of Parking	Current	Alternative 2	Description
Day Parking	16	16	existing parking area at Pothole Dome
	0	20	new parking/viewing area east of Pothole Dome
	0	4	existing roadside pullout south of Pothole Dome
	0	58	new parking area associated with the relocated stables
	50	126	existing parking area at the visitor center (expanded to also include Cathedral Lakes trailhead parking)
	0	80	new day parking area west of Unicorn Creek and across Tioga Road from the Parsons Memorial Lodge trailhead
	11	13	existing parking area at the campground office
	11	11	existing parking in the campground for the Elizabeth Lakes trailhead
	15	15	existing parking area at the fuel station
	51	55	existing parking area at the current site of the store and grill
	58	0	existing parking area at the concessioner stable
	0	30	new parking area in conjunction with picnic area at the existing concessioner stable
	0	34	roadside parking along the road to the concessioner stable
	29	50	existing parking area at the base of Lembert Dome
	7	7	existing parking area at the ranger station (relocated in this alternative)
	25	52	existing parking area at the Dog Lake/John Muir Trail trailhead
	67	71	existing parking areas in the road corridor east of Tuolumne Meadows, including the Mono Pass and Gaylor Peak trailheads and the Dana Meadows and other pullouts
	340	642	Total day parking
Overnight Parking (excluding cars parked in the Tuolumne Meadows campground)	58	86	existing parking area at the wilderness office
	33	59	existing parking area at the Dog Lakes/John Muir Trail trailhead
	0	35	relocated parking area for the Cathedral Lakes trailhead
	0	58	roadside parking along the road to the concessioner stable
	102	102	Tuolumne Meadows Lodge
	193	340	Total overnight parking

NPS and Concessioner Stables

- Co-locate the NPS and concessioner stables in a new location near the wastewater treatment plant, as proposed in the *Yosemite General Management Plan*.
- Reserve the current site of the NPS stable for NPS employee housing, if needed.

Park Operations

In addition to “Actions Common to Alternatives 1–4,” earlier in this chapter:

- Adapt the CCC mess hall building (current site of the visitor center) for park operations to provide the administrative facilities determined to be necessary to support visitor use and resource protection, but which would be infeasible to locate outside the river corridor.
- Retain the ranger station.
- Retain the aboveground diesel fuel tank at the ranger station for concessioner and NPS use.

Employee Housing

- Provide NPS employee housing for no more than 144 employees, plus campsites for an additional 30 employees. This would accommodate a total of 174 NPS employees, which is the number determined to be necessary in the Tuolumne Meadows area to support the kinds and levels of visitor use included in this alternative. It would be infeasible to locate this housing outside the river corridor due to site constraints; therefore, it must be inside the corridor. To protect river values, the housing would be provided at the following locations determined not to contain river-related or sensitive resources:
 - Road Camp (30 employees)
 - Ranger Camp (70 employees)
 - Gaylor Pit (44 employees, plus 30 additional employee campsites). The area currently does not contain water, wastewater, or communication infrastructure. Additional planning and environmental compliance for employee housing at this site would be required in order to address utilities.
- Provide concessioner employee housing for 101 concessioner employees at a new housing area at Gaylor Pit, immediately west of the helipad. As stated above, the area currently does not contain water, wastewater, or communication infrastructure. Future planning for this site for employee housing would need to address utilities. Provide hard-sided cabin for two stable employees at the concessioner stable at a location that would comply with relevant OSHA and NPS housing regulations regarding the proximity of housing and stock corrals, and relocate all other stable employees to Gaylor Pit.

Utility Systems

The general direction for site-specific planning for utility systems under alternative 2, intended to protect and enhance the river’s free flow, water quality, and outstandingly remarkable values, is outlined below.

Tuolumne Meadows Wastewater Collection, Treatment, and Disposal

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Design for an average water demand of 70,000 gallons per day.
- Seek technology to allow removal of the wastewater containment ponds and sprayfields from the north side of Tioga Road and replace with facilities on the south side of the road, to be designed in conjunction with the new wastewater treatment plant. If technology is not available, redesign the ponds and sprayfields to minimize risks of overflow from containment ponds or saturation of the sprayfields.

Tuolumne Meadows Water Collection, Treatment, and Distribution

In addition to “Actions Common to Alternatives 1–4,” beginning on page 7-19:

- Design for an average water demand of 70,000 gallons per day.

Site Restoration

See “Actions Common to Alternatives 1–4,” beginning on page 7-19.

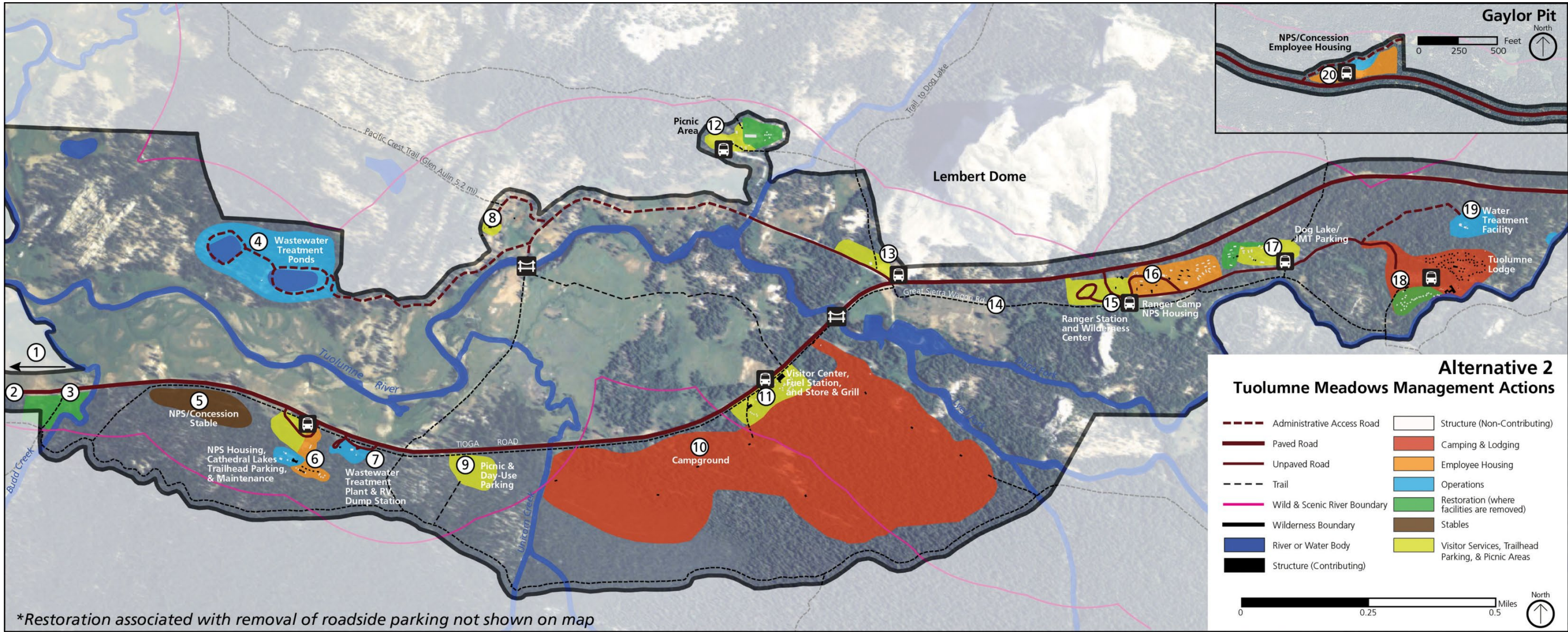


Figure 7-7. Tuolumne Meadows Site Plan, Alternative 2.

Key to figure 7-7 and List of Facilities Management Actions (actions marked with an asterisk (*) are specific to this alternative. All other actions are common to alternatives 1–4):

1. Pothole Dome scenic pullout/ parking areas	<ul style="list-style-type: none">Designate day parking with trailhead on north side of Tioga Road.Improve trail to Pothole Dome.Formalize roadside pullout (four vehicles) on south side of Tioga Road near Pothole Dome.Add parking, viewing, picnicking area east of Pothole Dome.	6. Existing visitor center and Road Camp	<ul style="list-style-type: none">Relocate visitor center to location #11; convert building to park operations.Construct new Cathedral Lakes trailhead with day and overnight parking.Retain maintenance yard and office.Increase NPS employee housing.	11. Existing commercial services core	<ul style="list-style-type: none">Retain store, grill, public fuel station, and post office.Remove mountaineering shop/school.Add visitor contact station, shower/restroom facility, picnic area, and day parking.Add trail connector to campground.Relocate concessioner employee housing to location #20.	16. Existing ranger station and Ranger Camp	<ul style="list-style-type: none">Replace NPS employee housing with hard-sided cabins.Relocate ranger station function to location #15.Retain aboveground diesel fuel tank.
2. Tioga Road through the Tuolumne Meadows area	<ul style="list-style-type: none">Retain the Tioga Road in its current alignment.Add roadside curbing to eliminate undesignated roadside parking and associated informal trails.Add approximately four viewing turnouts (four vehicles each; no parking).Tioga Road bridge to improve free flow of river.Add hiking trail paralleling the road.	7. Wastewater treatment plant	<ul style="list-style-type: none">Upgrade wastewater treatment plant.Retain recreational vehicle dump station.	12. Existing concessioner stable	<ul style="list-style-type: none">Relocate existing concessioner stable and concessioner employee housing to location #5.Add meadow overlook picnic area and day parking.Retain day and overnight parking along access road.	17. Bug Camp, Dog Lake/John Muir Trail parking	<ul style="list-style-type: none">Increase day and overnight parking.Remove NPS housing.
3. Existing Cathedral Lakes trailhead	<ul style="list-style-type: none">Relocate trailhead and parking to location #6; restore to natural conditions.	8. Parsons Memorial Lodge	<ul style="list-style-type: none">Preserve lodge and retain vehicle access.Upgrade footbridge to improve free flow of river.	13. Lumber Dome	<ul style="list-style-type: none">Retain picnic area.Expand day parking and retain trailheads for Lumber Dome and Parsons Memorial Lodge.Add shuttle stop.	18. Tuolumne Meadows Lodge	<ul style="list-style-type: none">Retain Lodge at current capacity.Eliminate roadside parking.Relocate concessioner employee housing to location #20.
4. Existing wastewater ponds and sprayfields	<ul style="list-style-type: none">Retain and upgrade (or relocate if feasible).	9. Area west of Unicorn Creek	<ul style="list-style-type: none">Add day parking and picnic area.Add trailhead for Parsons Memorial Lodge.	14. Old Tioga Road/Great Sierra Wagon Road	<ul style="list-style-type: none">Preserve as trails; mitigate impacts of historic roads to meadow hydrology.	19. Water treatment facility	<ul style="list-style-type: none">Upgrade water treatment facility.
5. Area east of Budd Creek and west of existing visitor center	<ul style="list-style-type: none">Construct new Cathedral Lakes trail connector.Co-locate new NPS and concessioner stables and day parking.Build new hard-sided cabin for two stable employees.	10. Tuolumne Meadows campground	<ul style="list-style-type: none">Expand campground in current configuration, adding 41 additional walk-in campsites; relocate the A-loop sites closest to the Lyell Fork.Retain campground office and day parking.Retain the existing entrance road.Formalize John Muir Trail connection.Retain Elizabeth Lakes trailhead and day parking.Remove riprap from riverbank.	15. Existing wilderness center and NPS stable	<ul style="list-style-type: none">Combine ranger station with existing wilderness center; expand parking.Relocate NPS stable to location #5; use site for expansion of NPS employee housing.	20. Gaylor Pit	<ul style="list-style-type: none">Retain helipad.Add NPS and concessioner employee housing.

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Summary of Protection and Enhancement of River Values under Alternative 2

The *Tuolumne River Plan* will be evaluated in terms of four legal requirements: (1) the WSR requirement that it protect and enhance river values; (2) the NEPA requirement that it fully consider the effects on the human environment; (3) the NHPA requirement that it consider effects on historic properties; and (4) the requirement of the Wilderness Act that it consider the effects on wilderness character. Guidelines for each of these requirements describe the criteria to be used in determining the effects of the plan. This section focuses directly on how the plan would meet the WSR requirement to protect and enhance river values if alternative 2 were to be selected. The NEPA, NHPA, and Wilderness Act analyses are presented in chapter 8.

All the action alternatives, including alternative 2, would protect and enhance river values as described in detail in chapter 5 and summarized in this chapter under “Summary of Protection and Enhancement of River Values under All Action Alternatives,” earlier in this chapter. In addition, alternative 2 would take the following additional actions, primarily related to management of visitor use, user capacity, and development, to further protect or enhance river values.

Free-Flowing Condition of the River

So long as low flows remained around or above 1.0 cubic foot per second, average water withdrawals of 60,000 to 70,000 gallons per day would ensure that management could maintain consumption at no more than 10% of flow during low-flow periods and impose additional temporary conservation measures if necessary, as discussed in chapter 5.

The average estimated water demand for alternative 2 has been calculated as shown in table 7-8.

Table 7-8.
Summary of Average Estimated Water Demand, Alternative 2

Facility	Current consumption per unit	No-Action		Alternative 2	
		Number of units	Gallons per day	Number of units	Gallons per day
Campsites	100 gallons/standard site/day	304 standard sites	30,400	304 standard sites	30,400
	50 gallons/walk-in site/day	0 walk-in sites	0	41 walk-in sites	2,050
	500 gallons/group site/day	7 group sites	3,500	7 group sites	3,500
Recreational vehicle dump station	50 gallons/use/day	32 dumps	1,600	32 dumps	1,600
Tuolumne Meadows Lodge	30 gallons/person/ day	276 guests	8,280	276 guests	8,280
Camper showers	10 gallons/person/shower	0	0	35 showers	350
NPS housing	50 gallons/employee/ day in housing	104 employees in housing	5,200	144 employees in housing	7,200
	25/gallons/employee/ day in campsites	0 employees in campsites	0	30 employees in campsites	750
Concessioner employee housing	50 gallons/employee/ day	103 employees	5,150	103 employees	5,150
Cafeteria meals (2 per concessioner employee)	6 gallons/person/ day	206 meals	1,236	206 meals	1,236
Store/grill	5 gallons/person/ day	1,148 visitors	5,740	Total visitor capacity increased by 9%	6,257
Visitor center /visitor contact station	5 gallons/visitor/ day	607 visitors	3,035	Total visitor capacity increased by 9%	3,308
Total consumption			64,141		70,081

Based on the calculations in table 7-8, the increase in overnight visitor use and employee housing under alternative 2 would increase the demand for domestic water in the Tuolumne Meadows area by 10%, to an average of about 70,000 gallons per day. Intensive management effort, including water metering, replacing inefficient fixtures, and implementing educational programs, would be required to ensure that water use remained within the standard. If climate change should lead to longer low-flow durations occurring earlier in the summer, this alternative would have the greatest potential for requiring reductions in service, including reducing the capacities at the lodge and/or campground, to ensure that the level of water consumptions remained protective of river flows.

Management to Protect Water Quality

Risks to water quality in the Tuolumne Meadows area would be mitigated by upgrading the wastewater treatment plant, wastewater ponds, and sprayfields. The improved utilities would be designed for loads commensurate with the estimate of domestic water use. The risk to water quality from fuel storage at the public fuel station would be mitigated, but not eliminated, by continued monitoring. Risks to water quality at Glen Aulin would be reduced by removing the wastewater treatment system and leach mound, to be replaced by a new composting toilet. Water use would be greatly reduced there. Water used for meal preparation and sanitation would be screened before disposal in a wastewater sump. Monitoring would be ongoing to ensure that water quality remained excellent at both Tuolumne Meadows and Glen Aulin.

Management to Protect the Subalpine Meadow and Riparian Complex

Most of the actions to protect and enhance the subalpine meadow and riparian complex would be common to all the action alternatives. Alternative 2 would additionally enhance this river value by directing visitors to designated trails and delineating or fencing certain trail segments to facilitate the ecological recovery of adjacent vegetation.

Management to Protect Archeological Sites

The management of visitor use common to all the action alternatives would reduce impacts on archeological sites in the Tuolumne Meadows and Lower Dana Fork segments. Monitoring would be ongoing to ensure that site disturbance did not exceed the protective standard established for these sites. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as described in chapter 5.

Management to Protect and Enhance Scenic Values

Scenic views and viewpoints in the Tuolumne Meadows area and along the Tioga Road corridor would be protected and enhanced by managing unnatural features, such as facilities and parked cars, to minimize their intrusion into remarkable views. The eight scenic vista points identified by the *Tuolumne River Plan* would be protected and enhanced, if necessary, by removing encroaching vegetation, primarily conifers.

Management to Protect and Enhance the Wilderness Experience along the River

The wilderness experience along trails in wild segments but within reach of a day hike from Tuolumne Meadows would be protected by restricting use to levels that resulted in encounters with no more than 10 other parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

Management to Protect and Enhance Tioga Road Access to the River through Tuolumne and Dana Meadows

Opportunities for scenic driving along Tioga Road would be enhanced by eliminating undesignated roadside parking and congestion caused by vehicles slowing to park and pedestrians crossing the road. Opportunities for people wishing to park their cars would be enhanced by increasing the number of designated parking spaces.

Alternative 3: Celebrating the Tuolumne Cultural Heritage

Alternative 3 builds upon all the major elements included in the *Tuolumne River Plan* to identify a set of management actions that would work together to protect river values while accommodating day and overnight visitors in a historic setting.

Alternative 3 includes the technical correction to the river corridor boundary (presented in chapter 3), the section 7 determination process for evaluating water resources projects (presented in chapter 4), the management standards and actions for protecting and enhancing river values (presented in chapter 5), and the guidance for identifying an appropriate visitor experience and associated user capacity (presented in chapter 6).

Concept

Alternative 3 responds to those members of the public who have strong traditional ties to the Tuolumne River corridor and who expressed a desire to see the area remain unchanged. It would preserve many aspects of Tuolumne Meadows' historic setting.

As with all alternatives, most of the river corridor would be managed as wilderness. In these areas, natural river-related systems would be sustained by natural ecological processes, archeological and American Indian traditional cultural resources would characterize the cultural landscape, and recreational opportunities would be primitive and unconfined.

