Snapshot Day, May 16, 2009

Lake Tahoe Basin and Truckee River Watershed

What is Snapshot Day?

Snapshot Day is a one-day, volunteer-based event designed to collect watershed information during one point in time. Volunteer "team leaders" are trained, and these leaders accompany teams of volunteers to various pre-determined sites to collect information relative to the health of our watersheds.
The goals of this effort are two-fold: 1) to promote environmental education and stewardship, and 2) to collect valuable water quality information. While there is a great deal of high quality agency and university-sponsored monitoring taking place in the region, there is still insufficient information to adequately assess the status of all of the aquatic resources in the Truckee River Hydrologic Unit which includes all the Lake Tahoe Basin and Truckee River watersheds. With proper training and quality assurance, community volunteers can help fill this void by providing valuable information for watershed management and pollution prevention.

Some of the objectives of Snapshot Day are:

- Build awareness of water quality issues, aquatic resources and pollution prevention
- Screen for water quality problems, including the identification of sources of pollution and detection of illegal activities (i.e., chemical spills, filling of wetlands, diversions, illicit discharges, destruction of stream environment zones (SEZs), non-compliance with ordinances or regulations in place to protect natural resources, etc.)
- Provide water quality data that may be compared to water quality standards set by TRPA for the Tahoe Basin, and the States of California and Nevada;
- Provide water quality data that may be used in status and trend analyses;
- Provide baseline water quality data for non-monitored waters to determine how they compare to the water quality standards
- Provide some pre and post data for evaluating the effectiveness of restoration activities

It is important to note that citizen monitoring is designed to supplement existing agency monitoring efforts; all information is provided to the regulatory and resource management agencies, whose responsibility it is to protect water quality.

The Truckee River Annual Snapshot Day was held on May 16, 2009 and includes entire Truckee River, from Lake Tahoe to the terminus at Pyramid Lake. This event has been sustained and operated by the dedication of both paid and unpaid staff, the funding of a few grants and donations, but mostly by the dedication and commitment of peoples who value the public involvement to protect the watershed they live in.

The 2009 Snapshot Day summary of volunteers and sites for the Truckee River Hydrologic Unit each region is shown in Table 1. Over the almost 10 years of the Truckee River Snapshot Day the number of sites has fluctuated, and recent lower volunteer numbers is mostly related to the team leaders training and experience over the years and the ability to visit multiple sites with minimal effort. The Lower Truckee River Group has been very effective at engaging the local high school students, while the Middle Truckee River has a solid base through the Truckee River Aquatic Monitors (TRAM). Lake Tahoe has the largest struggle to maintain interested citizens, partially due to lack of full time residents.

Table 1: Snapshot Day 2009

	Volunteers	Locations
North Shore Lake Tahoe	30	19
South Shore Lake Tahoe	57	32
Lake Tahoe*		3
Middle Truckee River	51	22
Lower Truckee River	45	15
Totals for 2009	**183**	**91**
*excludes duplicate samplers		

This collaborative effort was planned and coordinated by the Truckee River Watershed Council (TRWC), Incline Village General Improvement District (IVGID), the Regional Chapter of CalTrout, Nevada Division of Environmental Protection (NDEP), Pyramid Lake Paiute Tribe (PLPT), and the Tahoe Regional Planning Agency (TRPA). The complete list of organizations involved in putting on Snapshot Day 2009 includes:

- Citizens at Fallen Leaf Lake
- City of Reno
- Incline Village General Improvement District (IVGID)
- Lahontan Regional Water Quality Control Board
- Lake Tahoe Community College (LTCC)
- Nevada Division of Environmental Protection (NDEP)
- Nevada Division of State Lands (NDSL)
- Pyramid Lake Paiute Tribe (PLPT)
- Tahoe Regional Planning Agency (TRPA)
- Truckee River Watershed Council (TRWC)
- University of California Berkeley, Sagehen Creek Field Station
- University of California Cooperative Extension (UCCE)
- University of Nevada Cooperative Extension (UNCE)
- University of Nevada Reno (UNR) Electrical Engineering Department

The citizen-monitoring program of the California State and Regional Boards is the *Clean Water Team*, (website) and many of the existing groups have adopted this moniker (Incline Village Clean Water Team). The Nevada equivalent is under *Project Wet* (website) and these two agencies bring volunteers from Lake Tahoe, the many residents along the Truckee River and Reno, and the Washoe/Paiute Tribes to make the Ninth Annual Snapshot Day event a large region-wide success.

Methods of Data Collection

Citizen monitoring "team leaders" were provided training prior to Snapshot Day during April or May of each year. Team leader trainings covered protocols for visual observations, photo-documentation, water quality field measurements (temperature, pH, conductivity, dissolved oxygen), and water sampling (grab samples sent into the laboratory for subsequent analysis of nutrients, coliform, and turbidity). Each monitoring team leader was required to attend at least one session prior to the field day. Training for the team leaders is usually taught by the coordinator for that region, with assistance as needed from the cooperating resource and regulatory agencies.

