

## Section 6

### Discussion

The following discussion of the WY 2012 monitoring results is based on the integrated results of the assessments performed. Additional information regarding water quality areas of concern, SWMP performance and the prioritization of the existing TRWQMP elements is also included.

#### 6.1 Integration of the Assessment Data

The results of various assessment types conducted during WY 2012 were evaluated from a holistic perspective to determine whether they support, or conflict with, one another and if any additional conclusions or observations can be made. The discussions are organized by watershed including Squaw Creek, Martis Creek, and Town of Truckee.

##### 6.1.1 Squaw Creek

The monitoring assessment types conducted within Squaw Creek include rapid assessments and bioassessments. Rapid assessment surveys were conducted along the downstream one half mile of the creek above the confluence with the Truckee River, while the bioassessments were conducted further upstream where the creek meanders through a large meadow along a golf course and just downstream of Squaw Valley Ski Area and its base area village and parking lots. The results of the RAM surveys indicate that approximately 25 percent of the channel substrate is comprised of fine sediment and that the percentage of fine sediment substrate has increased since the previous surveys conducted in 2010.

Observations made in the field during the Squaw Creek bioassessments also indicate the predominance of DG sand and finer sediments in benthic habitat areas; however, the biological metrics for two of the three bioassessment reaches have improved since the previously conducted surveys in 2010.

##### 6.1.2 Martis Creek

The monitoring assessment types conducted within the Martis Creek watershed include rapid assessments, bioassessments, community water quality sampling, tributary water quality sampling, and stream discharge monitoring.

In Martis Creek, the rapid assessments were generally conducted along stream intervals that either included, or were near, the bioassessment sites and community and tributary level water quality sampling sites. The RAM results for the Martis Creek watershed indicate that West Martis Creek contains the highest percentage of fine substrate with a value of 38 percent.

The results of the community and tributary level water quality monitoring tend to support the rapid assessment results in the Martis Creek watershed. The streams with high percentages of fine substrate identified in the RAM were also observed to contain the highest TSS concentrations at their respective tributary sites and in the stormwater runoff discharging to that channel. Site DST-MC4, which is in West Martis Creek, has the second highest mean concentration of TSS behind only DST-MC1 which is in the main stem of Martis Creek near the Martis Creek Reservoir. Also, while stormwater treatment controls upstream of site DSC-MC3 are providing benefits, moderate TSS concentrations have been

observed at this site. This outfall, and others in the Northstar community that discharge into West Martis Creek, are likely contributing to the higher fine sediment percentages observed in the RAM and elevated TSS levels at site DST-MC4.

Bioassessment results indicate that the surveyed reaches that are located upstream of the developed areas ranked higher than the respective downstream reaches in terms of the biological metrics used to evaluate the streams.

### 6.1.3 Town of Truckee Corridor

The monitoring assessment types conducted in the Town of Truckee corridor include RAM and community level water quality monitoring. RAM monitoring took place on Donner Creek, Trout Creek, and prioritized locations of the Truckee River. The results of the Truckee River RAM did not indicate high percentages of fine substrate despite a very high percentage in Trout Creek and elevated TSS concentrations at the community level monitoring sites discharging into the Truckee River throughout the downtown corridor. Trout Creek had the highest fine sediment percentages of all stream segments where rapid assessments took place. The results of the Donner Creek RAM did not indicate high percentages of fine substrate despite the turbid flows that were sometimes observed, likely due to the higher energy flows in this segment of Donner Creek. The two photographs in Figures 6-1 and 6-2 below show plumes of sediment entering the Truckee River from Donner Creek and site DSC-TT4 at Bridge Street.

The integrated results indicate that most fine sediment is discharged to the Truckee River from areas of high vehicle traffic where traction sand is used and is then transported downstream where it settles in lower energy reaches downstream and along the channel fringes where flows are slow.