In comparison to no action, alternative 3 would include the following actions:

- Restore previously disturbed ecological conditions to subalpine meadow and riparian areas.
- Reduce risks to stream flow and water quality.
- Increase protection of archeological sites and resources important to American Indians.
- Reduce the capacity of the Tuolumne Meadows Lodge by half.
- Slightly reduce lodging and the level of service at Glen Aulin.

Tuolumne Meadows and Glen Aulin would serve as platforms for celebrating the relationships people have had with the Tuolumne River over decades. Many of the historic visitor facilities at Tuolumne Meadows and Glen Aulin date from a time when a trip to the Tuolumne River was a rigorous journey and amenities were few. Visitors would continue to have the opportunity for a classic national park experience, characterized by ranger-guided walks and interpretive programs, independent exploration along the river (including opportunities to disperse away from formal trails), horseback riding, camping, and rustic lodging, in a high-country setting retaining historic structures and buildings. Visitors who have developed deep personal connections with these areas through repeated experiences shared among generations would continue to have these opportunities in a setting that would appear little changed over time.

In giving primacy to the cultural landscape, this alternative would not endorse perpetuating past patterns of use that proved to be unsustainable, like unmanaged camping in the meadows. The desire to maintain strong, tangible ties with the past would be balanced with lessons from the past and present so that the experience could be perpetuated for future generations.

Table 7-9.
Corridorwide Visitor and Administrative Use Capacity, Alternative 3

Visitor Overnight Capacity					
River Segment	Existing Use Calculation	Current Overnight Visitors	Proposed Action	Units	Maximum Overnight Visitors, Alt. 3
Scenic Segments					
Tuolumne Meadows Lodge	# of lodging units (69) × max of 4 people per unit	276	Reduce lodge capacity (minus 35 guest tent cabins)	34 guest tent cabins	136
Tuolumne Meadows Campground	# of campsites (304 sites × max 6 people per site, 7 group sites × max 30 people per site)	2,034	Retain campground capacity	304 sites, 7 groups sites	2,034
Wild Segments					
Glen Aulin HSC	# of lodging units (8) × max of 4 people per unit	32	Reduce Glen Aulin HSC capacity (minus 1 guest tent cabin)	7 guest tent cabins	28
Wilderness	Maximum capacity of wilderness zones (400)	400	Retain current wilderness zone capacities	–	400
Subtotal, Overnight		2,742			2,598
Visitor Day Use Capacity					
River Segment	Existing Use Calculation	Maximum Observed People At One Time, 2011^a	Proposed Action	Proposed Units	Maximum People At One Time, Alt. 3
Scenic Segments					
Access from Tuolumne Meadows	# of cars parking in designated parking spaces (340) × 2.9 ^b	986	Increase designated day parking (plus 170 spaces)	510 spaces at 90% occupancy × 2.9 ^b	1,331
	# cars parking in undesignated spaces (190) × 2.9 ^b	551	Eliminate undesignated roadside parking	–	0
	Maximum people arriving by in-park shuttles, tour buses, and regional public transit	225	Maintain current level of arrivals by in-park shuttles, tour buses, and regional public transit	–	225
Access from below O'Shaughnessy Dam	# of cars parking in designated spaces (4) × 2.9 ^b	12	Retain existing parking.	4 spaces × 2.9 ^b	12
Subtotal, Day Use		1,774			1,568
Total Visitor People At One Time		4,516			4,166
Administrative Capacity					
River Segment	Existing Use Calculation	Maximum employees (existing)	Proposed Action	Units	Maximum employees, Alt. 3
Wild Segments					
Concessioner	Approximately 9 employees at Glen Aulin HSC	9	Retain all employees at Glen Aulin HSC	9	9
Scenic Segments					
NPS	Approximately 150 employees assigned to Tuolumne Meadows	150	Meet staffing need with 124 employees at Tuolumne Meadows	124 employees	124
Concessioner	103 employees based at Tuolumne Meadows	103	Meet staffing need with 103 employees at Tuolumne Meadows	103 employees	103
Total Administrative People At One Time		262			236
Total Capacity Corridorwide		4,778 (existing)			4,402 (proposed)

a The peak number of vehicles observed during vehicle counts in 2011 (observed on August 13, 2011).

b The vehicle occupancy rate is 2.9 people per vehicle, based on visitor studies conducted over the past 20 years that found an average vehicle occupancy ranging from 2.6 to 3.4 (Van Wagtenonk and Coho 1980; FHWA 1982; Corridor ORCA 1999; Littlejohn et al. 2005; Le et al. 2008). Based on this range, an average of 2.9 persons per vehicle is used for estimating visitor numbers for planning purposes in this document.

Abbreviations: Alt. = alternative; HSC = High Sierra Camp; max = maximum; # = number

River values would be protected and enhanced by restoring ecological conditions to meadow and riparian areas, and by directing use in scenic segments to resilient areas (see “Summary of Protection and Enhancement of River Values under Alternative 3” at the end of this alternative).

The visitor use capacity under alternative 3 would be reduced to a maximum of 4,166 people at one time, as shown in table 7-9. Actual day use levels would be lower during nonpeak periods, and actual overnight use levels would be lower even during peak periods because not all individual campsites and lodging units would be occupied by the maximum number of people allowable. The administrative use capacity under alternative 3 would be reduced to a maximum of 236 employees at one time (table 7-9).

Wild Segments (Designated Wilderness and Glen Aulin)

Resource Protection and Enhancement

Free Flow

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Water Quality

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Continue to restrict water use at the Glen Aulin High Sierra Camp to 600 gallons per day to mitigate the risk to water quality (see “Glen Aulin,” below).

Biological Value: Subalpine Meadow and Riparian Complex

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Biological Value: Low-Elevation Riparian and Meadow Habitat

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Cultural Value: Archeological Landscape

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Scenic Value: Scenery through Lyell Canyon and the Grand Canyon of the Tuolumne

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Recreational Value: Wilderness Experience along the River

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Manage day use levels along wilderness trails within reach of day hikes from Tioga Road to achieve a standard of no more than 10 encounters with other parties per hour (80% of the time, sampled over the entire season, including weekdays and weekends).
- Continue concessioner stock day rides into wilderness, but at a reduced capacity to reduce conflicts on trails (four-hour and all-day rides eliminated; two-hour rides reduced from 3 to 2 per day, accommodating a maximum of 24 people per day).
- Allow commercial use in wilderness, with restrictions on types and levels of use based on a determination of extent necessary (see appendix C) that gives priority to noncommercial use and restricts commercial use to no more than one overnight group per zone per night and no more than one day group per trail per day. Additional restrictions would include the following:

- *Restrictions on types of use, Glen Aulin zone, peak months only:* During the peak use months of July and August, commercial groups having only a recreational purpose would no longer have access to the Glen Aulin zone; groups having an educational or scenic, as well as recreational, purpose (as defined in appendix C) would continue to have access consistent with limitations on total use levels, described above.
- *Restrictions on types of use, Lyell Canyon zone, peak months only:* During the peak use months of July and August, commercial use in the Lyell Canyon zone by groups with only a recreational purpose would be restricted to Monday–Thursday only. Groups having an educational or scenic, as well as a recreational, purpose would continue to have access to the Lyell Canyon zone on weekends, as well as weekdays, consistent with limitations on total use levels, described above.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

All ongoing uses would continue.

Maximum Amounts of Visitor Use

Maximum day use along popular wilderness trails would be limited as necessary to achieve the standard of encounters with no more than ten parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

The overnight capacity for backpacker camping in wild segments would be retained at 400 persons per night (350 persons per night above the reservoir and 50 persons per night below the reservoir). This capacity might be reduced in the future if determined necessary to protect wilderness values; however, it would not be increased above this amount, which has been determined to be protective of river values. The overnight capacity at the Glen Aulin High Sierra Camp would be reduced to 28 guests.

Management of Visitor Use Capacity

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- The current overnight trailhead quota system would be retained to regulate overnight use in wild segments.

Administrative Use

The types and levels of administrative use in wild segments would remain the same as existing conditions. Nine concessioner employees would be housed at the Glen Aulin High Sierra Camp.

Glen Aulin (Potential Wilderness Addition)

Glen Aulin High Sierra Camp

The Glen Aulin High Sierra Camp would be retained at a reduced capacity of 28 guests to facilitate opportunities for visitors with a broader range of physical abilities to connect with the river in a remote setting, while increasing protection of river values. Day use at Glen Aulin would decrease commensurate with an overall reduction in day use in the river corridor. The level of service at the camp would be reduced:

- Eliminate flush toilets for guests to reduce demands for water use and waste disposal. Provide composting toilets for guests. Retain flush toilets for employees living at Glen Aulin.
- Discontinue wood for heat stoves in visitor tent cabins to reduce the need for stock use to supply wood to the camp.

- Discontinue “meals-only” service for people who are not lodge guests to reduce demands for water use and waste disposal.
- Continue overnight saddle trips to the camp.

Utility improvements at the camp would include the following (see figure 7-8):

- Design for a capacity of 600 gallons per day.
- Construct a new composting toilet facility between the granite slab behind the kitchen and the septic tank. To the extent possible, facility design would be compatible with the historic character.
- Install one water treatment tank (1,200 gallons) and one water storage tank (1,200 gallons) north of the existing water tank; remove the existing tank. Replace the existing chlorinator, filter tank, and surge tanks.
- Retain the existing septic tank and leach mound.

The replacement storage tanks, filter tank, and surge tanks would be flown in by helicopter. The rest of the materials would be either flown in by helicopter or packed in with stock. The determination as to which mode of transport to use would be based on the minimum-requirement criteria established under the Wilderness Act. The estimated net construction costs for Glen Aulin under alternative 3 would be approximately \$1.1 million (see appendix L).

Backpacker Campground

See "Actions Common to Alternatives 1-4," beginning on page 7-19.

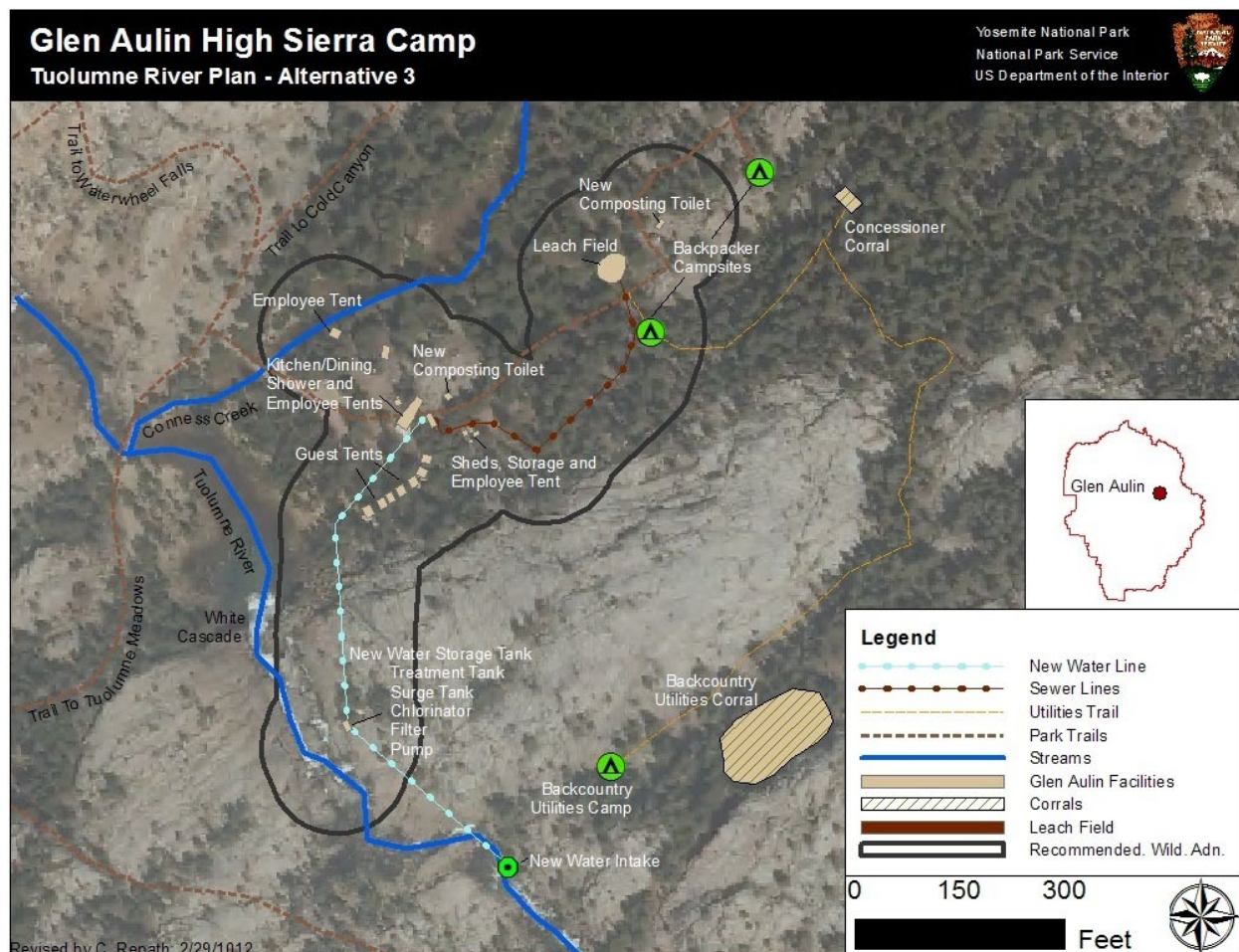


Figure 7-8. Glen Aulin Site Plan, Alternative 3.

Scenic Segments (Tuolumne Meadows and Tioga Road Corridor)

Note that this discussion pertains only to the nonwilderness portions of the Tuolumne Meadows and Lower Dana Fork segments. The portions of these segments within designated wilderness would be managed the same as the wild segments.

Resource Protection and Enhancement

Free Flow

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Reduce uses, primarily overnight lodging, that would otherwise require water consumption, thus reducing the estimated average water demand to approximately 60,000 gallons per day. This level of water withdrawal would be expected to remain within the standard of no more than 10% of low flow unless climate change led to longer low-flow durations occurring earlier in the summer, in which case further reductions in water use would be required as discussed in chapter 5.

Water Quality

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Reduce concessioner stock day rides to reduce stock use and risks to water quality. Compared to current service levels, the amount of stock use on trails would be reduced by 1 two-hour and 2 four-hour rides per day, which might otherwise involve up to 14 head of stock per ride on the trails. Full-day rides, which occur only occasionally, would also be eliminated.
- Remove the public fuel station to eliminate the risk to water quality.

Biological Value: Subalpine Meadow and Riparian Complex

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Cultural Value: Archeological Landscape

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Cultural Value: Parsons Memorial Lodge

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Tuolumne Meadows, Soda Springs, and Tioga Road Historic Districts

The Tuolumne Meadows, Soda Springs, and Tioga Road Historic Districts did not meet the outstandingly remarkable value criteria (see the criteria in the “Background” section of chapter 5). However, these historic districts are considered critical to the implementation of alternative 3 and therefore are addressed under this alternative. Under alternative 3, the three historic districts would be managed as follows to preserve their historic character and to protect and enhance opportunities for visitors to connect with the history and traditional uses of the Tuolumne River:

- Keep all visitor and administrative functions that are to be retained under alternative 3 in their current structures and current locations, most of which are historic and contributing elements of the Tuolumne Meadows Historic District. (Half the Tuolumne Meadows Lodge guest tent cabins and the fuel station/mountaineering shop would be removed under this alternative.) All of the functions to be retained under alternative 3 have been determined to be necessary, and no feasible locations exist outside the river

corridor to relocate these functions; therefore, it would be consistent with the intent of the WSRA and the concept of this alternative to retain them in their historic structures and locations.

- Upgrade exterior of wilderness center to be compatible with the historic landscape.
- Retain the Tioga Road on its current alignment. Impacts of culvert improvements on the district would be minimized or avoided by salvaging and reusing materials of the original historic culverts and ensuring that new or modified structures (e.g., headwalls) were compatible with the materials, size, and scale of the originals.

Scenic Value: Scenery through Dana and Tuolumne Meadows

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Maintain views from eight scenic vista points (identified in chapter 5) by controlling the encroachment of vegetation in a manner that was protective of ecological conditions and archeological values at each vista point. Each particular vista point would be managed in accordance with an individual work plan based on evaluations of river values and other resources at that specific location. The work plans are included in appendix J. No other vegetation management would be conducted to enhance scenery or viewing opportunities.

Recreational Value: Tioga Road Access to the River through Tuolumne and Dana Meadows

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Increase the amount of designated parking available to visitors wishing to get out of cars to enjoy recreational experiences in a river-related landscape.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

To enhance opportunities for visitors to connect with the history and traditional uses of the Tuolumne River, the historic setting would be preserved under alternative 3, and the day use capacity would be somewhat reduced to allow for a mix of traditional park programs and relatively unstructured exploration at a level that would be protective of river values. As with alternatives 2 and 4, visitors would be directed from trailheads at designated parking lots to trails; however, unlike alternatives 2 and 4, they would not be discouraged from dispersing into the meadow or along the riverbank. Congestion would be reduced by reducing use levels, improving parking and trailhead conditions, increasing shuttle bus service between destinations within the Tuolumne Meadows area, and expanding visitor information and orientation services to advise visitors about less used destinations and trail segments.

Visitor services would be managed as follows:

- Conduct a full range of orientation, interpretation, and education programs, with increased emphasis on education about the need to protect river values, at the visitor center, wilderness center, Parsons Memorial Lodge, and in the field.
- Retain some commercial services (store/grill, concessioner stock day rides) and the postal service (subject to future USPS level of service decisions beyond NPS control). The public fuel station and mountaineering shop and school would be eliminated.
- Reduce concessioner stock day rides to 2 two-hour rides per day (maximum of 24 people per day); eliminate the four-hour and full-day rides.
- Retain the campground at its current capacity of 304 sites plus 7 group campsites.
- Retain the Tuolumne Meadows Lodge, but at half its current capacity. Such a reduced capacity would preserve the historic setting while reducing use levels to allow for a mix of traditional park programs and

relatively unstructured exploration at a level that would be protective of river values. The reduced capacity would also decrease demands for water use and disposal.

- Increase the frequency of shuttle bus service among destinations within the Tuolumne Meadows area, and add stops at visitor service areas, thereby making it easier for visitors to use public transportation to circulate within the Tuolumne Meadows area.

