

November 4, 2008

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SEKI/General

Memorandum

To: Superintendent, Sequoia and Kings Canyon National Parks

Through: William L. Jackson, Chief, Water Resources Division (WRD)
Gary Rosenlieb, Chief, Water Operations Branch (WOB)

From: Larry Martin, Hydrogeologist, Water Operations Branch, WRD

Subject: Assessment of water use in the Mineral King area of
Sequoia National Park

Introduction

The General Management Plan for Sequoia and Kings Canyon National Parks states that the park will “*assess the impacts of water use by private owners (Silver City, Kaweah Han) and by special use permittees in three areas of Mineral King.*” This report briefly describes the water supply systems and water use at these areas and at NPS facilities in the Mineral King/Silver City area to the extent possible. We do not have access to much of the information for private developments; instead, we make the assumption that the private systems are similar to water systems operated by the park service. All of the water systems in this general area, private and public, obtain water by diversions from small creeks or springs. Groundwater wells provide some portion of the water supply for the Silver City Mutual Water Company.

Mineral King/Silver City Area

The Mineral King/Silver City area includes a mix of park service development, private property, and special use permit cabins. Several small-volume water systems provide water for the various developed areas. These developments include;

1. Silver City – 160 acres of private land with approximately 40 cabins and a small resort with 14 rental cabins, public showers, and a restaurant/store.
2. Kaweah Han – 60 acres of private land with a lodge and a caretaker’s house.
3. Mineral King Permit Cabins – Approximately 60 cabins (primarily seasonal) in three areas: Cabin Cove, West Mineral King (aka Faculty Flat), and East Mineral King.
4. NPS Silver City – Four cabins providing seasonal housing for park employees.

5. NPS Atwell Mill – Ranger residence, campground, and NPS maintenance area.
6. NPS Cold Spring – Ranger station, campground, and approximately 30 residential summer cabins in the West Mineral King area.

The location of these areas is shown on Figure 1 and Figure 2.

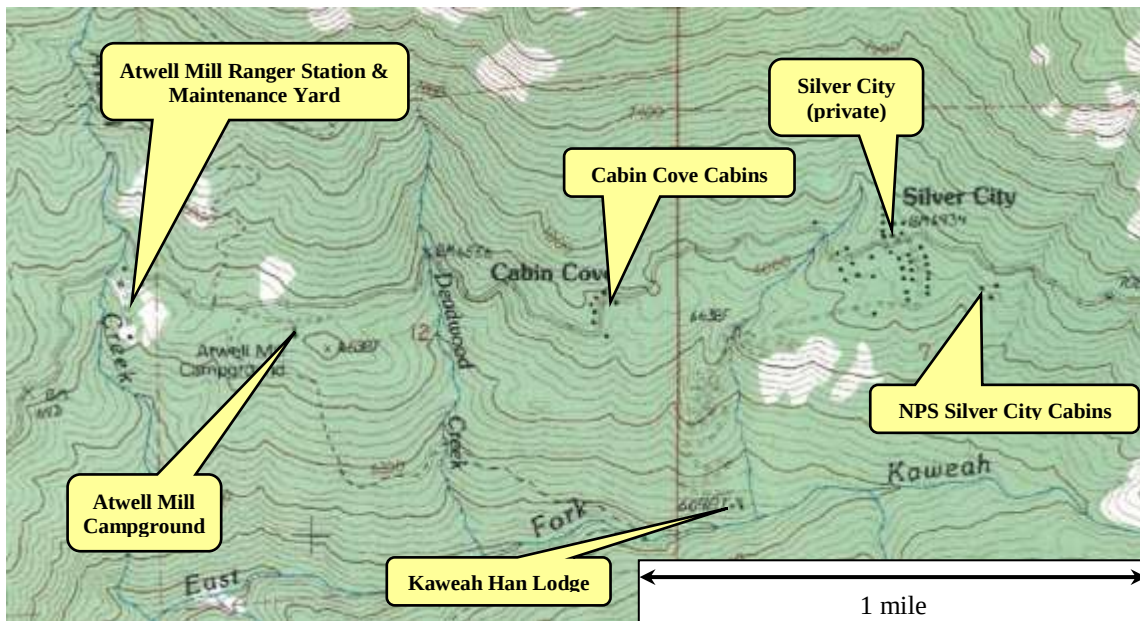


Figure 1. Developed areas in the vicinity of Silver City.