**Figure 6-1**  
**Sediment Plume in Truckee River from Donner Creek**



**Figure 6-2**  
**Sediment Plume in Truckee River at Bridge Street**

## 6.2 Water Quality Areas of Concern

After three years of monitoring, the following areas were identified as areas of the highest concern for water quality:

- **Brickelltown:** Community level water quality sampling indicated that stormwater runoff from this portion of historic downtown Truckee often contains very high concentrations of sediment and nutrients.
- **Donner Creek:** Community level water quality sampling indicated that stormwater runoff entering Donner Creek from West River Street contains high concentrations of suspended solids. Visual observations at the Donner Creek/Truckee River confluence also indicate that Donner Creek discharges large amounts of sediment into the Truckee River during large storm events.
- **West Martis Creek:** Monitoring results show that this site had the greatest pollutant loading of TSS, total phosphorus, and total nitrogen per acre of watershed. RAM monitoring also indicates a relatively high percentage of fine substrate in West Martis Creek.
- **Trout Creek:** Results of the RAM indicate Trout Creek has very high percentages of fine substrate covering the streambed. The newly restored portion in the upper reaches of the RAM survey segment shows improvement over conditions during the previous survey but also indicates a large amount of sediment is being transported from upstream.
- **Squaw Creek:** RAM and bioassessment results indicate a continued impact to this stream by sediment deposition. The area of highest concern identified from 2012 bioassessment monitoring was the upper meadow site in Squaw Creek (site Bio-SC1). This site had the lowest IBI score of all sites sampled in 2012 (IBI score= 46), as well as the smallest median particle size

(D50= 2 mm). The middle meadow (site Bio-SC2) and lower meadow (site Bio-SC3) sites in Squaw Creek also had very small median particle sizes (D50= 3 mm), although these sites scored well in terms of Biological Condition Scores (BCS= 25 and 27 out of a possible 35, respectively) and the Eastern Sierra IBI (93 and 90 out of a possible 100, respectively).

- **Truckee River (Town Corridor):** The results of the Truckee River RAM did not indicate high percentages of fine substrate despite a very high percentage in Trout Creek and elevated TSS concentrations at the community level monitoring sites discharging into the Truckee River throughout the downtown corridor. The integrated results indicate that most fine sediment is discharged to the Truckee River from urban and high impermeable areas with old infrastructure, commercial, and industrial uses where heavy traffic exists and traction sand applications are greatest. Fine sediment in the Truckee River is likely transported downstream where it settles in lower energy reaches downstream and along the channel fringes where flow rates decrease. Water quality within the Town Corridor is also heavily influenced by Union Pacific Railroad and Caltrans.

### 6.3 Evaluation of SWMP Performance

The effectiveness of the implementation of SWMP related activities can generally be evaluated through the comparisons presented above. Because this is only the third year of implementation and relatively little changes to the watershed have occurred, spatial comparisons are most appropriate at this time. The temporal water quality trends that were identified are likely related to differences in precipitation amounts and are not related to SWMP activities. Temporal analyses will become more valuable with the continued, long-term, implementation of this program. Also, in some cases, a specific project or action may cause an immediate improvement that is recognizable in the data from one year to the next.

The community level discrete sampling continues to provide some demonstration of the effectiveness of SWMP activities. The permanent stormwater treatment BMPs present in some of the drainage systems provide clear benefits as shown in the monitoring results. When compared to other sites, the water quality at the treated sites is clearly improved with respect to all the monitored pollutants in almost every runoff event.

### 6.4 Prioritization of Existing TRWQMP Elements

The TRWQMP is currently being implemented as planned. Overall, monitoring activities should be continued per the guidance in the TRWQMP and the adaptive management based modifications that have been made to the program over the initial three years of implementation. There is a continued need to develop more comprehensive and robust datasets that will help to identify specific areas of concern and evaluate SWMP performance.

For the WY 2013, monitoring will take on a new focus on continuous turbidity monitoring and sediment load evaluations. Two new automated stations will be operated in the Martis Creek Watershed at the West Martis Creek (DST-MC4) and main stem Martis Creek (DST-MC5) tributary sites. These new stations will be equipped with continuous turbidity probes and pressure transducers to monitoring discharge. Two new continuous turbidity probes will also be installed and operated in the Truckee River upstream and downstream of the Town boundary. The Town's turbidity probes will be installed at existing USGS gauging stations so that stream discharge data will also be available from those locations. The implementation of continuous turbidity probes in the Truckee River and Martis Creek will provide valuable insight on the current sediment loading patterns within these watershed

systems. This data, combined with data collected by other groups and through other TRWQMP elements, will be valuable in identifying watershed areas of concern and developing recommendations for water quality protection and improvement activities.