Maximum Amounts of Visitor Use

- Reduce the maximum day use capacity above Hetch Hetchy Reservoir from 1,762 people at one time to a maximum of 1,556 people at one time (see table 7-9; in this table, the total maximum day use number includes the maximum day use below O'Shaughnessy Dam, which would remain at 12 people at one time).
- Reduce the overnight capacity at Tuolumne Meadows to 2,170 people per night: 2,034 people accommodated by the 304 sites and 7 group sites in the campground, and 136 people accommodated by the 34 guest tent cabins at Tuolumne Meadows Lodge (see table 7-9). Actual overnight use levels would be lower than these capacities because individual campsites and lodging units would not always be occupied by the maximum number of people allowable.

Management of Visitor Use Capacity

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

Day Use

Day use capacity would be managed by controlling day parking, which would be restricted to paved or otherwise authorized spaces. No undesignated roadside parking would be allowed through the Tuolumne Meadows area. Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows. The amount of formal, designated day parking in the Tuolumne Meadows area would be increased from 340 to 510 spaces. (See parking details under “Tuolumne Meadows Site Plan,” below.)

Overnight Use

Overnight user capacity under alternative 3 would be managed by the facility capacities of the campground and Tuolumne Meadows Lodge. These facilities would continue to be available through a reservation system, with some campsites also available on a first-come, first-served basis.

Administrative Use

NPS staffing would be reduced to a maximum of 124 employees (see table 7-9). In addition to current housing, 20 employee campsites would be provided to meet the need for incidental “housing” for employees on temporary duty in the Tuolumne Meadows area (see “Employee Housing,” below). Concessioner employee staffing and housing necessary to support commercial services would remain the same as under the no-action alternative (103 employees). (See “Tuolumne Meadows Site Plan,” below for the location of proposed employee housing.)

Tuolumne Meadows Site Plan

The locations identified below are illustrated on the site plan map (figure 7-9) at the end of this section on alternative 3. The estimated net construction costs for Tuolumne Meadows under alternative 3 would be approximately \$48.5 million, based on calculations included in appendix L.

Visitor Facilities

- Retain the visitor center, wilderness center, and store and grill in their existing locations and arrangement to maintain the historic character of the river corridor. Upgrade exterior of the wilderness center to be compatible with the historic landscape. The public fuel station and the mountaineering shop/school would be removed.
- Retain the campground at its current capacity (see the next subhead below).
- Retain the Tuolumne Meadows Lodge but at half its current capacity. The 35 tent cabins on the north side of the lodge complex would be removed. The three guest tent cabins nearest the river would be relocated to protect adjacent riparian habitat.
- Increase shuttle bus stops. (Shuttle buses would no longer stop at location 3 on the site plan after a new trailhead was provided for the Cathedral Lakes trailhead.)

Campground

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Design for a capacity of 304 sites (6 people per site) plus 7 group sites (30 people per site) for a maximum of 2,034 people).
- Retain the campground A-loop road and campsites.
- Retain the campground office.
- Retain the existing entrance road alignment.
- Formalize a trail connection between the campground and the John Muir Trail.

Trails and Trailheads

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Picnic Areas

- Retain the picnic area near Lemberg Dome (replace the waterless toilets in kind).
- Provide new picnic area east of Pothole Dome.
- Provide new picnic area near the new Cathedral Lakes trailhead.

Parking

The total number of designated parking spaces in the Tuolumne Meadows area (day and overnight) would be increased from 533 to 813 spaces.

Table 7-9a.
Number of Parking Spaces in Designated Parking Areas, Alternative 3

Type of Parking	Current	Alternative 3	Description
Day Parking	16	16	existing parking area at Pothole Dome
	0	4	existing roadside pullout south of Pothole Dome
		20	new parking/viewing area east of Pothole Dome
	50	113	existing parking area at the visitor center, including additional parking for the Cathedral Lakes trailhead
	11	13	existing parking area at the campground office
	11	11	existing parking in the campground for the Elizabeth Lakes trailhead
	15	15	existing parking area at the fuel station
	51	55	existing parking area at the current site of the store and grill
	58	58	existing parking area at the concessioner stable
	0	34	roadside parking along the road to the concessioner stable
	29	37	existing parking area at the base of Lember Dome
	7	7	existing parking area at the ranger station
	25	45	existing parking area at the Dog Lake/John Muir Trail trailhead
	0	15	existing parking area at Gaylor pit
	67	67	existing parking areas in the road corridor east of Tuolumne Meadows, including the Mono Pass and Gaylor Peak trailheads and the Dana Meadows and other pullouts
	340	510	Total day parking
Overnight Parking (excluding cars parked in the Tuolumne Meadows campground)	58	86	existing parking area at the wilderness office
	33	59	existing parking area at the Dog Lakes/John Muir Trail trailhead
	0	32	relocated parking area for the Cathedral Lakes trailhead
	0	56	roadside parking along the road to the concessioner stable
	102	70	Tuolumne Meadows Lodge
	193	303	Total overnight parking

NPS and Concessioner Stables

- Retain the NPS and concessioner stables in their current locations. Housing for all but two employees would be removed from the stable area and replaced at the consolidated concessioner employee housing area near Tuolumne Meadows Lodge (see “Employee Housing,” below).

Park Operations

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Add a new maintenance yard and office and consolidate operational facilities related to roads, trails, buildings, and grounds at the wastewater treatment site.
- Relocate the aboveground diesel fuel tank to the new maintenance yard for concessioner and NPS use.

Employee Housing

- Provide NPS employee housing for no more than 104 employees, plus campsites for an additional 20 employees to be added behind Tuolumne Meadows Lodge. This would accommodate a total of 124 employees, which is the amount of housing determined to be necessary in the Tuolumne Meadows area to support the kinds and levels of visitor use included in alternative 3. It would be infeasible to locate this housing outside the river corridor due to site constraints; therefore, it must be inside the corridor.
 - Road Camp (17 employees)
 - Ranger Camp (54 employees)
 - Bug Camp (33 employees)
 - campsites behind Tuolumne Meadow Lodge (20 employees)

- Provide concessioner employee housing for 101 employees north of the existing Tuolumne Meadows Lodge parking area (at a density equal to that of the existing lodge employee area plus kitchen, dining, toilet, and shower house facilities). Provide a hard-sided cabin for two stable employees at the concessioner stable at a location that would comply with relevant OSHA and NPS housing regulations regarding the proximity of housing and stock corrals, and relocate all other stable employees to the lodge area.

Utility Systems

The general direction for site-specific planning for utility systems under alternative 3, intended to protect and enhance the river's free flow, water quality, and outstandingly remarkable values, is outlined below.

Tuolumne Meadows Wastewater Collection, Treatment, and Disposal

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Design for an average water demand of 60,000 gallons per day.
- Seek technology to allow removal of the wastewater containment ponds and sprayfields from the north side of Tioga Road and replace with facilities on the south side of the road, to be designed in conjunction with the new wastewater treatment plant. If technology is not available, redesign the ponds and sprayfields to minimize risks of overflow from containment ponds or saturation of the sprayfields.

Tuolumne Meadows Water Collection, Treatment, and Distribution

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Design for an average water demand of 60,000 gallons per day.

Site Restoration

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

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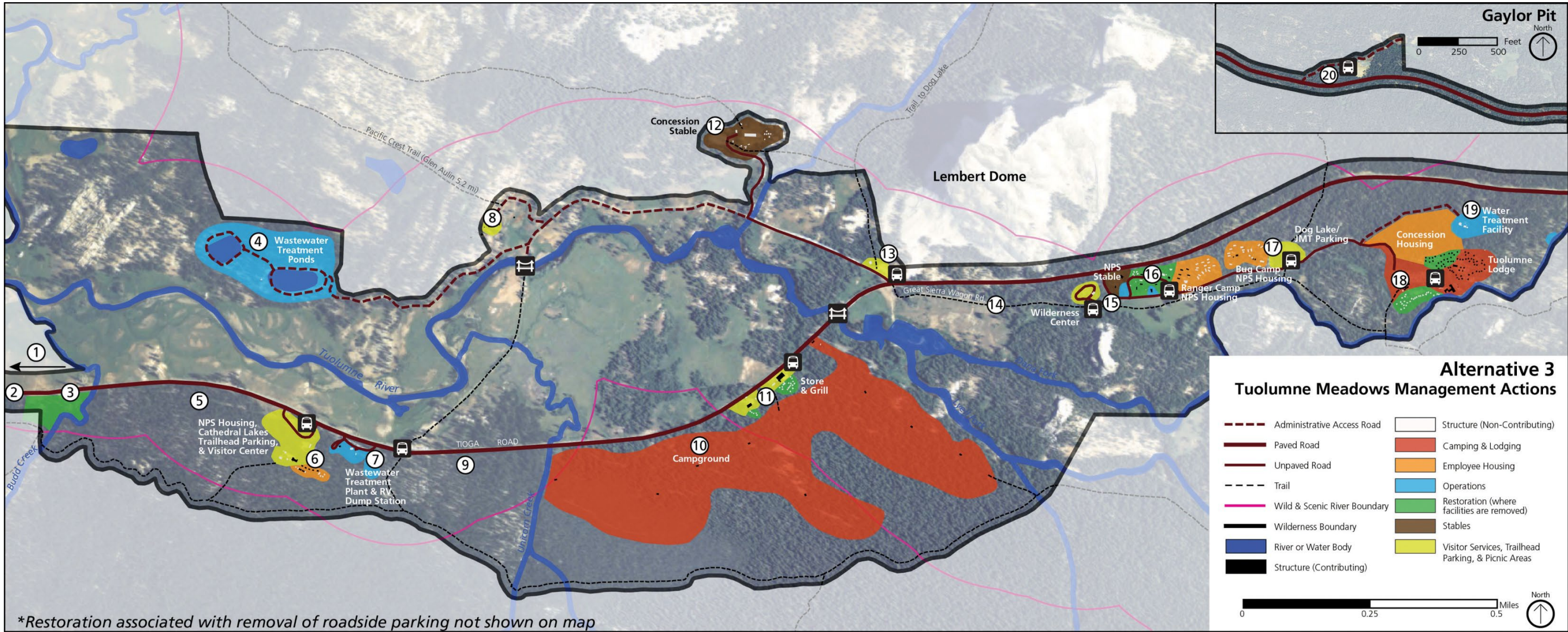


Figure 7-9. Tuolumne Meadows Site Plan, Alternative 3.

Key to figure 7-9 and List of Facilities Management Actions (actions marked with an asterisk (*) are specific to this alternative. All other actions are common to alternatives 1–4):

1. Pothole Dome scenic pullout/ parking areas	<ul style="list-style-type: none">Designate day parking with trailhead on north side of Tioga Road.Improve trail to Pothole Dome.Formalize roadside pullout (four vehicles) on south side of Tioga Road near Pothole Dome.* Add parking, viewing, and picnicking area east of Pothole Dome.	6. Existing visitor center and Road Camp	<ul style="list-style-type: none">* Retain visitor center in current location.Construct new cathedral lakes trailhead and picnic area, day and overnight parking.* Relocate maintenance yard and office to location #7.* Retain NPS employee housing.	10. Tuolumne Meadows campground	<ul style="list-style-type: none">* Retain campground in current configuration at current capacity.Retain campground office and day parking.* Retain existing entrance road.Formalize John Muir Trail connection.Retain Elizabeth Lakes trailhead and day parking.Remove riprap from riverbank.	14. Old Tioga Road/Great Sierra Wagon Road	<ul style="list-style-type: none">Preserve as trails; mitigate impacts of historic roads to meadow hydrology.
2. Tioga Road through the Tuolumne Meadows area	<ul style="list-style-type: none">Retain the Tioga Road in its current alignment.Add roadside curbing to eliminate undesignated roadside parking and associated informal trails.Add approximately four viewing turnouts (four vehicles each; no parking).Upgrade Tioga Road bridge to improve free flow of river.	7. Wastewater treatment plant	<ul style="list-style-type: none">Upgrade wastewater treatment plant.Retain recreational vehicle dump station.Add new modest operational facilities related to roads, trails, buildings, and grounds.Add NPS maintenance yard and office, including aboveground diesel fuel tank.Diesel fuel tank for NPS and concessioner use relocated from location #16.	11. Existing commercial services core	<ul style="list-style-type: none">* Retain store, grill, post office, and day parking.* Remove mountaineering shop/school and public fuel station; retain day parking at fuel station site.Upgrade restroom.Add trail connector to campground.Relocate concessioner employee housing to location #18.	15. Existing wilderness center and NPS stable	<ul style="list-style-type: none">* Retain wilderness center; expand parking.Retain NPS stable.
3. Existing Cathedral Lakes trailhead	<ul style="list-style-type: none">Relocate trailhead and parking to location #6; restore to natural conditions.	8. Parsons Memorial Lodge	<ul style="list-style-type: none">* Preserve lodge and retain vehicle access.Upgrade footbridge to improve free flow of river.	12. Existing concessioner stable	<ul style="list-style-type: none">* Retain concessioner stable and day parking.* Retain one hard-sided cabin for two stable employees (most employee housing relocated to location #18).* Retain day and overnight parking along access road.	16. Existing ranger station and Ranger Camp	<ul style="list-style-type: none">* Retain ranger station and day parking.* Relocate aboveground diesel fuel tank to location #7.Replace NPS employee housing with hard-sided cabins.
4. Existing wastewater ponds and sprayfields	<ul style="list-style-type: none">* Retain and upgrade (or relocate if feasible).	9. Area west of Unicorn Creek	<ul style="list-style-type: none">* Retain as undeveloped natural area.	13. Lember Dome	<ul style="list-style-type: none">Retain picnic area.Expand day parking and retain trailheads for Lember Dome and Parsons Memorial Lodge.Add shuttle stop.	17. Bug Camp, Dog Lake/ John Muir Trail parking	<ul style="list-style-type: none">* Increase day and overnight parking.* Retain NPS employee housing.
5. Area east of Budd Creek and west of existing visitor center	<ul style="list-style-type: none">Construct new cathedral lakes trailhead connector.* Retain as undeveloped natural area except for trail segment.					18. Tuolumne Meadows Lodge	<ul style="list-style-type: none">* Retain Lodge with reduced capacity.Eliminate roadside parking.Expand concessioner employee housing.
						19. Water treatment facility	<ul style="list-style-type: none">Upgrade water treatment facility.
						20. Gaylor Pit	<ul style="list-style-type: none">Retain helipad.* Add day parking.

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Summary of Protection and Enhancement of River Values under Alternative 3

The *Tuolumne River Plan* will be evaluated in terms of four legal requirements: (1) the WSR requirement that it protect and enhance river values; (2) the NEPA requirement that it fully consider the effects on the human environment; (3) the NHPA requirement that it consider effects on historic properties; and (4) the requirement of the Wilderness Act that it consider the effects on wilderness character. Guidelines for each of these requirements describe the criteria to be used in determining the effects of the plan. This section focuses directly on how the plan would meet the WSR requirement to protect and enhance river values if alternative 3 were to be selected. The NEPA, NHPA, and Wilderness Act analyses are presented in chapter 8.

All the action alternatives, including alternative 3, would protect and enhance river values as described in detail in chapter 5 and summarized in this chapter under “Summary of Protection and Enhancement of River Values under All Action Alternatives,” beginning on page 7-28. In addition, alternative 3 would take the following additional actions, primarily related to management of visitor use, user capacity, and development, to further protect or enhance river values.

Free-Flowing Condition of the River

So long as low flows remained around or above 1.0 cubic foot per second, average water withdrawals of 60,000 to 70,000 gallons per day would ensure that management could maintain consumption at no more than 10% of flow during low-flow periods and impose additional temporary conservation measures if necessary, as discussed in chapter 5. The average estimated water demand for alternative 3 is shown in table 7-10.

Table 7-10.
Summary of Average Estimated Water Demand, Alternative 3

Facility	Current consumption per unit	No-Action		Alternative 3	
		Number of units	Gallons per day	Number of units	Gallons per day
Campsites	100 gallons/site/day	304 sites	30,400	304 sites	30,400
	500 gallons/group site/day	7 group sites	3,500	7 group sites	3,500
Recreational vehicle dump station	50 gallons/use/day	32 dumps	1,600	32 dumps	1,600
Tuolumne Meadows Lodge	30 gallons/person/ day	276 guests	8,280	136 guests	4,080
Camper showers	10 gallons/person/shower	0	0	0	0
NPS housing	50 gallons/employee/ day in housing	104 employees in housing	5,200	104 employees in housing	5,200
	25/gallons/employee/ day in campsites	0 employees in campsites	0	20 employees in campsites	500
Concessioner employee housing	50 gallons/employee/ day	103 employees	5,150	103 employees	5,150
Cafeteria meals (2 per concessioner employee)	6 gallons/person/day	206 meals	1,236	206 meals	1,236
Store/grill	5 gallons/person/day	1,148 visitors	5,740	Total visitor capacity decreased by 8%	5,281
Visitor center / visitor contact station	5 gallons/visitor/day	607 visitors	3,035	Total visitor capacity decreased by 8%	2,792
Total consumption			64,141		59,739

As shown by the calculations in table 7-10, a reduction in levels of use, particularly overnight use, would reduce the average estimated water demand by about 6% to about 60,000 gallons per day. This level of water withdrawal would be expected to remain within the standard of no more than 10% of low flow.

Management to Protect Water Quality

Risks to water quality in the Tuolumne Meadows area would be mitigated by upgrading the wastewater treatment plant, wastewater ponds, and sprayfields. The improved utilities would be designed for loads commensurate with estimates of domestic water use. The risk to water quality from fuel storage at the public fuel station would be eliminated. Risks to water quality at Glen Aulin would be mitigated by replacing flush toilets with composting toilets and slightly decreasing use levels, which would keep the demand for water at no more than 600 gallons per day. Monitoring would be ongoing to ensure that water quality remained excellent at both Tuolumne Meadows and Glen Aulin.

Management to Protect the Subalpine Meadow and Riparian Complex

Most of the actions to protect and enhance the subalpine meadow and riparian complex would be common to all the action alternatives. Alternative 3 would additionally reduce the maximum people at one time in the river corridor (almost all of whom would access through the Tuolumne Meadows area) by an estimated 8% (from an estimated maximum user capacity of 4,778 visitors and employees to a maximum user capacity of 4,402 visitors and employees). The reduction in numbers of people would be expected to keep meadow fragmentation associated with foot traffic within the protective standard discussed in chapter 5.

Management to Protect Archeological Sites

The same management of visitor use described above would also reduce impacts on archeological sites in the Tuolumne Meadows and Lower Dana Fork segments. Monitoring would be ongoing to ensure that site disturbance did not exceed the protective standard established for these sites. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as described in chapter 5.