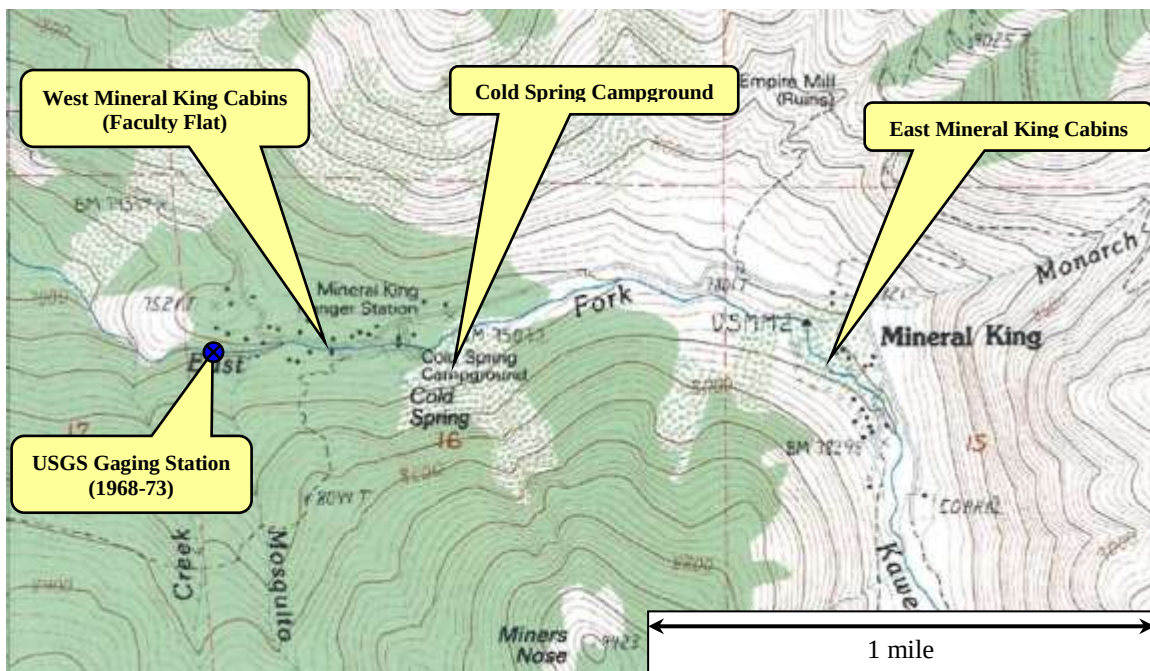


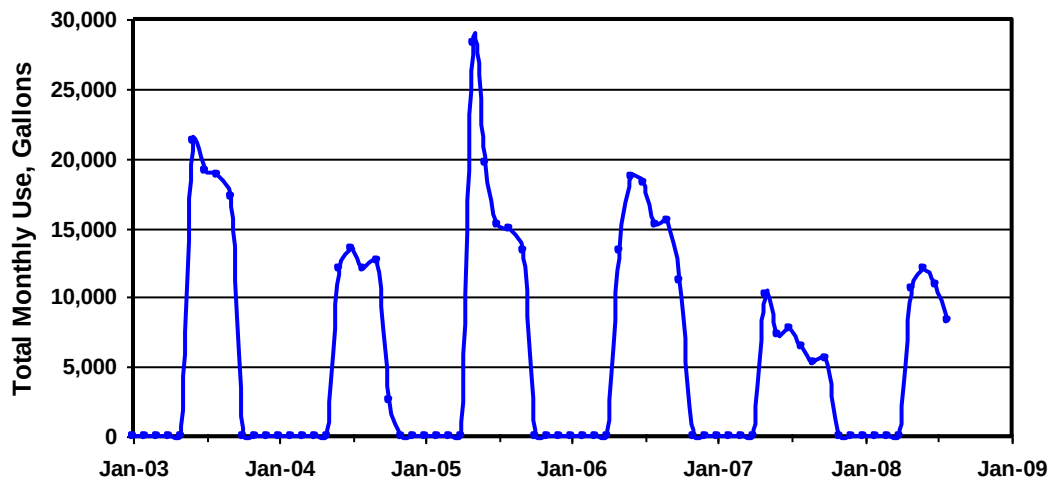
Figure 2. Developed areas in the vicinity of Mineral King.

NPS Water Systems

The park service operates three water systems in the Silver City/Mineral King areas.