Management to Protect and Enhance Scenic Values

Scenic views and viewpoints in the Tuolumne Meadows area and along the Tioga Road corridor would be protected and enhanced by managing unnatural features, such as facilities and parked cars, to minimize their intrusion into remarkable views.

The eight scenic vista points identified by the *Tuolumne River Plan* would be protected and enhanced if necessary by removing encroaching vegetation, primarily conifers.

Management to Protect and Enhance the Wilderness Experience along the River

The wilderness experience along trails in wild segments but within reach of a day hike from Tuolumne Meadows would be protected by restricting use to levels that resulted in encounters with no more than 10 other parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

Management to Protect and Enhance Tioga Road Access to the River through Tuolumne and Dana Meadows

Opportunities for scenic driving along Tioga Road would be enhanced by eliminating undesignated roadside parking and the congestion currently caused by vehicles slowing to park and pedestrians crossing the road. Opportunities for people wishing to park and get out of their cars would be enhanced by increasing the number of designated parking spaces.

Alternative 4 (Preferred): Improving the Traditional Tuolumne Experience

Alternative 4 builds upon all the major elements in the *Tuolumne River Plan* to identify a set of management actions that would work together to protect river values, while accommodating existing day and overnight use and providing improved, but more highly structured, opportunities for day visitors at Tuolumne Meadows.

Alternative 4 includes the technical correction to the river corridor boundary (presented in chapter 3), the section 7 determination process for evaluating water resources projects (presented in chapter 4), the management standards and actions for protecting and enhancing river values (presented in chapter 5), and the guidance for identifying an appropriate visitor experience and associated user capacity (presented in chapter 6).

Concept

Alternative 4 responds to a range of public concerns by balancing desires to retain a traditional Tuolumne experience with desires to reduce development and make visitor use more sustainable. It also addresses the need to provide a meaningful introduction to the Tuolumne River for the growing number of short-term visitors.

As with all alternatives, most of the river corridor would be managed as wilderness. In these areas, natural river-related systems would be sustained by natural ecological processes, archeological and American Indian traditional cultural resources would characterize the cultural landscape, and recreational opportunities would be primitive and unconfined.

In comparison to no action, alternative 4 would include the following actions:

- Restore previously disturbed ecological conditions to subalpine meadow and riparian areas.
- Reduce risks to stream flow and water quality.
- Increase protection of archeological sites and resources important to American Indians.
- Retain all current recreation opportunities except concessioner day rides.
- Reduce lodging and the level of service at Glen Aulin.

At Tuolumne Meadows, day visitors would be encouraged to get out of their cars and take walks or short hikes to sites of natural and cultural interest, where they could enjoy activities such as sightseeing and participation in interpretive and educational programs, fishing, swimming, and picnicking. Visitors would be directed to formally maintained trails and specific destinations to protect and enhance recovering meadow and riparian habitats while accommodating existing levels of day use. Current levels of camping and lodging would be retained, as would a small store and grill. The potential for traffic congestion on peak days would be reduced by increasing public transit as an option for arriving at Tuolumne Meadows.

The Glen Aulin High Sierra Camp would remain open, but at a reduced level of service, to decrease risks to water quality while still allowing visitors with a broader range of physical abilities the opportunity to experience a wild segment of the river.

River values would be protected and enhanced by restoring ecological conditions to meadow and riparian areas, by directing visitors to designated trails, and by eliminating most risks to water quality (see “Summary of Protection and Enhancement of River Values under Alternative 4” at the end of this alternative).

The visitor use capacity under alternative 4 would remain relatively unchanged at a maximum of 4,569 people at one time, as shown in table 7-11. Actual day use levels would be lower during nonpeak periods, and actual overnight use levels would be lower even during peak periods because not all individual campsites and lodging units would be occupied by the maximum number of people allowable. The administrative use capacity under alternative 4 would be increased to 274 employees at one time (table 7-11).

Table 7-11.
Corridorwide Visitor and Administrative Use Capacity, Alternative 4

Visitor Overnight Capacity					
River Segment	Existing Use Calculation	Current # Overnight Visitors	Proposed Action	Units	Maximum Overnight Visitors, Alt. 4
Scenic Segments					
Tuolumne Meadows Lodge	# of lodging units (69) × max of 4 people per unit	276	Retain lodge capacity	69 guest tent cabins	276
Tuolumne Meadows Campground	# of campsites (304 sites × max of 6 people per site, 7 group sites × max 30 people per site)	2,034	Retain campground capacity	304 sites, 7 group sites	2,034
Wild Segments					
Glen Aulin HSC	# of lodging units (8) × max of 4 people per unit	32	Reduce Glen Aulin HSC capacity (minus 3 guest tent cabins)	5 guest tent cabins	20
Wilderness	Maximum capacity of wilderness zones (400)	400	Retain current wilderness zone capacities	–	400
Subtotal, Overnight		2,742			2,730
Visitor Day Use Capacity					
River Segment	Existing Use Calculation	Maximum Observed People At One Time, 2011^a	Proposed Action	Proposed Units	Maximum People At One Time, Alt. 4
Scenic Segments					
Access from Tuolumne Meadows	# of cars parking in designated parking spaces (340) × 2.9 ^b	986	Increase designated day parking (plus 222 spaces)	562 spaces at 90% occupancy × 2.9 ^b	1,467
	# cars parking in undesignated spaces (190) × 2.9 ^b	551	Eliminate undesignated roadside parking	–	0
	Maximum people arriving by in-park shuttles, tour buses, and regional public transit (YARTS)	225	Maintain current level of arrivals by in-park shuttles and tour buses; increase capacity for regional public transit	–	360
Access from below O'Shaughnessy Dam	# of cars parking in designated spaces (4) × 2.9 ^b	12	Retain existing parking	4 spaces × 2.9 ^b	12
Subtotal, Day Use		1,774			1,839
Total Visitor People At One Time		4,516			4,569
Administrative Capacity					
River Segment	Existing Use Calculation	Maximum employees (existing)	Proposed Action	Units	Maximum employees, Alt. 4
Wild Segments					
Concessioner	Approximately 9 employees at Glen Aulin HSC	9	Reduce staffing at Glen Aulin HSC to 8 employees.	8 employees	8
Scenic Segments					
NPS	Approximately 150 employees assigned to Tuolumne Meadows	150	Meet staffing need with 163 employees at Tuolumne Meadows.	163 employees	163
Concessioner	103 employees based at Tuolumne Meadows	103	Meet staffing need with 103 employees at Tuolumne Meadows.	103 employees	103
Total Administrative People at One Time		262			274
Total Corridorwide Capacity		4,778 (existing)			4,843 (proposed)

a The peak number of vehicles observed during vehicle counts in 2011 (observed on August 13, 2011).

b The vehicle occupancy rate is 2.9 people per vehicle, based on visitor studies conducted over the past 20 years that found an average vehicle occupancy ranging from 2.6 to 3.4 (Van Wagtenonk and Coho 1980; FHWA 1982; ORCA 1999; Littlejohn et al. 2005; Le et al. 2008). Based on this range, an average of 2.9 persons per vehicle is used for estimating visitor numbers for planning purposes in this document.

Abbreviations: HSC = High Sierra Camp; max = maximum; # = number.

Wild Segments (Designated Wilderness and Glen Aulin)

Resource Protection and Enhancement

Free Flow

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Water Quality

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Reduce water use at the Glen Aulin High Sierra Camp to 500 gallons per day to mitigate the risk to water quality (see “Glen Aulin,” below).

Biological Value: Subalpine Meadow and Riparian Complex

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Biological Value: Low-Elevation Riparian and Meadow Habitat

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Cultural Value: Archeological Landscape

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Scenic Value: *Scenery through Lyell Canyon and the Grand Canyon of the Tuolumne*

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Recreational Value: Wilderness Experience along the River

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Manage day use levels along wilderness trails within reach of day hikes from Tioga Road to achieve a standard of no more than 10 encounters with other parties per hour (80% of the time, sampled over the entire season, including weekdays and weekends). If necessary for maintaining use levels within this standard, day use wilderness trailhead quotas would be implemented for major trail segments, including Lyell Canyon, Glen Aulin, Cathedral Lakes, and Dog Lake, using a mixed first-come/first-served and advanced reservation system.
- Discontinue concessioner stock day rides into wilderness to eliminate conflicts on trails and enhance opportunities for self-reliance.
- Allow commercial use in wilderness, with restrictions on types and levels of use based on a determination of extent necessary (see appendix C) that gives priority to noncommercial use and restricts commercial use to no more than 2 overnight groups per zone per night and no more than 2 day groups per trail per day. Additional restrictions would include the following:
 - *Restrictions on types of use, Glen Aulin zone, peak months only:* During the peak use months of July and August, commercial groups having only a recreational purpose would no longer have access to the Glen Aulin zone; groups having an educational or scenic, as well as recreational, purpose (as defined in appendix C) would continue to have access consistent with limitations on total use levels, described above.
 - *Restrictions on types of use, Lyell Canyon zone, peak months only:* During the peak use months of July and August, commercial use in the Lyell Canyon zone by groups with only a recreational purpose would be restricted to Monday–Thursday only; groups having an educational or scenic, as well as a recreational,

purpose would continue to have access to the Lyell Canyon zone on weekends, as well as weekdays, consistent with limitations on total use levels, described above.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

All ongoing uses would continue.

Maximum Amounts of Visitor Use

Maximum day use along popular wilderness trails would be limited as necessary to achieve the standard of encounters with no more than 10 parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

The overnight capacity in wild segments would be retained at 400 persons per night (350 persons per night above the reservoir and 50 persons per night below the reservoir). This capacity might be reduced in the future if determined necessary to protect wilderness values; however, it would not be increased above this amount, which has been determined to be protective of river values. The overnight visitor capacity at the Glen Aulin High Sierra Camp would be reduced to 20 guests.

Management of Visitor Use Capacity

The current overnight trailhead quota system would be retained to regulate overnight use in wild segments.

Administrative Use

The types and levels of administrative use in wild segments would remain the same as existing conditions. Eight concessioner employees would be housed at the Glen Aulin High Sierra Camp.

Glen Aulin (Potential Wilderness Addition)

Glen Aulin High Sierra Camp

The Glen Aulin High Sierra Camp would be retained at a significantly reduced capacity of 20 guests to continue to offer the opportunity for visitors with a broader range of physical abilities to connect with the river in a remote setting, while decreasing the risk to water quality. Day use at Glen Aulin would decrease commensurate with an overall reduction in day use in the river corridor.

The level of service at the camp would be reduced:

- Eliminate flush toilets for guests to reduce demands for water use and waste disposal. Provide composting toilets for guests. Retain flush toilets for employees living at Glen Aulin.
- Discontinue wood for heat stoves in visitor tent cabins to reduce the need for stock use to supply wood to the camp.
- Discontinue “meals-only” service for people who are not lodge guests to reduce demands for water use and waste disposal.
- Continue overnight saddle trips but discontinue concessioner day rides to the camp.

Utility improvements at the camp would include the following (see figure 7-10):

- Design for a capacity of 500 gallons per day.
- Construct a new composting toilet facility between the granite slab behind the kitchen and the septic tank. To the extent possible, facility design would be compatible with the historic character.

- Install one water treatment tank (1,000 gallons) and one water storage tank (1,000 gallons) north of the existing water tank; remove the existing tank. Replace the existing chlorinator, filter tank, and surge tanks.
- Retain the existing septic tank and leach mound.
- Pull the water intake line back to its former location, entirely within the boundaries of the Glen Aulin potential wilderness addition. In years where the flow from this location is not adequate (dry years), the line would be extended as necessary, but only temporarily, upstream (into wilderness) to maintain sufficient flow for water treatment. As soon as the camp closed for the season or upon restoration of adequate flows, the line would be pulled back inside the Glen Aulin boundaries.

The replacement storage tanks, filter tank, and surge tanks would be flown in by helicopter. The rest of the materials for the project would be either flown in by helicopter or packed in with stock. The determination would be based on the minimum-requirement criteria established under the Wilderness Act.

The estimated net construction costs for Glen Aulin under alternative 4 would be approximately \$1.1million (see appendix L).

Backpacker Campground

See "Actions Common to Alternatives 1-4," beginning on page 7-19.

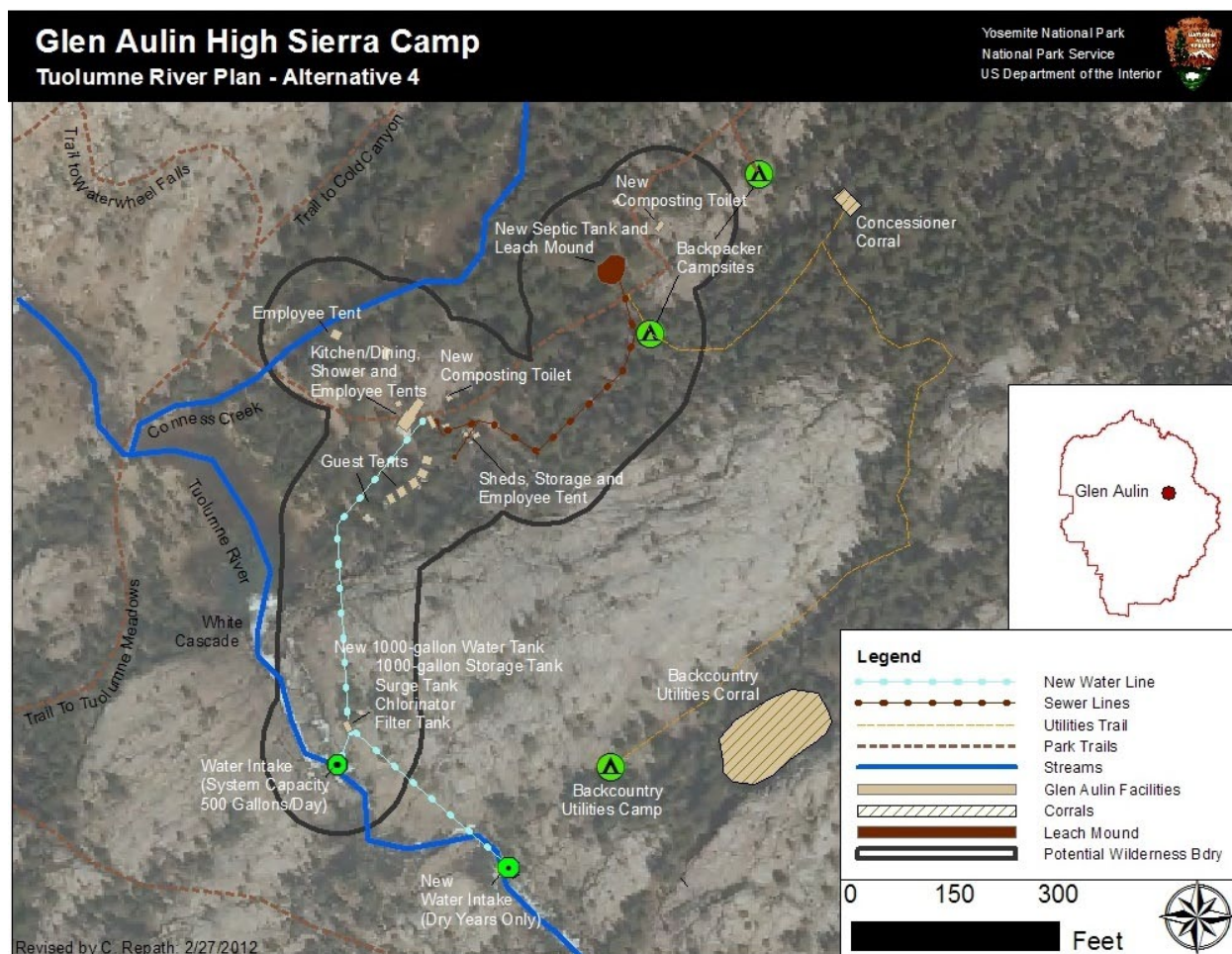


Figure 7-10. Glen Aulin Site Plan, Alternative 4.

Scenic Segments (Tuolumne Meadows and Tioga Road Corridor)

Note that this discussion pertains only to the nonwilderness portions of the Tuolumne Meadows and Lower Dana Fork segments. Portions of these segments within designated wilderness would be managed the same as the wild segments.

Resource Protection and Enhancement

Free Flow

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Increase uses, primarily employee housing, that would require water consumption, thus increasing the estimated average water demand to about 67,000 gallons per day. This level of water withdrawal would be expected to remain within the standard of no more than 10% of low flow unless climate change led to longer low-flow durations occurring earlier in the summer, in which case further reductions in water use would be required as discussed in chapter 5.

Water Quality

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Discontinue concessioner stock day rides to reduce risks to water quality associated with stock use. Compared to current service levels, the amount of stock use on trails could be reduced by 3 two-hour and 2 four-hour rides per day, which might otherwise involve up to 14 head of stock per ride on the trails. Full-day rides, which occur only occasionally, would also be eliminated.
- Remove the public fuel station to eliminate the risk to water quality.

Biological Value: Subalpine Meadow and Riparian Complex

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Cultural Value: Archeological Landscape

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Cultural Value: Parsons Memorial Lodge

See “Actions Common to Alternatives 1-4,” beginning on page 7-19.

Scenic Value: Scenery through Dana and Tuolumne Meadows

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Maintain views from eight scenic vista points (identified in chapter 5) by controlling the encroachment of vegetation in a manner that was protective of ecological conditions and archeological values at each vista point. Each particular vista point would be managed in accordance with an individual work plan based on evaluations of river values and other resources at that specific location. The work plans are included in appendix J. No other vegetation management would be conducted to enhance scenery or viewing opportunities.

Recreational Value: Tioga Road Access to the River through Tuolumne and Dana Meadows

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Increase the amount of designated parking available to visitors wishing to get out of cars to enjoy recreational experiences in a river-related landscape.

Management of Visitor Use and User Capacity

Kinds of Visitor Use

Visitor services, facilities, and management strategies would be reoriented to improve opportunities for day visitors to connect with the river in a way that is protective of river values, while retaining existing opportunities for traditional overnight use. The day use capacity would be slightly increased, thus allowing for a slight increase in use compared to existing conditions. As in alternative 2, visitors would be directed from trailheads at designated parking lots onto trails and boardwalks, some with fencing or other forms of delineation to discourage dispersed foot traffic through these sensitive environments, and to formal picnic areas. Visitor services would be managed as follows:

- Conduct a full range of orientation, interpretation, and education programs, with increased emphasis on education about the need to protect river values, at a small visitor contact station, wilderness center, Parsons Memorial Lodge, and in the field.
- Reduce commercial services to the store/grill. The public fuel station, mountaineering shop/school, and concessioner stock day rides would be eliminated. The postal service would be retained (subject to future USPS level of service decisions beyond NPS control).
- Retain the campground at its current capacity.
- Retain the Tuolumne Meadows Lodge at its current capacity, while relocating the tent cabins nearest the river to protect adjacent riparian habitat. Upgrade the shower house at the lodge for improved service to lodge guests and campers.
- Increase the capacity of regional transit as an option for arriving at Tuolumne Meadows.
- Increase the frequency of shuttle bus service among destinations within the Tuolumne Meadows area, and add stops at visitor service areas, making it easier for visitors to use public transportation to circulate within the Tuolumne Meadows area.

Maximum Amounts of Visitor Use

- Slightly increase the maximum day use capacity above the Hetch Hetchy Reservoir from 1,762 people at one time to a maximum of 1,827 people at one time (see table 7-11; in this table, the total maximum day use number includes the maximum day use below O'Shaughnessy Dam, which would remain at 12 people at one time).
- Retain the current overnight capacity of 2,310 people per night at Tuolumne Meadows: 2,034 people accommodated by the 304 sites plus 7 group sites in the campground, and 276 people accommodated by the 69 guest tent cabins at Tuolumne Meadows Lodge (see table 7-11). Actual overnight use levels would be lower than these capacities because individual campsites and lodging units would not always be occupied by the maximum number of people allowable.

Management of Visitor Use Capacity

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

Day Use

Day use capacity would be managed by controlling day parking, which would be restricted to paved or otherwise authorized spaces. No undesignated roadside parking would be allowed through the Tuolumne Meadows area. Undesignated roadside parking would continue to be allowed along Tioga Road west and east of Tuolumne Meadows. The amount of formal, designated day parking in the Tuolumne Meadows area would be increased from 340 to 562 spaces. In addition, regional transit capacity would be increased by 135 people, the equivalent of three 45-passenger shuttle buses, to encourage use of regional transit and relieve traffic congestion at Tuolumne Meadows on peak days.

Overnight Use

Overnight use capacity would be managed by the facility capacities of the campground and lodge. These facilities would continue to be available through a reservation system, with some campsites also available on a first-come, first-served basis.

Administrative Use

NPS staffing would be increased to a maximum of 163 employees to provide for increased resource protection needs (including management of the user capacity program, below), resource management, and monitoring (see table 7-11). NPS employee housing or campsites would be increased by 59 additional units. Campsites would meet the need for incidental “housing” for employees on temporary duty in the Tuolumne Meadows area, with a bunkhouse for these employees to be constructed as funds become available. Concessioner employee staffing and housing necessary to support commercial services would remain the same as under the no-action alternative (103 employees). (See “Tuolumne Meadows Site Plan,” below for the location of proposed employee housing.)

Tuolumne Meadows Site Plan

The locations identified below are illustrated on the site plan map (figure 7-11) at the end of this section. The estimated net construction costs for Tuolumne Meadows under alternative 4 would be approximately \$64.5 million, based on calculations included in appendix L.

Visitor Facilities

- Provide a new visitor contact station south of Tioga Road, across from the Parsons Memorial Lodge trailhead. Enhance opportunities for day visitors to experience the river, meadows, and historic setting by providing a new trail along Tioga Road that connects the new visitor contact station with the existing trail across the meadow to Parsons Memorial Lodge, allowing short-term visitors to receive information and take a short stroll across the meadow to the river and the lodge before continuing on their way. A visitor contact station at this location would also provide improved separation between this visitor function, commercial services, and park operations.
- Retain the store and grill, post office, wilderness center, and ranger station in their current locations.
- Retain the campground at its current capacity (see below).
- Retain the Tuolumne Meadows Lodge at its current capacity, while relocating the three guest tent cabins nearest the river to protect adjacent riparian habitat. Upgrade the shower house at the lodge.
- Increase shuttle bus stops. (Shuttle buses would no longer stop at location 3 on the site plan after a new trailhead was provided for the Cathedral Lakes trail.)

Campground

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Design for a capacity of 304 sites (6 people per site) plus 7 group sites (people per site) for a maximum of 2,034 people).
- Realign the campground A-loop road and relocate the campsites closest to the Lyell Fork farther away from the river.
- Retain the campground office.
- Relocate the existing entrance road out of the floodplain.
- Formalize a trail connection between the campground and the John Muir Trail.

Picnic Areas

- Expand the picnic area near Lembert Dome.
- Provide a new picnic area in association with the new visitor contact station and day parking.
- Accommodate picnicking at the new parking/viewing area near Pothole Dome.

Trails and Trailheads

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Delineate or fence the Cathedral Lakes trail to facilitate ecological restoration while allowing for use by stock and hikers.
- Move the Tioga Road trailhead for Parsons Memorial Lodge to the new day parking area south of Tioga Road and provide a trail connection to the existing trail; install protective fencing on either side of the trail from Tioga Road to Parsons Memorial Lodge to facilitate meadow recovery.
- Install protective fencing on either side of the trail/access road between Lembert Dome and Tuolumne Meadows Lodge, to facilitate meadow recovery.
- Provide a new hiking trail connecting facilities along Tioga Road; tie into the section of the Great Sierra Wagon Road east of Lembert Dome.

Parking

The total number of designated parking spaces in the Tuolumne Meadows area (day and overnight) would be increased from 533 to 914 spaces.

Table 7-11a.
Number of Parking Spaces in Designated Parking Areas, Alternative 4

Type of Parking	Current	Alternative 4	Description
Day Parking	16	16	existing parking area at Pothole Dome
	0	20	new parking/viewing area east of Pothole Dome
	0	4	existing roadside pullout south of Pothole Dome
	50	76	existing parking area at the visitor center, for Cathedral Lakes trailhead parking
	0	80	new parking area for visitor contact station and picnic area
	11	13	existing parking area at the campground office
	11	11	existing parking in the campground for the Elizabeth Lakes trailhead
	15	30	existing parking area at the fuel station
	51	55	existing parking area at the store and grill
	58	38	existing parking area at the concessioner stable
	0	34	roadside parking along the road to the concessioner stable
	29	50	existing parking area at the base of Lembert Dome
	7	7	existing parking area at the ranger station (relocated in this alternative)
	25	52	existing parking area at the Dog Lake/John Muir Trail trailhead
	0	5	existing parking area at Gaylor pit
	67	71	existing parking areas in the road corridor east of Tuolumne Meadows, including the Mono Pass and Gaylor Peak trailheads and the Dana Meadows and other pullouts
	340	562	Total day parking
Overnight Parking (excluding cars parked in the Tuolumne Meadows campground)	58	89	existing parking area at the wilderness office
	33	68	existing parking area at the Dog Lakes/John Muir Trail trailhead
	0	35	relocated parking area for the Cathedral Lakes trailhead
	0	58	road to concessioner stable
	102	102	Tuolumne Meadows Lodge
	193	352	Total overnight parking

The number of visitors delivered by public transit to the corridor would be managed according to the overall user capacity in this alternative and would be higher than the no-action alternative.

NPS and Concessioner Stables

- Co-locate the NPS and concessioner stables at the current site of the concessioner stable. This facility would support stock operations associated with High Sierra Camps and NPS administrative uses. Housing for all but two employees would be relocated to the concessioner employee housing area north of the Tuolumne Meadows Lodge. The current site of the NPS stable would be reserved for additional NPS employee housing.

Park Operations

In addition to "Actions Common to Alternatives 1-4," beginning on page 7-19:

- Adapt the CCC mess hall building (current site of the visitor center) for park operations to provide the administrative facilities determined necessary to support visitor use and resource protection but which would be infeasible to locate outside the river corridor.
- Relocate maintenance to a new maintenance yard near the wastewater treatment facility.
- Relocate the aboveground diesel fuel tank to the new maintenance yard for concessioner and NPS use.

Employee Housing

- Provide NPS housing for no more than 133 employees, plus campsites for an additional 30 employees. This would accommodate a total of 163 employees, which is the number determined to be necessary in the Tuolumne Meadows area to support the kinds and levels of visitor use included in this alternative. It would be infeasible to locate this housing outside the river corridor; therefore, it must be inside the corridor. In addition to the existing housing, which currently accommodates 104 employees, the following options for additional housing for 29 employees would be considered:
 - Use existing housing structures more efficiently. For example, conduct an efficiency analysis to determine where infill of beds within existing structures is possible.
 - Provide a new bunkhouse(s), with bathrooms and communal kitchen at the current NPS stable site.
 - If options 1 and 2 proved insufficient to provide the additional 29 beds needed under this alternative, construct up to five new double-capacity units at Road Camp, designed to be similar to existing units, with current code compliance.
- Dry campsites for 30 NPS employees would be provided at Gaylor Pit. The employee campground at Gaylor Pit would be configured to temporarily accommodate up to 60 employees while additional permanent housing was under construction.
- Provide concessioner employee housing for 101 employees north of the existing Tuolumne Meadows Lodge parking area (at a density equal to that of the existing lodge employee area plus kitchen, dining, toilet, and shower house facilities; all new facilities would be hard-sided and compliant with all current NPS standards and OSHA codes). Provide hard-sided cabin for two stable employees at the concessioner stable at a location that would comply with relevant OSHA and NPS housing regulations regarding the proximity of housing and stock corrals, and relocate all other stable employees to the lodge area.

Utility Systems

The general direction for site-specific planning for utility systems under alternative 4, intended to protect and enhance the river's free-flowing condition, water quality, and outstandingly remarkable values, is outlined below.

Tuolumne Meadows Wastewater Collection, Treatment, and Disposal

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Design for an estimated water demand of 67,000 gallons per day.
- Seek technology to allow removal of the wastewater containment ponds and sprayfields from the north side of Tioga Road and replace with facilities on the south side of the road, to be designed in conjunction with the new wastewater treatment plant. If technology is not available, redesign the ponds and sprayfield to minimize risks of overflow from containment ponds or saturation of the sprayfields.

Tuolumne Meadows Potable Water Collection, Treatment, and Distribution

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Design for an estimated water demand of 67,000 gallons per day.

Site Restoration

In addition to “Actions Common to Alternatives 1-4,” beginning on page 7-19:

- Restore the site of the public fuel station and mountaineering shop to natural conditions.

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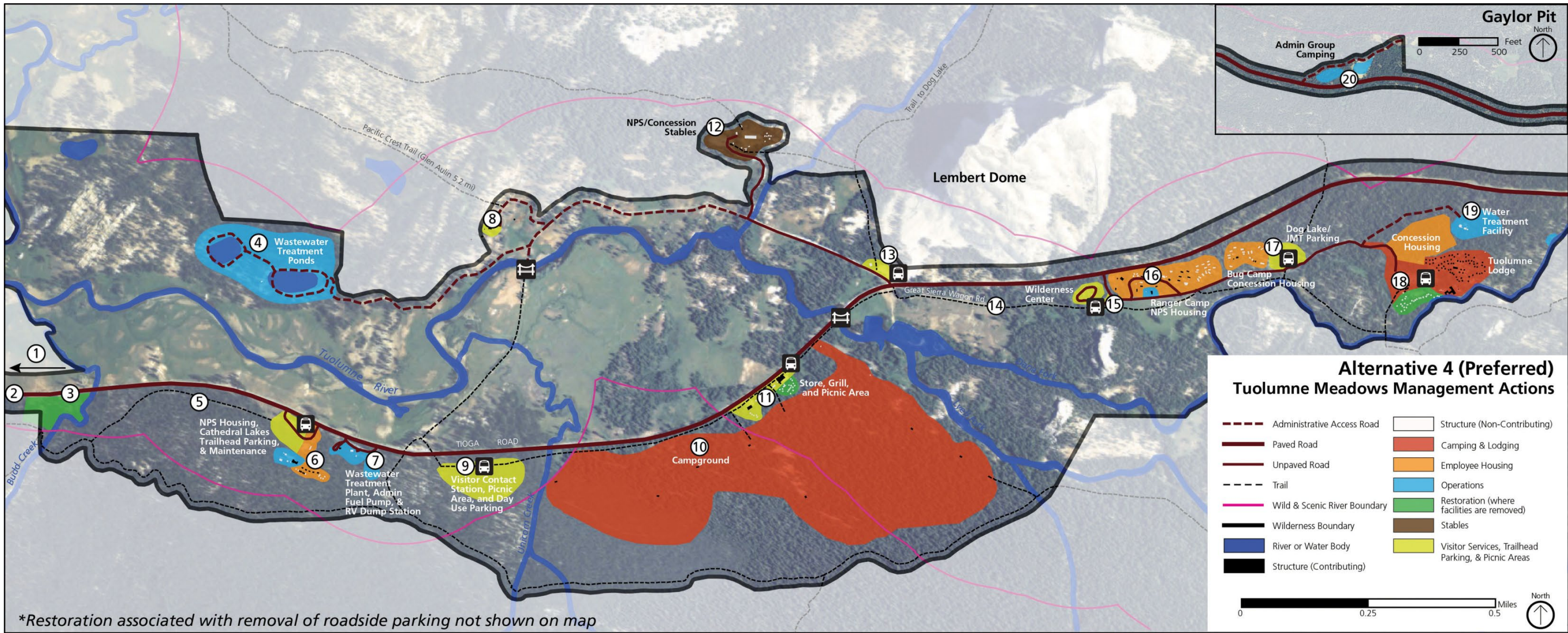


Figure 7-11. Tuolumne Meadows Site Plan, Alternative 4.

Key to figure 7-11 and List of Facilities Management Actions (actions marked with an asterisk (*) are specific to this alternative. All other actions are common to alternatives 1–4):

1. Pothole Dome scenic pullout/ parking areas	<ul style="list-style-type: none">Designate parking with trailhead on north side of Tioga Road.Improve trail to Pothole Dome.Formalize roadside pullout (four vehicles) on south side of Tioga Road near Pothole Dome.Add parking/viewing/picnicking area east of Pothole Dome.	6. Existing visitor center and Road Camp	<ul style="list-style-type: none">Relocate visitor center to location #9; convert building for park operations.Construct new Cathedral Lakes trailhead with day and overnight parking.Relocate maintenance yard and office to location #7.Increase NPS employee housing.	11. Existing commercial services core	<ul style="list-style-type: none">Retain store, grill, and post office; expand day parking.Remove mountaineering shop/school and public fuel station, add parking.Upgrade restroom.Add trail connector to campground.Relocate concessioner employee housing to location #18.	16. Existing ranger station and Ranger Camp	<ul style="list-style-type: none">Relocate ranger station to location #6.Relocate aboveground diesel fuel tank to location #7.Replace NPS employee housing with hard-sided cabins.
2. Tioga Road through the Tuolumne Meadows area	<ul style="list-style-type: none">Retain the Tioga Road in its current alignment.Add roadside curbing to eliminate undesignated roadside parking and associated informal trails.Add approximately four viewing turnouts (four vehicles each; no parking).Upgrade Tioga Road bridge to improve free flow of river.Add hiking trail parallel to the road.	7. Wastewater treatment plant	<ul style="list-style-type: none">Upgrade wastewater treatment plant.Retain recreational vehicle dump station.Add NPS maintenance yard and office, including aboveground diesel fuel tank.	12. Existing concessioner stable	<ul style="list-style-type: none">Co-locate NPS and small concessioner stable (for administrative use only).Retain one hard-sided cabin for two stable employees (relocate most concessioner employee housing to location #18).Retain day and overnight parking along access road.	17. Bug Camp, Dog Lake/ John Muir Trail parking	<ul style="list-style-type: none">Increase day and overnight parking.Retain NPS employee housing.
3. Existing Cathedral Lakes trailhead	<ul style="list-style-type: none">Relocate trailhead and parking to location #6; restore to natural conditions.	8. Parsons Memorial Lodge	<ul style="list-style-type: none">Preserve lodge and retain vehicle access.Upgrade footbridge to improve free flow of river.	13. Lembert Dome	<ul style="list-style-type: none">Retain picnic area.Expand day parking and retain trailheads for Lembert Dome and Parsons Memorial Lodge.Add shuttle stop.	18. Tuolumne Meadows Lodge	<ul style="list-style-type: none">Retain Lodge at current capacity.Upgrade shower house.Eliminate roadside parking.Expand concessioner employee housing.
4. Existing wastewater ponds and sprayfields	<ul style="list-style-type: none">Retain and upgrade (or relocate if feasible).	9. Area west of Unicorn Creek	<ul style="list-style-type: none">Add new small visitor contact station, picnic area, trailhead for Parsons Memorial Lodge, and day parking.	14. Old Tioga Road/Great Sierra Wagon Road	<ul style="list-style-type: none">Preserve as trails; mitigate impacts of old roads to meadow hydrology.	19. Water treatment facility	<ul style="list-style-type: none">Upgrade water treatment facility.
5. Area east of Budd Creek and west of existing visitor center	<ul style="list-style-type: none">Construct new Cathedral Lakes trailhead connector.Retain as undeveloped natural area except for trail segment.	10. Tuolumne Meadows campground	<ul style="list-style-type: none">Retain campground at current capacity; realign the A-loop road and relocate campsites closest to Lyell ForkRetain campground office and day parking.Relocate entrance road outside of floodplain.Formalize John Muir Trail connection.Retain Elizabeth Lakes trailhead and day parking.Remove riprap from riverbank.	15. Existing wilderness center and NPS stable	<ul style="list-style-type: none">Retain wilderness center; expand parking.Move NPS stable to location #12; use site for expansion of NPS employee housing.	20. Gaylor Pit	<ul style="list-style-type: none">Retain helipad.Add NPS employee campsites, vault toilets, and potable water tank.

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Summary of Protection and Enhancement of River Values under Alternative 4 (Preferred)

The *Tuolumne River Plan* will be evaluated in terms of four legal requirements: (1) the WSR requirement that it protect and enhance river values; (2) the NEPA requirement that it fully consider the effects on the human environment; (3) the NHPA requirement that it consider effects on historic properties; and (4) the requirement of the Wilderness Act that it consider the effects on wilderness character. Guidelines that describe the criteria to be used in determining the effects of the plan exist for each of these requirements. This section focuses directly on how the plan would meet the WSR requirement to protect and enhance river values if alternative 4 were to be selected. The NEPA, NHPA, and Wilderness Act analyses are presented in chapter 8.