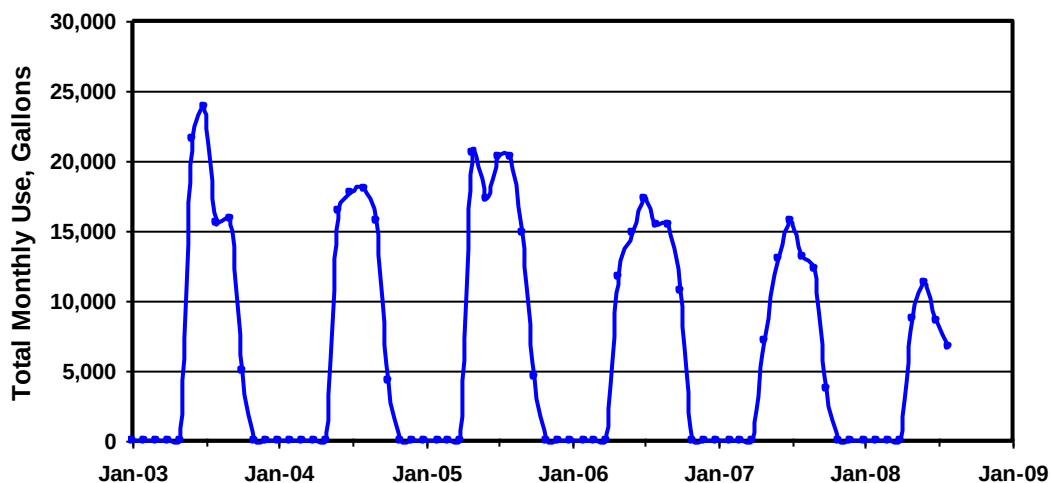
The NPS Silver City Cabins water system is a non-public, seasonal system that supplies water to four cabins used as park employee housing. Surface water is diverted from Silver City Creek, treated by filtration and chlorination, and stored in a 3,000 gallon tank. Average daily use (May-September) is 450 gallons.

NPS Silver City Residential Area



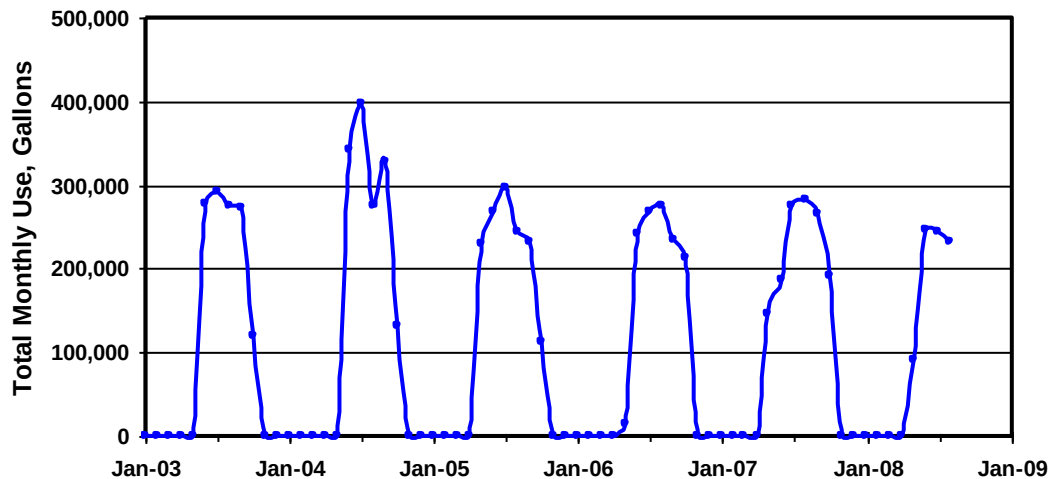
The Atwell water system is a public, transient, non-community seasonal system that supplies water to a ranger residence, campground (21 sites), and maintenance area. Surface water is diverted from Atwell Mill Creek, treated by filtration and chlorination, and stored in a 1,000 gallon tank. Average daily use (May-September) is 500 gallons.

NPS Atwell Mill



The Cold Spring water system is a public, transient, non-community seasonal system that supplies water to a ranger station, campground (40 sites), and approximately 30 private cabins in the vicinity of the Cold Spring campground (generally referred to as West Mineral King or Faculty Flat). Water is diverted from Cold Spring, on the hillside above (south) the campground. Since this is a groundwater source, filtration is not necessary. Water is chlorinated and stored in a 5,000 gallon tank. Average daily use (June-September) is 9,000 gallons.