All the action alternatives, including alternative 4, would protect and enhance river values as described in detail in chapter 5 and summarized in this chapter under “Summary of Protection and Enhancement of River Values under All Action Alternatives,” beginning on page 7-28. In addition, alternative 4 would take the following additional actions, primarily related to management of visitor use, user capacity, and development, to further protect or enhance river values.

Free-Flowing Condition of the River

So long as low flows remained around or above 1.0 cubic foot per second, average water withdrawals of 60,000 to 70,000 gallons per day would ensure that management could maintain consumption at no more than 10% of flow during low-flow periods and impose additional temporary conservation measures if necessary, as discussed in chapter 5.

The average estimated water demand for alternative 4 has been calculated as shown in table 7-12.

Table 7-12.
Summary of Average Estimated Water Demand, Alternative 4

Facility	Current consumption per unit	No-Action		Alternative 4	
		Number of units	Gallons per day	Number of units	Gallons per day
Campsites	100 gallons/site/ day	304 sites	30,400	304 sites	30,400
	500 gallons/group site/day	7 group sites	3,500	7 group sites	3,500
Recreational vehicle dump station	50 gallons/use/ day	32 dumps	1,600	32 dumps	1,600
Tuolumne Meadows Lodge	30 gallons/person/ day	276 guests	8,280	276 guests	8,280
Camper showers	10 gallons/person/shower	0	0	35 showers	350
NPS housing	50 gallons/employee/ day in housing	104 employees in housing	5,200	133 employees in housing	6,650
	25/gallons/employee/ day in campsites	0 employees in campsites	0	30 employees in campsites	750
Concessioner employee housing	50 gallons/employee/ day	103 employees	5,150	103 employees	5,150
Cafeteria meals (2 per concessioner employee)	6 gallons/person/day	206 meals	1,236	206 meals	1,236
Store/grill	5 gallons/person/day	1,148 visitors	5,740	Total visitor capacity increased by 1%	5,797
Visitor center /visitor contact station	5 gallons/visitor/day	607 visitors	3,035	Total visitor capacity increased by 1%	3,065
Total consumption			64,141		66,778

As shown by the calculations in table 7-12, an increase in employee housing would increase the average demand for domestic water by 4% to about 67,000 gallons per day. This level of water withdrawal would be expected to remain within the standard of no more than 10% of low flow unless climate change led to longer low-flow durations occurring earlier in the summer, in which case further reductions in water use would be required.

Management to Protect Water Quality

Risks to water quality in the Tuolumne Meadows area would be mitigated by upgrading the wastewater treatment plant, treatment ponds, and sprayfields. The improved utilities would be designed for loads commensurate with estimates of domestic water use. The risk to water quality from fuel storage at the public fuel station would be eliminated. A further reduction in risks to water quality would be achieved greatly reducing the size of the concessioner stable operation. Risks to water quality at Glen Aulin would be mitigated by replacing flush toilets with composting toilets and reducing the guest capacity, which would decrease the demand for water to no more than 500 gallons per day. Monitoring would be ongoing to ensure that water quality remained excellent at both Tuolumne Meadows and Glen Aulin.

Management to Protect the Subalpine Meadow and Riparian Complex

Most of the actions to protect and enhance the subalpine meadow and riparian complex would be common to all the action alternatives. Alternative 4 would additionally enhance this river value by directing visitors to designated trails and delineating or fencing certain trail segments to facilitate the ecological recovery of adjacent vegetation. The subalpine meadows in Lyell Canyon would be protected by regulating the amount and locations of stock use, as described for alternative 2.

Management to Protect Archeological Sites

The same management of visitor use described above would also reduce impacts on archeological sites in the Tuolumne Meadows and Lower Dana Fork segments. Monitoring would be ongoing to ensure that site disturbance did not exceed the protective standard established for these sites. If conditions were not being maintained within the protective standards, additional actions would be taken to further manage or reduce visitor use, as described in chapter 5.

Management to Protect and Enhance Scenic Values

Scenic views and viewpoints in the Tuolumne Meadows area and along the Tioga Road corridor would be protected and enhanced under all the action alternatives by managing unnatural features, such as facilities and parked cars, to minimize their intrusion into remarkable views.

The eight scenic vista points identified by the *Tuolumne River Plan* would be protected and enhanced if necessary by removing encroaching vegetation, primarily conifers.

Management to Protect and Enhance the Wilderness Experience along the River

The wilderness experience along trails in wild segments but within reach of a day hike from Tuolumne Meadows would be protected by restricting use to levels that resulted in encounters with no more than ten other parties per hour, 80% of the time, sampled over the entire season, including weekdays and weekends.

Management to Protect and Enhance Tioga Road Access to the River through Tuolumne and Dana Meadows

Opportunities for scenic driving along Tioga Road would be enhanced by eliminating undesignated roadside parking and the congestion currently caused by vehicles slowing to park and pedestrians crossing the road. Opportunities for people wishing to park and get out of their cars would be enhanced by increasing the number of designated parking spaces.

Summary Comparisons of Alternatives

Protection and Enhancement of River Values, Alternatives 1–4

The actions that would be taken under each alternative to protect and enhance river values are summarized and compared in table 7-13.

Table 7-13.
Summary Comparison of Alternative Actions to Protect and Enhance River Values

WILD SEGMENTS				
Actions to Protect and Enhance River Values	Alternative 1	Alternative 2	Alternative 3	Alternative 4 (preferred)
Free Flow				
Continue to work cooperatively with the San Francisco Public Utilities Commission and others to inform releases from O'Shaughnessy Dam intended to more closely mimic natural flows.	✓	✓	✓	✓
Water Quality				
Eliminate or mitigate the risk associated with wastewater disposal at the Glen Aulin High Sierra Camp (details would differ as shown below):	✓	✓	✓	✓
▪ Close the camp, eliminating the risk to water quality.	✓			
▪ Convert camp to a seasonal outfitter camp to greatly reduce water use.		✓		
▪ Continue to restrict water use at the camp to 600 gallons per day.			✓	
▪ Reduce water use at the camp to 500 gallons per day.				✓
Replace the composting toilet at the backpacker campground at Glen Aulin.	✓	✓	✓	✓
Biological Values				
Subalpine Meadow and Riparian Complex				
Discontinue commercial pack stock use to reduce impacts on subalpine meadow/riparian areas.	✓			
Reduce the potential for stock-related impacts in Lyell Canyon by reducing commercial use capacity to 192 grazing-nights per year and regulating an opening date, campsite locations and access routes, and grazing locations.		✓	✓	✓
Restore localized areas previously disturbed by human use in Lyell Canyon, using techniques that meet the minimum-requirement criteria established under the Wilderness Act.	✓	✓	✓	✓
Low-Elevation Riparian and Meadow Habitat				
Make informed recommendations for water releases from O'Shaughnessy Dam that would provide maximum ecological benefits to the river-dependent ecosystems below the dam.	✓	✓	✓	✓
Cultural Values				
Archeological Landscape				
Protect prehistoric archeological sites by diverting use away from sensitive areas.	✓	✓	✓	✓
Mitigate ecological restoration practices by using noninvasive techniques wherever possible, and undertake site-specific treatment actions, such as data recovery, where necessary to avoid resource loss through park actions or natural forces.	✓	✓	✓	✓
Scenic Values				
Scenery through Lyell Canyon and the Grand Canyon of the Tuolumne				
Continue to allow the natural scenery to evolve in response to natural ecological processes, with no management of scenic vistas (no scenic vista points are managed in wild segments).	✓	✓	✓	✓

Table 7-13.
Summary Comparison of Alternative Actions to Protect and Enhance River Values (continued)

WILD SEGMENTS (continued)				
Actions to Protect and Enhance River Values	Alternative 1	Alternative 2	Alternative 3	Alternative 4 (preferred)
Recreational Value				
Wilderness Experience Along the River				
Enhance opportunities for primitive, unconfined recreation in a primitive setting (details would differ as shown below):	✓	✓	✓	✓
<i>Overnight use:</i>				
<ul style="list-style-type: none"> Continue to manage overnight use in wilderness through an overnight trailhead quota system (see "Maximum Amounts of Use," below) to protect opportunities for solitude. 	✓	✓	✓	✓
<i>Trail use:</i>				
<ul style="list-style-type: none"> Greatly reduce (by approximately half) the maximum day use levels along wilderness trails within reach of day hikes from Tioga Road, making them more commensurate with use levels in remote wilderness, thereby enhancing opportunities for solitude. A standard of no more than 4 encounters with other parties per hour (80% of the time) would be maintained through implementation of a day trailhead quota system similar to the overnight trailhead quota system if necessary. 	✓			
<ul style="list-style-type: none"> Manage day use levels along wilderness trails within reach of day hikes from Tioga Road to achieve a standard of no more than 10 encounters with other parties per hour (80% of the time). 		✓	✓	✓
Allow limited recreational whitewater boating on portions of the river to provide opportunities for people with expert paddling skills to experience and connect with the Tuolumne in a uniquely adventurous pursuit.		✓		
<i>Commercial use:</i>				
<ul style="list-style-type: none"> Discontinue all commercial use in wilderness. 	✓			
<ul style="list-style-type: none"> Allow commercial use in wilderness, with restrictions on types and levels of use based on a determination of extent necessary that gives priority to noncommercial use and restricts commercial use to no more than 1 overnight group per zone per night and no more than 1 day group per trail per day. 			✓	
<ul style="list-style-type: none"> Allow commercial use in wilderness, with restrictions on types and levels of use based on a determination of extent necessary that gives priority to noncommercial use and restricts commercial use to no more than 2 overnight groups per zone per night and no more than 2 day groups per trail per day. 		✓		✓
<i>Concessioner stock day rides:</i>				
<ul style="list-style-type: none"> Discontinue concessioner stock day rides into wilderness to reduce stock impacts on trails used by hikers. 	✓			✓
<ul style="list-style-type: none"> Continue concessioner stock day rides into wilderness but at a reduced capacity to reduce conflicts on trails. 		✓	✓	
<i>Glen Aulin:</i>				
<ul style="list-style-type: none"> Remove the Glen Aulin High Sierra Camp to enhance opportunities for self-reliance. 	✓			
<ul style="list-style-type: none"> Convert the Glen Aulin High Sierra Camp to a seasonal outfitter camp to allow guests to connect with the river in a setting with no permanent facilities (except a composting toilet). 		✓		
<ul style="list-style-type: none"> Retain the Glen Aulin High Sierra Camp at reduced capacity to allow guests to connect with the river in a remote setting. 			✓	✓

Table 7-13.
Summary Comparison of Alternative Actions to Protect and Enhance River Values (continued)

SCENIC SEGMENTS				
Actions to Protect and Enhance River Values	Alternative 1	Alternative 2	Alternative 3	Alternative 4 (preferred)
Free Flow				
Reduce demand for domestic water withdrawals from the Dana Fork (details would differ as shown below):	✓			
▪ Reduce employee housing.	✓			
▪ Reduce overnight lodging.			✓	
▪ Eliminate overnight lodging.	✓			
▪ Reduce overnight camping.	✓			
Continue to improve water conservation and sustainability practices, including installation of water meters, use of low-flow fixtures, and visitor and employee education, and identify and implement additional long-term water conservation measures.	✓	✓	✓	✓
Improve the Tioga Road bridge at Tuolumne Meadows and the footbridge at Parsons Memorial Lodge to mitigate impacts on river hydrology during periods of high flows. Improvements to the footbridge would be compatible with its historic character.	✓	✓	✓	✓
Remove the boulder riprap from approximately 150 feet of riverbank near the campground A-loop road to allow the river to flow more freely.	✓	✓	✓	✓
Water Quality				
Upgrade utility systems to conserve water and protect water quality (details would differ as shown below):	✓	✓	✓	✓
Remove the wastewater ponds and sprayfields and replace them with new facilities on the south side of Tioga Road.	✓			
Stabilize the road cut east of Tuolumne Meadows along Tioga Road to reduce erosion into the Dana Fork.	✓	✓	✓	✓
Continue best management practices to mitigate the potential for impacts on water quality associated with stock use.	✓	✓	✓	✓
Eliminate concessioner stock day rides to reduce stock use and risks to water quality.	✓			✓
Reduce concessioner stock day rides to reduce stock use and risks to water quality.		✓	✓	
Remove the public fuel station to eliminate the risk to water quality posed by this facility.	✓		✓	✓
Biological Values				
Subalpine Meadow and Riparian Complex				
Eliminate undesignated roadside parking and associated informal trails.	✓	✓	✓	✓
Remove structures inappropriately sited near the riverbank or in wet areas.	✓	✓	✓	✓
Crush or remove the existing wastewater line that runs beneath the meadow from the treatment plant to the containment ponds.	✓			
Restore riparian vegetation along riverbanks.	✓	✓	✓	✓
Mitigate effects of Tioga Road culverts on surface flows into Tuolumne Meadows.	✓	✓	✓	✓
Mitigate the effects of the Great Sierra Wagon Road bed on surface flows across Tuolumne Meadows.	✓	✓	✓	✓
Conduct additional research to support ecological restoration.	✓	✓	✓	✓
Reduce user capacities to protect subalpine meadow/riparian habitat from foot traffic.	✓		✓	
Confine use to protect subalpine meadow/riparian habitat from foot traffic.		✓		✓
Increase interpretive programming to educate visitors about the fragility of meadow/riparian areas.	✓	✓	✓	✓

Table 7-13.
Summary Comparison of Alternative Actions to Protect and Enhance River Values (continued)

SCENIC SEGMENTS (continued)				
Actions to Protect and Enhance River Values	Alternative 1	Alternative 2	Alternative 3	Alternative 4 (preferred)
Cultural Values				
Archeological Landscape				
Protect prehistoric archeological sites by removing informal trails and managing visitor use to avoid sensitive areas.	✓	✓	✓	✓
Avoid, reduce, or mitigate the potential effects of ecological restoration by using noninvasive techniques wherever possible, and undertake site-specific treatment actions, such as data recovery, where necessary to avoid resource loss through park actions or, where possible and practicable, through natural forces.	✓	✓	✓	✓
Parsons Memorial Lodge				
Continue to preserve Parsons Memorial Lodge through periodic assessments and appropriate treatments directed by the List of Classified Structures.	✓	✓	✓	✓
Scenic Values				
Scenery through Dana and Tuolumne Meadows				
Maintain views from eight scenic vista points, following individual work plans developed to protect ecological conditions at each particular location.		✓	✓	✓
Mitigate human intrusions into views by eliminating undesignated roadside parking, removing informal trails, and restoring more natural conditions to many currently disturbed sites.	✓	✓	✓	✓
Recreational Value				
Tioga Road Access to the River through Tuolumne and Dana Meadows				
Retain seasonal (generally late May or early June through October) recreational access to the river through Tuolumne and Dana Meadows by way of Tioga Road. Recreational opportunities afforded by this access include both scenic driving along the river and the opportunity to park and get out of cars to enjoy recreational experiences in a river-related landscape.	✓	✓	✓	✓
Retain Tioga Road on its current alignment.	✓	✓	✓	✓
Enhance the scenic driving experiences by eliminating undesignated roadside parking.	✓	✓	✓	✓
Increase the amount of designated parking available to visitors wishing to get out of their cars and enjoy recreational experiences in a river-related landscape.		✓	✓	✓

User Capacities, All Alternatives

The visitor and administrative use capacities under each alternative are summarized and compared in table 7-14.

Table 7-14.
Corridorwide Comparison of Visitor Use Capacities, by Alternative

Visitor Overnight Capacity					
Segment	Current Overnight Visitors	Maximum Overnight Visitors, Alternative 1	Maximum Overnight Visitors, Alternative 2	Maximum Overnight Visitors, Alternative 3	Maximum Overnight Visitors, Alternative 4
Scenic Segments					
Tuolumne Meadows Lodge	276	0	276	136	276
Tuolumne Meadows Campground	2,034	1,632	2,280	2,034	2,034
Wild Segments					
Glen Aulin HSC	32	0	32	28	20
Wilderness	400	400	400	400	400
Subtotal, Overnight	2,742	2,032	2,988	2,598	2,730
Visitor Day Use Capacity					
Segment	Maximum People At One Time, Based on 2011 Vehicle Count	Maximum People At One Time, Alternative 1	Maximum People At One Time, Alternative 2	Maximum People At One Time, Alternative 3	Maximum People At One Time, Alternative 4
Scenic Segments					
Access from Tuolumne Meadows (designated parking)	986	796	1,676	1,331	1,467
Access from Tuolumne Meadows (undesignated parking)	551	0	0	0	0
Access from Tuolumne Meadows (arrival by bus)	225	225	225	225	360
Access from below O'Shaughnessy Dam	12	12	12	12	12
Subtotal, Day Use	1,774	1,033	1,913	1,568	1,839
Total Visitor Overnight and Day Use People At One Time	4,516	3,065	4,901	4,166	4,569
Administrative Capacity					
Segment	Maximum employees (existing)	Maximum employees, Alternative 1	Maximum employees, Alternative 2	Maximum employees, Alternative 3	Maximum employees, Alternative 4
Wild Segments					
Concessioner	9	0	9	9	8
Scenic Segments					
NPS	150	100	174	124	163
Concessioner	103	2	103	103	103
Total Administrative People At One Time	262	102	286	236	274
Total People At One Time	4,778 (existing)	3,167 (proposed)	5,187 (proposed)	4,402 (proposed)	4,843 (proposed)

Average Estimated Water Demand, Tuolumne Meadows, All Alternatives

The average estimated water demand associated with facilities and use at Tuolumne Meadows under each alternative is summarized and compared in table 7-15.

Table 7-15.
Summary Comparison of Average Estimated Water Demand, All Alternatives

Facility	Current consumption per unit	No-Action		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
		Number of units	Gallons per day	Number of units	Gallons per day	Number of units	Gallons per day	Number of units	Gallons per day	Number of units	Gallons per day
Campsites	100 gallons/ standard site/day	304 sites	30,400	237 sites	23,700	304 sites	30,400	304 sites	30,400	304 sites	30,400
	50 gallons/ walk-in site/day	0	0	0	0	41 walk-in sites	2,050	0	0	0	0
	500 gallons/ group site/day	7 group sites	3,500	7 group sites	3,500	7 group sites	3,500	7 group sites	3,500	7 group sites	3,500
Recreational vehicle dump station	50 gallons/ use/ day	32 dumps	1,600	32 dumps	1,600	32 dumps	1,600	32 dumps	1,600	32 dumps	1,600
Tuolumne Meadows Lodge	30 gallons/ person/ day	276 guests	8,280	removed	0	276 guests	8,280	136 guests	4,080	276 guests	8,280
Camper showers	10 gallons/ shower/day	0	0	0	0	35 showers	350	0	0	35 showers	350
NPS housing	50 gallons/ employee/ day in housing	104 employees in housing	5,200	100 employees in housing	5,000	144 employees in housing	7,200	104 employees in housing	5,200	133 employees in housing	6,650
	25/gallons/ employee/ day in campsites	0 employees in campsites	0	0 employees in campsites	0	30 employees in campsites	750	20 employees in campsites	500	30 employees in campsites	750
Concessioner employee housing	50 gallons/ employee/ day	103 employees	5,150	2 employees	100	103 employees	5,150	103 employees	5,150	103 employees	5,150
Cafeteria meals (2 per concessioner employee)	6 gallons/ person/day	206 meals	1,236	0 meals	0	206 meals	1,236	206 meals	1,236	206 meals	1,236
Store/grill	5 gallons/ person/day	1,148 visitors	5,740	Removed	0	Total visitor capacity increased by 10%	6,257	Total visitor capacity decreased by 8%	5,281	Total visitor capacity increased by 1%	5,797
Visitor center / visitor contact station	5 gallons/ visitor/day	607 visitors	3,035	Total visitor capacity reduced by 34%	2,064	Total visitor capacity increased by 10%	3,308	Total visitor capacity decreased by 8%	2,792	Total visitor capacity increased by 1%	3,065
Total consumption			64,141		35,964		70,081		59,739		66,778

Summary Comparison of Site Development at Tuolumne Meadows, All Alternatives

The facilities that would be provided at Tuolumne Meadows under each alternative are summarized and compared in table 7-16, and parking capacities are summarized and compared in table 7-17. The location numbers in table 7-16 correspond to the numbering on the site development maps for each alternative.

Table 7-16.
Site Plan Summary, All Alternatives

Location	No-Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
1	Pothole Dome scenic pullout/parking areas: <ul style="list-style-type: none"> Retain roadside pullout/day parking and trailhead on north side of road. Retain roadside pullout/day parking on south side of road. Retain trail to Pothole Dome. 	Pothole Dome scenic pullout/parking areas: <ul style="list-style-type: none"> Designate day parking with trailhead on north side of road. Improve trail to Pothole Dome. Formalize roadside pullout (four vehicles) on south side of road. 	Pothole Dome scenic pullout/parking areas: <ul style="list-style-type: none"> Designate day parking with trailhead on north side of road. Improve trail to Pothole Dome. Formalize roadside pullout (four vehicles) on south side of road. Add parking, viewing, picnicking area east of Pothole Dome. 	Pothole Dome scenic pullout/parking areas: <ul style="list-style-type: none"> Designate day parking with trailhead on north side of road. Improve trail to Pothole Dome. Formalize roadside pullout (four vehicles) on south side of road. Add parking, viewing, picnicking area east of Pothole Dome. 	Pothole Dome scenic pullout/parking areas: <ul style="list-style-type: none"> Designate day parking with trailhead on north side of road. Improve trail to Pothole Dome. Formalize roadside pullout (four vehicles) on south side of road. Add parking, viewing, picnicking area east of Pothole Dome. Add parking/viewing/picnicking area east of Pothole Dome.
2	Tioga Road through the Tuolumne Meadows area: <ul style="list-style-type: none"> Retain Tioga Road in its current alignment. Allow undesignated roadside parking. Retain Tioga Road bridge. 	Tioga Road through the Tuolumne Meadows area: <ul style="list-style-type: none"> Retain Tioga Road in its current alignment. Add roadside curbing to eliminate undesignated roadside parking and associated informal trails. Add approximately four viewing turnouts (four vehicles each; no parking). Upgrade Tioga Road bridge to improve free flow of river. 	Tioga Road through the Tuolumne Meadows area: <ul style="list-style-type: none"> Retain Tioga Road in its current alignment. Add roadside curbing to eliminate undesignated roadside parking and associated informal trails. Add approximately four viewing turnouts (four vehicles each; no parking). Upgrade Tioga Road bridge to improve free flow of river. Add hiking trail that parallels the road. 	Tioga Road through the Tuolumne Meadows area: <ul style="list-style-type: none"> Retain Tioga Road in its current alignment. Add roadside curbing to eliminate undesignated roadside parking and associated informal trails. Add approximately four viewing turnouts (four vehicles each; no parking). Upgrade Tioga Road bridge to improve free flow of river. 	Tioga Road through the Tuolumne Meadows area: <ul style="list-style-type: none"> Retain Tioga Road in its current alignment. Add roadside curbing to eliminate undesignated roadside parking and associated informal trails. Add approximately four viewing turnouts (four vehicles each; no parking). Upgrade Tioga Road bridge to improve free flow of river. Add hiking trail that parallels the road.
3	Existing Cathedral Lakes trailhead: <ul style="list-style-type: none"> Allow undesignated roadside parking; retain trailhead. 	Existing Cathedral Lakes trailhead: <ul style="list-style-type: none"> Relocate trailhead and parking to location #6; restore to natural conditions. 	Existing Cathedral Lakes trailhead: <ul style="list-style-type: none"> Relocate trailhead and parking to location #6; restore to natural conditions. 	Existing Cathedral Lakes trailhead: <ul style="list-style-type: none"> Relocate trailhead and parking to location #6; restore to natural conditions. 	Existing Cathedral Lakes trailhead: <ul style="list-style-type: none"> Relocate trailhead and parking to location #6; restore to natural conditions.

Table 7-16.
Site Plan Summary, All Alternatives (continued)

Location	No-Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
4	Existing wastewater ponds and sprayfields: <ul style="list-style-type: none"> Retain ponds, sprayfields, and service road. 	Existing wastewater ponds and sprayfields: <ul style="list-style-type: none"> Pending additional planning, replace with upgraded wastewater treatment plant at locations #7 and #9; restore to natural conditions. 	Existing wastewater ponds and sprayfields: <ul style="list-style-type: none"> Retain and upgrade (or relocate if feasible). 	Existing wastewater ponds and sprayfields: <ul style="list-style-type: none"> Retain and upgrade (or relocate if feasible). 	Existing wastewater ponds and sprayfields: <ul style="list-style-type: none"> Retain and upgrade (or relocate if feasible).
5	Area east of Budd Creek: <ul style="list-style-type: none"> Retain as undeveloped natural area. 	Area east of Budd Creek: <ul style="list-style-type: none"> Construct new Cathedral Lakes trailhead connector. Retain as undeveloped natural area except for trail segment. 	Area east of Budd Creek: <ul style="list-style-type: none"> Co-locate new NPS and concessioner stables and day parking. Build new hard-sided cabin for two stable employees. Construct new Cathedral Lakes trailhead connector. 	Area east of Budd Creek: <ul style="list-style-type: none"> Construct new Cathedral Lakes trailhead connector. Retain as undeveloped natural area except for trail segment. 	Area east of Budd Creek: <ul style="list-style-type: none"> Construct new Cathedral Lakes trailhead connector. Retain as undeveloped natural area except for trail segment.
6	Existing visitor center and Road Camp: <ul style="list-style-type: none"> Retain visitor center and day parking. Retain NPS employee housing. Retain maintenance yard and office. 	Existing visitor center and Road Camp: <ul style="list-style-type: none"> Relocate visitor contact station to location #15; convert building to park operations. Construct new Cathedral Lakes trailhead with day and overnight parking. Retain maintenance yard and office. Increase NPS employee housing. 	Existing visitor center and Road Camp: <ul style="list-style-type: none"> Relocate contact station to location #11; convert building to park operations. Construct new Cathedral Lakes trailhead with day and overnight parking. Retain maintenance yard and office. Increase NPS employee housing. 	Existing visitor center and Road Camp: <ul style="list-style-type: none"> Retain visitor center in current location. Construct new Cathedral Lakes trailhead and picnic area, day and overnight parking. Relocate maintenance yard and office to location #7. Retain NPS employee housing. 	Existing visitor center and Road Camp: <ul style="list-style-type: none"> Relocate visitor contact station to location #9; convert building to park operations. Construct new Cathedral Lakes trailhead with day and overnight parking. Relocate maintenance yard and office to location #7. Increase NPS employee housing.
7	Wastewater treatment plant: <ul style="list-style-type: none"> Retain wastewater treatment plant. Retain recreational vehicle dump station. 	Wastewater treatment plant: <ul style="list-style-type: none"> Upgrade wastewater treatment plant. Retain recreational vehicle dump station. 	Wastewater treatment plant: <ul style="list-style-type: none"> Upgrade wastewater treatment plant. Retain recreational vehicle dump station. 	Wastewater treatment plant: <ul style="list-style-type: none"> Upgrade wastewater treatment plant. Retain recreational vehicle dump station. Add new modest operational facilities related to roads, trails, buildings, and grounds. Add NPS maintenance yard and office, and relocate existing aboveground diesel fuel tank to this location. 	Wastewater treatment plant: <ul style="list-style-type: none"> Upgrade wastewater treatment plant. Retain recreational vehicle dump station. Add NPS maintenance yard and office, and relocate existing aboveground diesel fuel tank to this location.

Table 7-16.
Site Plan Summary, All Alternatives (continued)

Location	No-Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
8	Parsons Memorial Lodge: <ul style="list-style-type: none"> Preserve Parsons Memorial Lodge and retain vehicle access. Retain footbridge. 	Parsons Memorial Lodge: <ul style="list-style-type: none"> Preserve lodge; eliminate vehicle access. Upgrade footbridge to improve free flow of river. 	Parsons Memorial Lodge: <ul style="list-style-type: none"> Preserve lodge and retain vehicle access. Upgrade footbridge to improve free flow of river. 	Parsons Memorial Lodge: <ul style="list-style-type: none"> Preserve lodge and retain vehicle access. Upgrade footbridge to improve free flow of river. 	Parsons Memorial Lodge: <ul style="list-style-type: none"> Preserve lodge and retain vehicle access. Upgrade footbridge to improve free flow of river.
9	Area west of Unicorn Creek: <ul style="list-style-type: none"> Retain as undeveloped natural area. 	Area west of Unicorn Creek: <ul style="list-style-type: none"> Retain as undeveloped natural area; if needed, use area for wastewater treatment facilities. 	Area west of Unicorn Creek: <ul style="list-style-type: none"> Add day parking and picnic area. Add trailhead for Parsons Memorial Lodge. 	Area west of Unicorn Creek: <ul style="list-style-type: none"> Retain as undeveloped natural area. 	Area west of Unicorn Creek: <ul style="list-style-type: none"> Add new small visitor contact station, picnic area, trailhead for Parsons Memorial Lodge, and day parking.
10	Tuolumne Meadows campground: <ul style="list-style-type: none"> Retain campground in current loop configuration (304 sites plus 7 group sites). Retain campground office and day parking. Retain Elizabeth Lakes trailhead and day parking. 	Tuolumne Meadows campground: <ul style="list-style-type: none"> Retain smaller campground; remove the A-loop road and all 67 A-loop campsites. Retain campground office and day parking. Add vending machine for ice and firewood. Relocate entrance road outside of floodplain. Formalize John Muir Trail connection. Retain Elizabeth Lakes trailhead and day parking. Remove riprap from riverbank. 	Tuolumne Meadows campground: <ul style="list-style-type: none"> Expand campground in current configuration, adding 41 additional walk-in campsites; relocate the A-loop sites closest to the Lyell Fork. Retain campground office and day parking. Retain existing entrance road. Formalize John Muir Trail connection. Retain Elizabeth Lakes trailhead and day parking. Remove riprap from riverbank. 	Tuolumne Meadows campground: <ul style="list-style-type: none"> Retain campground in current configuration at current capacity. Retain campground office and day parking. Retain existing entrance road. Formalize John Muir Trail connection. Retain Elizabeth Lakes trailhead and day parking. Remove riprap from riverbank. 	Tuolumne Meadows campground: <ul style="list-style-type: none"> Retain campground at current capacity; realign the A-loop road and relocate campsites closest to Lyell Fork Retain campground office and day parking. Relocate entrance road outside of floodplain. Formalize John Muir Trail connection. Retain Elizabeth Lakes trailhead and day parking. Remove riprap from riverbank.
11	Existing commercial services core: <ul style="list-style-type: none"> Retain store, grill, mountaineering shop/school, public fuel station, and day parking. Retain concessioner employee housing. 	Existing commercial services core: <ul style="list-style-type: none"> Remove store, grill, mountaineering shop/school, public fuel station and post office. Convert area to day parking and picnic area. Add new public restroom. Add trail connector to campground. Remove concessioner employee housing. 	Existing commercial services core: <ul style="list-style-type: none"> Retain store, grill, public fuel station, and post office. Remove mountaineering shop/school. Add visitor contact station, shower/restroom facility, picnic area, and day parking. Add trail connector to campground. Relocate concessioner employee housing to location #20. 	Existing commercial services core: <ul style="list-style-type: none"> Retain store, grill, post office, and day parking. Remove mountaineering shop/school and public fuel station. Upgrade restroom. Add trail connector to campground. Relocate concessioner employee housing to location #18. 	Existing commercial services core: <ul style="list-style-type: none"> Retain store, grill, and post office; expand day parking. Remove mountaineering shop/school and public fuel station. Upgrade restroom. Add trail connector to campground. Relocate concessioner employee housing to location #18.

Table 7-16.
Site Plan Summary, All Alternatives (continued)

Location	No-Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
12	Existing concessioner stable: <ul style="list-style-type: none"> Retain concessioner stable and day parking. Retain concessioner employee housing. Retain day and overnight parking along access road. 	Existing concessioner stable: <ul style="list-style-type: none"> Co-locate NPS stable with concessioner stable (for administrative use only). Remove most concessioner employee housing except for one hard-sided cabin for two stable employees; restore to natural conditions. Eliminate parking along access road. 	Existing concessioner stable: <ul style="list-style-type: none"> Relocate concessioner stable and concessioner employee housing to location #5. Add meadow overlook picnic area and day parking. Retain day and overnight parking along access road. 	Existing concessioner stable: <ul style="list-style-type: none"> Retain concessioner stable and day parking. Retain one hard-sided cabin for two stable employees (most employee housing relocated to location #18). Retain day and overnight parking along access road. 	Existing concessioner stable: <ul style="list-style-type: none"> Co-locate NPS and concessioner stable (for administrative use only). Retain one hard-sided cabin for two stable employees (relocate most concessioner employee housing to location #18). Retain day and overnight parking along access road.
13	Lembert Dome: <ul style="list-style-type: none"> Retain day parking and trailheads for Lembert Dome and Parsons Memorial Lodge. Retain picnic area. 	Lembert Dome: <ul style="list-style-type: none"> Retain day parking and trailheads for Lembert Dome and Parsons Memorial Lodge. Retain picnic area. Add shuttle stop. 	Lembert Dome: <ul style="list-style-type: none"> Expand day parking. Retain picnic area. Add shuttle stop. Add Parsons Memorial Lodge trailhead. 	Lembert Dome: <ul style="list-style-type: none"> Expand day parking and retain trailheads for Lembert Dome and Parsons Memorial Lodge. Retain picnic area. Add shuttle stop. 	Lembert Dome: <ul style="list-style-type: none"> Expand day parking and retain trailheads for Lembert Dome and Parsons Memorial Lodge. Retain picnic area. Add shuttle stop.
14	Old Tioga Road/Great Sierra Wagon Road: <ul style="list-style-type: none"> Preserve as trails. 	Old Tioga Road/Great Sierra Wagon Road: <ul style="list-style-type: none"> Preserve as trails; mitigate impacts of old roads to meadow hydrology. 	Old Tioga Road/Great Sierra Wagon Road: <ul style="list-style-type: none"> Preserve as trails; mitigate impacts of old roads to meadow hydrology. 	Old Tioga Road/Great Sierra Wagon Road: <ul style="list-style-type: none"> Preserve as trails; mitigate impacts of old roads to meadow hydrology. 	Old Tioga Road/Great Sierra Wagon Road: <ul style="list-style-type: none"> Preserve as trails; mitigate impacts of old roads to meadow hydrology.
15	Existing wilderness center and NPS stable: <ul style="list-style-type: none"> Retain wilderness center and overnight parking. Retain NPS stable. 	Existing wilderness center and NPS stable: <ul style="list-style-type: none"> Combine new, small visitor contact station with existing wilderness center; expand parking. Relocate NPS stable to location #12; use site for expansion of NPS employee housing, if needed. 	Existing wilderness center and NPS stable: <ul style="list-style-type: none"> Combine ranger station with existing wilderness center; expand parking. Relocate NPS stable to location #5; use site for expansion of NPS employee housing, if needed. 	Existing wilderness center and NPS stable: <ul style="list-style-type: none"> Retain wilderness center; expand parking. Retain NPS stable. 	Existing wilderness center and NPS stable: <ul style="list-style-type: none"> Retain existing wilderness center; expand parking. Move NPS stable to location #12; use site for expansion of NPS employee housing, if needed.
16	Existing ranger station and Ranger Camp: <ul style="list-style-type: none"> Retain ranger station and day parking. Retain aboveground diesel fuel tank. Retain NPS employee housing. 	Existing ranger station and Ranger Camp: <ul style="list-style-type: none"> Retain ranger station and day parking. Retain aboveground diesel fuel tank for administrative use. Replace NPS employee housing with hard-sided cabins. 	Existing ranger station and Ranger Camp: <ul style="list-style-type: none"> Relocate ranger station function to location #15. Retain the aboveground diesel fuel tank. Replace NPS employee housing with hard-sided cabins. 	Existing ranger station and Ranger Camp: <ul style="list-style-type: none"> Retain existing ranger station and day parking. Relocate the aboveground diesel fuel tank to location #7. Replace NPS employee housing with hard-sided cabins. 	Existing ranger station and Ranger Camp: <ul style="list-style-type: none"> Relocate ranger station to location #6. Relocate the aboveground diesel fuel tank to location #7. Replace NPS employee housing with hard-sided cabins.