NPS Cold Spring



The majority of the water use from the Cold Spring system is probably at the private cabins in West Mineral King. There is minimal water use at the ranger station. The campground has twice as many sites as the Atwell Mill campground, so we might logically conclude there would be twice as much water use at the Cold Spring campground—approximately 1,000 gallons per day (gpd). That would leave 8,000 gpd used by the 30 cabins in the West Mineral King area—about 250 gpd per cabin. There is reportedly considerable leakage in the distribution system to the cabins (personal communication, Matt St. Martin). Water use, and diversion from the spring, might be reduced considerably by repairing leaks throughout the distribution system.

Private Water Systems

Private water systems provide water for developed sites at Silver City, Kaweah Han, and special use permit cabins at Cabin Cove and East Mineral King. Less water use data are available for these water systems than for the park service water systems.

Silver City is a 160-acre tract of private property. There are 40 privately-owned cabins and a small resort north of the Mineral King Road that includes 14 rental cabins, public showers, and a store/restaurant. Water is obtained by diversion from creeks in the area and/or private well(s). The system is owned and operated by the Silver City Mutual Water Company. No water use data are available for the Silver City private water

system. If we estimate use at 250 gpd per cabin plus additional water for the restaurant, total use could be 15,000 gpd.

Kaweah Han is a 60-acre tract of private property on the north side of the East Fork of the Kaweah River, south of Silver City. It includes a 5,000 square foot lodge and a caretaker's house. Information regarding the source of potable water is not readily available. However, since the lodge is at the confluence of Silver City Creek and the East Fork of the Kaweah River, it's a fairly safe assumption that water is obtained by diversion from one of those streams—more likely Silver City Creek. Water use is probably less than 1000 gpd.

Special use permit cabins at Cabin Grove obtain water by diverting water from Deadwood Creek. There may be private well(s) to supplement the surface water source. There are 7 cabins at Cabin Grove. No information is available regarding the water systems for these cabins, or how much water is used. It seems reasonable to assume that the total use rarely exceeds 2000 gpd.

Special use permit cabins at East Mineral King obtain water by diverting water from local creeks and springs. There are 22 cabins in the East Mineral King area. Water systems for these cabins are privately owned and operated. No information is available regarding the water systems for these cabins, or how much water is used. If we assume an average daily use of 250 gpd per cabin, the total use for the area would be 5,500 gpd.

Estimated Water Use

Data are available for water use at the water systems operated by the park service. Water use for the private systems in the Silver City and Mineral King areas is estimated. Total water use in the area is tabulated in Table 1. All of the park service water systems operate only in the summer months, May-October. Private systems may operate for a longer season. A few individual homes may have a small amount of use throughout the year.

Table 1. Estimated water use in the Silver City and Mineral King areas.

System	Operator	Average daily use, gallons (summer)
Atwell Mill	NPS	500
Cabin Cove	Private	2,000 est.
Silver City	Private	15,000 est.
Kaweah Han	Private	1,000 est.
Silver City	NPS	450
Cold Spring (includes West Mineral King)	NPS	9,000
East Mineral King	Private	5,500 est.
Total = 33,450 gallons per day (0.05 cfs)		

Streamflow is generally measured and reported in cubic feet per second (cfs). One cfs is equivalent to 450 gallons per minute (gpm).

Impacts of water withdrawals

There may be adverse impacts to the natural flora and fauna of some of the small creeks immediately downstream of the diversion dams for the small water systems. If the diversion dam is fairly watertight and the demand for diversion is high, the entire flow of the creek might be diverted, leaving a dry streambed below the diversion dam. Most of the diversion dams were constructed many years ago, and it is likely that there is a leakage through these dams to provide at least a minimal amount of flow downstream. Data regarding the amount of streamflow bypassing the diversion dams, or the frequency and extent of dry streambeds below diversion dams, do not exist. However, even the largest water system (the private system at Silver City) probably uses no more than 15,000 gpd (0.025 cfs), which is really a trivial amount of water for a creek with any measurable flow. Further, the Silver City water system uses groundwater from wells to supplement its surface water source. The ratio of groundwater to surface water use for the system is unknown to us, as it is a private system.

The U.S. Geological Survey operated a stream gaging station a short distance downstream of the Cold Spring Campground from 1968-73. The data obtained during that period are representative of normal streamflow for the upper part of the East Fork of the Kaweah River in the Silver City and Mineral King areas. Low flow occurs in September-January. Generally, the low flow was 5 cfs or greater (Figure 3), nearly 100 times greater than the total withdrawals for all of the water systems in the area. Maximum water withdrawals occur in July and August, during the peak of the tourist season.