Table 7-16.
Site Plan Summary, All Alternatives (continued)

Location	No-Action Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
17	Bug Camp, Dog Lake/John Muir Trail parking: <ul style="list-style-type: none"> Retain NPS employee housing. Retain day and overnight parking. 	Bug Camp, Dog Lake/John Muir Trail parking: <ul style="list-style-type: none"> Increase day and overnight parking. Remove NPS housing. 	Bug Camp, Dog Lake/John Muir Trail parking: <ul style="list-style-type: none"> Increase day and overnight parking. Remove NPS housing. 	Bug Camp, Dog Lake/John Muir Trail parking: <ul style="list-style-type: none"> Increase day and overnight parking. Retain NPS employee housing. 	Bug Camp, Dog Lake/John Muir Trail parking: <ul style="list-style-type: none"> Increase day and overnight parking. Retain NPS employee housing.
18	Tuolumne Meadows Lodge: <ul style="list-style-type: none"> Retain lodge and overnight parking. Retain roadside parking along access road. Retain concessioner employee housing. 	Tuolumne Meadows Lodge: <ul style="list-style-type: none"> Remove lodge, parking, and employee housing; restore area to natural conditions. 	Tuolumne Meadows Lodge: <ul style="list-style-type: none"> Retain lodge at current capacity. Eliminate roadside parking. Relocate concessioner employee housing to location #20. 	Tuolumne Meadows Lodge: <ul style="list-style-type: none"> Retain lodge with reduced capacity. Eliminate roadside parking. Expand concessioner employee housing. 	Tuolumne Meadows Lodge: <ul style="list-style-type: none"> Retain lodge at current capacity. Upgrade shower house. Eliminate roadside parking. Expand concessioner employee housing.
19	Water treatment facility: <ul style="list-style-type: none"> Retain water treatment facility. 	Water treatment facility: <ul style="list-style-type: none"> Upgrade water treatment facility. 	Water treatment facility: <ul style="list-style-type: none"> Upgrade water treatment facility. 	Water treatment facility: <ul style="list-style-type: none"> Upgraded water treatment facility. 	Water treatment facility: <ul style="list-style-type: none"> Upgrade water treatment facility.
20	Gaylor Pit: <ul style="list-style-type: none"> Retain helipad. Allow undesignated day parking. 	Gaylor Pit: <ul style="list-style-type: none"> Retain helipad. Discontinue undesignated parking. 	Gaylor Pit: <ul style="list-style-type: none"> Add NPS and concessioner employee housing. Retain helipad. 	Gaylor Pit: <ul style="list-style-type: none"> Retain helipad Add day parking 	Gaylor Pit: <ul style="list-style-type: none"> Add NPS employee campsites, vault toilets, and potable water tank. Retain helipad.

Table 7-17.
Summary Comparison of Designated Parking, Tuolumne Meadows, All Alternatives

Type of Parking	Current	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Parking Area Description
Day Parking Spaces (in Designated Parking Areas)	16	16	16	16	16	existing parking area at Pothole Dome
	0	0	20	20	20	new parking/viewing area east of Pothole Dome
	0	4	4	4	4	existing roadside pullout south of Pothole Dome
	0	0	58	0	0	new parking area associated with the relocated stables (alternative 2 only)
	50	50	126	113	76	existing parking area at the current visitor center
	0	0	80	0	80	new day parking area west of Unicorn Creek and across Tioga Road from the Parsons Memorial Lodge trailhead
	11	13	13	13	13	existing parking area at the campground office
	11	11	11	11	11	existing parking in the campground for the Elizabeth Lakes trailhead
	0	10	0	0	0	A-loop day use parking (alternative 1 only)
	15	0	15	15	30	existing parking area at the fuel station
	51	50	55	55	55	existing parking area at the store and grill
	58	0	30	58	38	existing parking area at the concessioner stable
	0	0	34	34	34	roadside parking along the road to the concessioner stable
	29	25	50	37	50	existing parking area at the base of Lambert Dome
	7	7	7	7	7	existing parking area at the ranger station
	25	52	52	45	52	existing parking area at the Dog Lake/John Muir Trail trailhead
	0	0	0	15	5	existing parking area at Gaylor pit
	67	67	71	67	71	existing parking areas in the road corridor east of Tuolumne Meadows, including the Mono Pass and Gaylor Peak trailheads and the Dana Meadows and other pullouts
	340	305	642	510	562	Subtotal, Day parking spaces
Overnight Parking Spaces (excluding cars parked in the Tuolumne Meadows campground)	58	89	86	86	89	existing parking area at the wilderness office
	33	68	59	59	68	existing parking area at the Dog Lakes/John Muir Trail trailhead
	102	0	102	70	102	Tuolumne Meadows Lodge
	-	19	35	32	35	relocated parking area for Cathedral Lakes trailhead
	-	-	58	56	58	roadside parking along the road to the concessioner stable
	193	176	340	303	352	Subtotal, Overnight parking spaces
Total	533^a	481	982	813	914	All Designated Day and Overnight Parking Spaces, Tuolumne Meadows

a In addition to vehicles in these designated parking spaces, an estimated 337 vehicles currently park in undesignated spaces during peak periods.

Environmentally Preferable Alternative

Legal Mandates

The Council on Environmental Quality (CEQ) regulations implementing NEPA (*Code of Federal Regulations* 40:1505.2) and the NPS NEPA guidelines require that “the alternative or alternatives which were considered to be environmentally preferable” be identified. *Environmentally preferable* is defined as “the alternative that will promote the national environmental policy as expressed in NEPA section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources” (CEQ 1981).

Section 101 of NEPA states that:

It is the continuing responsibility of the Federal Government to . . .

- (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;*
- (2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;*
- (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;*
- (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;*
- (5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and*
- (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.*

Conformance

Alternative 4 would best fulfill the responsibilities of the NPS to select the alternative that has the least amount of impacts to the biological and physical environment; that best protects, preserves, and enhances historic, cultural, and natural resources; and that best supports diversity and variety of individual choice.

The no-action alternative would provide for diversity and variety of individual choice; however, it would not best fulfill any of the other requirements, particularly at Tuolumne Meadows, where increasing amounts of use would continue to adversely affect ecologically sensitive meadow and riparian areas, archeological resources, scenic values, visitor experience, visitor safety, and park operations. Additionally, aging utilities at Tuolumne Meadows and Glen Aulin would continue to pose risks to water quality under the no-action alternative.

All of the action alternatives would fulfill all of the above requirements to some degree. In addition, all of the action alternatives would fulfill these requirements somewhat equally, through continuation of existing wilderness and resource management policies, ecological restoration of fragile meadow and riparian areas, protection of water quality, protection of archeological resources, and conformance with existing requirements under Executive Order 13514 to improve energy efficiency, reduce consumption and waste, and conserve water use to improve sustainability of NPS operations and facilities. The alternatives would vary primarily in water

consumption and related risks to water quality and habitat, protection of historic resources, and diversity of recreational opportunities.

Alternative 1 would remove significant historic resources at Tuolumne Meadows Lodge and Glen Aulin High Sierra Camp. It would also impose the most restrictions on diversity of visitor use in the most popular portions of the corridor. Alternative 2 would provide outstanding, diverse recreational opportunities in the river corridor. However, the historic setting at Tuolumne would be altered, and water consumption and associated risks would remain. Alternative 3 would provide outstanding recreational opportunities similar to existing conditions and would retain the historic setting of Tuolumne Meadows, but like alternative 2, it would not reduce risks to water quality to the degree that would occur under alternative 4.

In comparison, alternative 4 would strike a balance between maintaining the historic setting of the river corridor, maintaining a diversity of recreational opportunities, and allowing for extensive natural resource management at Tuolumne Meadows to restore natural ecosystem function to the extent possible.

Alternatives Dismissed from Further Consideration

Keep Tioga Road Open Year-Round

From roughly November to late May or early June, the Tioga Road is closed due to snow and icy conditions. The alternative of keeping the road open during winter is not considered feasible because the road is not engineered for year-round use. The feasible avalanche control work on both the Tioga Road and Highway 120 East toward Lee Vining Canyon might not be adequate to mitigate hazards to public and park staff. In addition, infrastructure along the road is not adequate to support road clearing operations and visitor protection activities. Costs and resource impacts associated with reengineering and maintaining the road for year-round access would be unreasonable. Also the wilderness boundary poses a constraint on any potential reengineering.

Closing Tioga Road in the winter does not adversely affect the outstandingly remarkable recreational value of the Tuolumne River. During this time, the recreational value of the Tuolumne Meadows and Lower Dana Forks segments shifts from river access via Tioga Road to a wilderness experience along the river. The snow season is a quiet time to enjoy solitude in the raw elements of winter.

Realign or Eliminate Tioga Road through the Tuolumne Meadows Area

Closing the Tioga Road to through-traffic through the Tuolumne Meadows area was not considered a reasonable alternative. The Tioga Road is one of the few east-west trans-Sierra highways, and its closure would significantly affect regional summer and fall travel patterns across the Sierra. The nearest east-west corridor to the north is along the Sonora Pass (Highway 108); the nearest southerly route is over the Tehachapi Pass from Highway 395 to Bakersfield.

The issue of realigning the road away from the river corridor through Tuolumne Meadows was considered during the early phases of planning. However, a study conducted for the NPS aimed at assessing the effects of the Tioga Road on the hydrologic processes in Tuolumne Meadows (Cooper et al. 2006) found that the Tioga Road does not appear to affect hydrologic conditions in Tuolumne Meadows except in localized areas. Culverts beneath the road channelize water during periods of high spring runoff, thereby creating localized variation in meadow hydrology but not affecting the amount of surface water or groundwater recharge from what would occur if the road was not there. The role of the road appears to be minimal with respect to conifer encroachment. Consequently, it does not appear that road realignment would enhance the protection of river-related ecological values.

Relocate Park Operations and Housing Functions to Lee Vining

The NPS considered the feasibility of relocating some park operations functions (including a maintenance yard and stable), some administrative offices, and some employee housing to an administrative site in Inyo National Forest (in Lee Vining Canyon), where they could be co-located with similar USFS functions.

After some analysis, the NPS determined that it would not be cost-effective to spend limited public funds to relocate seasonal facilities to Lee Vining, where they could only be used three or four months per year by Yosemite National Park staff (since Tioga Road is closed in the winter). Funds would be better allocated to year-round facilities badly needed throughout the park.

Furthermore, the NPS determined that a certain amount of employee housing and maintenance and administrative facilities are necessary at Tuolumne Meadows to effectively and efficiently support resource management and visitor use. Necessary facilities were identified for each alternative based on user capacity and the kinds of resource management and visitor use management needed to implement the alternative.

Although some employees could be housed off site if alternative housing was available (which it currently is not), many employees are considered “required occupants” who must be housed on site to respond to visitor and resource safety and operational emergencies. Maintenance functions requiring rapid response or large equipment would be greatly hampered by having to travel over Tioga Road from Lee Vining Canyon. The NPS also determined that frequently trailering the pack stock needed to support routine ranger patrols and maintenance would present a safety hazard if the stable was relocated to Lee Vining Canyon.

For these reasons, the NPS determined that park operations, administrative offices, and housing would be retained in the Tuolumne Meadows area rather than developing a new administrative site on Inyo National Forest land in Lee Vining Canyon.

Close or Reduce the Use of the Backpacker Camp at Glen Aulin

Because Glen Aulin is at the intersection of four popular trails that provide access to large parts of the wilderness, and because of the paucity of other low-impact camping areas nearby, removing the backpacker camp or reducing the capacity of the Glen Aulin wilderness zone and related trailhead quotas would cause large changes in visitor use patterns over a large part of the wilderness within the Tuolumne River corridor. This would be better analyzed in the upcoming Yosemite Wilderness Stewardship Plan, which will update the current *Yosemite Wilderness Management Plan*. For this reason, this concept was dismissed from further consideration.

Relocate the Wastewater Treatment Plant to the Site of the Existing Ponds and Sprayfields

Relocating the wastewater treatment plant to the north side of the river (near the existing wastewater ponds and sprayfields) was considered but dismissed for several reasons:

- Conveying the wastewater to this location would require either continuing to use the existing force main (line) under Tuolumne Meadows, or constructing a new line from the Lembert Dome parking lot west along the gravel road to the ponds. The route across the meadow is undesirable because potential failure of the line could degrade water quality (although the line is currently in good condition) as well as the outstandingly remarkable biological values in Tuolumne Meadows. A new wastewater line along the gravel road could disturb known archeological sites in the area, thus potentially degrading these outstandingly remarkable cultural values. The same line could also degrade the outstandingly remarkable

biological values in Tuolumne Meadows because the gravel road cuts across portions of those meadows and a new wastewater line could disrupt groundwater flow into the meadows. Construction of that line would also pose a threat of disturbance to the mineral spring habitat at Soda Springs. While that habitat is not an outstandingly remarkable value, it is home to several rare plants whose protection the NPS is obligated to ensure.

- Construction of a new wastewater plant at the site of the ponds would constitute a new visual intrusion into the area. While it might be possible to design the plant in such a way that it would not be visible from the river corridor (and intrude into views that contribute to an outstandingly remarkable scenic value), that possibility is not a guarantee. Furthermore, a new wastewater treatment plant in this location would almost certainly be visible from Lembert and Pothole Domes, thus amplifying the incursion into the area's scenic integrity already presented by the wastewater ponds.
- The Wilderness boundary was drawn very close to the existing ponds and sprayfields, thus leaving little room for new construction of any kind. The space necessary for a full treatment plant means that it could not be sited by the ponds without violating the wilderness boundary.

In conclusion, the possibility of relocating the wastewater treatment plant to the site of the existing ponds and sprayfields was dismissed because it would degrade several outstandingly remarkable values, would violate the wilderness boundary, could harm sensitive plant habitat, and would present a new incursion into the scenic integrity of Tuolumne Meadows.

Relocate Visitor Service to a Site in the Tuolumne Meadows Area Outside the River Corridor

The feasibility of relocating the facilities necessary for visitor use to areas outside the river corridor boundary is severely constrained by the boundaries of the Yosemite Wilderness, which generally overlap into the scenic segments of the corridor. The site most suitable for development that is outside both the river corridor and the designated wilderness is currently occupied by the campground B–G loops. The option of locating a visitor contact station and possibly a store and grill at the site currently occupied by the campground D loop was considered but dismissed because of the potential for impacts on Unicorn Creek and adjacent wetlands, and because of the number of campsites that would have to be either eliminated or redistributed to other campground locations. Redistributing these sites was dismissed because it would not be cost-effective and it would increase the site density within the campground.

Replace the Tuolumne Meadows Lodge with a More Permanent Facility

Replacing the Tuolumne Meadows Lodge with a larger and more permanent facility was not considered reasonable for several reasons:

- Any new construction in a wild and scenic river corridor must be necessary for visitor use and resource protection and infeasible to locate outside the river corridor. A new lodge is not necessary, given the presence of the existing Tuolumne Meadows Lodge, which is functional and appealing to many.
- A new lodge would result in adverse effects on the Tuolumne Meadows Historic District. The Tuolumne Meadows Lodge and High Sierra Camp was recommended eligible for listing on the National Register of Historic Places as a historic district in 1989 and 2004 (Kirk and Palmer 2004). The building and structures are designed to be as simple as possible, with no architectural ornamentation. The most distinctive feature of the area (established in 1916) is the village-like clustering, with the dining hall serving as the central hub to the clustering. Replacing part of the lodge (for example, half the tent cabins) with a new lodge would

heavily affect the rustic, village-like character of the lodge, thus causing an adverse effect on the historic district.

- If a new lodge included rooms with private baths (as it most likely would because such rooms are the norm in contemporary hotel construction), water withdrawals from the Dana Fork would likely increase because the ready access to domestic water in the hotel rooms would likely lead to greater per capita water consumption. As noted in chapter 5, water withdrawals from the Dana Fork are already at capacity, so construction of a new lodge would most likely cause water withdrawals that exceed NPS regulations.
- A persistent theme in public scoping was to keep the development in Tuolumne Meadows like it is now: rustic. Commenters were mostly opposed to the idea of building a modern new lodge in the area.
- Any construction of a new lodge in Tuolumne Meadows would be prohibitively expensive due to the area's remoteness and heavy snow loads. Such costs would be passed along to the visitor, thereby resulting in considerably higher lodging costs than the lodge currently charges. Providing affordable lodging is a common request heard in public comments in Yosemite; a new lodge would not address this concern.

In conclusion, based on wild and scenic river management regulations, interests and concerns raised during scoping, resource concerns, and high construction costs, the idea of constructing a new, permanent lodge at Tuolumne Meadows was dismissed from further consideration.

Increase Use Beyond the Level Considered in Alternative 2

A user capacity even higher than that considered in alternative 2 was considered but rejected for several reasons.

First, as noted in several places in this chapter, water withdrawals from the Dana Fork are already near the 70,000 gallon per day capacity, and alternative 2 would increase withdrawals to capacity. A user capacity above what is proposed in alternative 2 would demand more water from the Dana Fork than the river can provide without affecting the river's free-flowing character.

Additionally, the parking and infrastructure necessary for additional use would be difficult to construct without affecting the scenic or subalpine meadow and riparian values of the river corridor. Also, with the designated wilderness boundary closely approaching the road and the meadows, there is insufficient space to construct parking lots much larger than those proposed in alternative 2.

For these reasons, the idea of accommodating a higher user capacity than what is proposed in alternative 2 was dismissed from further consideration.

Allow Boating on the Tuolumne River in the Meadows Area

Allowing boating on the Tuolumne River in the meadows area was considered but dismissed for several reasons:

- Most importantly, the riverbanks in the meadows area currently have less willow vegetation than would be expected under natural conditions (as discussed in chapter 5). Boaters inevitably land on the banks to explore their surroundings, thus trampling the ground adjacent to the river. More trampling would only cause the willow recruitment problem to worsen.
- While alternative 2 provides for a very limited amount of boating below the meadows, most floaters would have to take out at the northwestern end of the meadows and hike (with their boats) back to the lodge area (where they would presumably have put in their boats). This would increase visitor use on the Glen Aulin

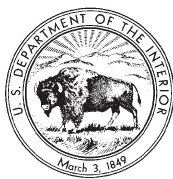
trail, which is already at levels approaching the management standard; boaters would easily push such use beyond the management standard.

- The stretch of water in the Tuolumne Meadows area is deceptively swift, much more so than the Merced River in Yosemite Valley. Were boating to be allowed, more boaters would need to be rescued, thus adversely affecting the limited park operations function in this remote area.

For these reasons, the idea of boating on the river in the meadows area was dismissed from further consideration.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



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(Photo by Kristina Rylands)*

*Front cover: Tuolumne Meadows,
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