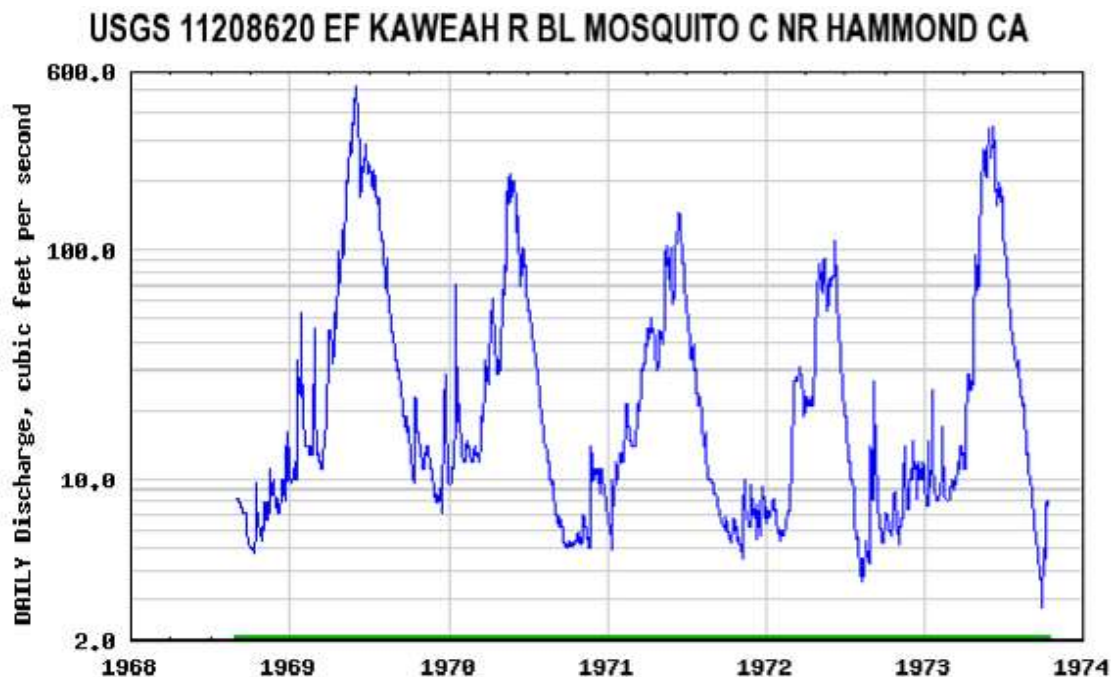


Figure 3. USGS streamflow record for a gaging station at West Mineral Fork.

The various water systems in the area divert water from different streams: Atwell Creek, Silver City Creek, Spring Creek, Monarch Creek, Crystal Creek, Cold Spring, etc. The impact on any creek is that of only the diversion(s) on that creek and is likely limited to the reach immediately downstream of the diversion dam. Cumulative impacts could only occur on the main stem of the East Fork of the Kaweah River. Since the total withdrawal rate for all of the water systems (0.05 cfs) is so small compared to the normal low flow of the East Fork (5 cfs), there is effectively no impact, cumulative or otherwise, on the resources associated with the river. Additionally, most of the high use period for water withdrawals (July-August) is offset from the normal low streamflow period (September-January).

Summary

The water systems in the Silver City and Mineral King areas divert such small amounts of water that there is generally little or no impact to the streams. The diversion dams allow some amount of water to pass, providing water for flow downstream of the dams. The largest water system, the Silver City Mutual Water Company obtains some part of its supply from groundwater wells, lessening the potential impact of streamflow diversion. Flow in the East Fork of the Kaweah River greatly exceeds the total water withdrawal of all of the water systems in the area.

Recommendations

1. Conduct an aggressive leak detection and repair program on all water systems operated by the National Park Service to minimize the amount of water diverted from the streams. Offer the leak detection services and expertise to private water system operators to further decrease withdrawals that might affect park service resources.
2. Construct a water system for the East Mineral King cabins and clean up the hodge-podge of pipes from active and abandoned systems strewn on the surface throughout the area. Consider construction of a shallow (LT 100') well in the valley to obtain groundwater from the alluvium rather than continuing to use untreated surface water. Solar power might be used to pump water from the well to a small storage tank for gravity distribution to the cabins.

If there are any questions regarding this trip report, please call me at (970)-225-3515.

cc:

SEKI – John Austin, Jack Vance, Dan Blackwell, Paul Schwarz, Charisse Sydoriak,
Chris Carpenter, Danny Boiano
2380 – Chuck Pettee, Mark Flora
8000 – Stephen Bosiljevac, Mietek Kolipinski