Visual observations and photo-documentation were performed according to the procedures developed by the SWRCB Clean Water Team. The standardized observation form, the *California Stream and Shore Walk Visual Assessment Form*, was slightly revised to better apply to the region. At least three photos were taken at each sampling site (bed conditions, view across stream and view upstream from the starting point), however volunteers are encouraged to photograph as much as possible, especially of team members in the field. All stream-walks were initiated from a downstream position, traveling upstream.

A variety of instruments and kits are used on Snapshot Day by the volunteers. The majority of the monitoring teams were assigned these typical field instruments: armored Envirosafe thermometers (alcohol filled, 0.5° C resolution); standard pH indicator strips (0.5 pH unit resolution) or handheld Hannah pH meters (0.02 unit resolution); hand-held Oakton TDS Tester Conductivity meters (10 µS/cm resolution or Oakton Conductivity Low+ meters (1 µS/cm resolution); and Chemet dissolved oxygen kits (colorimetric, indigo carmine dye reaction, 1 mg/L resolution below 6 mg/L and 2 mg/L resolution above 6 mg/L). A few more experienced volunteer teams were trained to use Winkler titration kits (0.2 mg/L resolution). Most of these instruments/kits have been purchased over time by funding from many sources including University of Nevada Reno (UNR) Electrical Engineering Department, a Proposition 13 grant from the California SWRCB, a Truckee Tahoe Community Foundation grant, a Proposition 40 Grant re-granted from the Sierra Nevada Alliance to TRWC, the Truckee River Fund, and the Cities of Reno and Sparks and Washoe County through the Storm Water Permit Coordinating Committee. The remainder of the equipment was borrowed from US Environmental Protection Agency (US EPA), LTCC, IVGID, and others. Turbidity meters, to be used at the staging locations, were supplied by TRWC and TRPA. All of the instruments and kits were calibrated and tested/standardized at a quality control session held one day prior to the event (see supplemental Snapshot Day QA/QP Plan ?)

All observations, photos, field measurements and samples were taken between 9:00 a.m. and 12:00 noon on May 16, 2009 Samples were kept chilled with ice or blue ice in coolers from the point of collection until arrival at the lab for analysis. Any samples submitted past 1:00 pm are evaluated at that time to determine what the value is of samples submitted. Bacteria samples were collected in sterile Whirl-paks and nutrient and turbidity samples were collected in clean (acid rinsed) Nalgene® plastic bottles.

Bacteria samples were transported from drop off points at Lake Tahoe and Truckee to either the Lahontan Water Quality lab in South Lake Tahoe or the U.S. Geologic Survey in Carnelian Bay. Bacteria samples collected from the Lower Truckee River were transported to the Nevada State Health Laboratory. The need for multiple labs for such a large area is to ensure sample analysis within the allotted 4 hour holding time. Quality assurance is comparable as each lab uses the same standard methods lab SM9222. re?

Nutrient samples collected from Lake Tahoe and the Middle Truckee River were delivered to High Sierra Water Lab in Truckee within the allotted hold time, which can be several days as long as they are kept chilled to 4° Celsius. LTR nutrient samples were taken to the Nevada State Health Lab for analysis. Nutrient samples were kept refrigerated until analyzed for the various constituents. One important distinction in regards to nutrients reporting units is the upper watersheds (SLT, NLT, and MTR) are in micrograms/liter or parts per billion and the lower Truckee is in milligrams/liter or parts per million. This limits the ability to compare levels upstream to downstream, and should be considered when looking at the full data set.

Turbidity samples were run from the grab samples taken on Snapshot Day, along with replicate testing of field measurements such as pH and conductivity.

Site Locations

Volunteers gathered data at 78 locations, including multiple reaches within some streams, in the Lake Tahoe and Truckee River watersheds (see maps in appendix) as follows:

Lake Tahoe (On Lake):

- North Shore Lake Tahoe, National Ave. Boat Ramp
- South Shore at Ski Run Marina
- South Shore of Reagan Beach

Lake Tahoe Tributaries, South Shore:

- Angora Creek near SEZ project (3 sites)
- Angora Creek at Lake Tahoe Golf Course
- Angora Creek at Washoe Meadows
- Bijou Park Drainage, at Werner Salas
- Bijou Park Drainage below Hansen's Resort
- Bijou Park Drainage at Verdon Rd.
- Burke Creek at mouth
- Burke Creek south of Hwy 50
- Cascade Creek
- Cold Creek above Trout Creek
- Eagle Creek south of bridge on Eagle Falls loop
- Echo Creek at Upper Truckee
- Fallen Leaf Lake
- Glen Alpine Creek at mouth
- Heavenly Creek above confluence with Trout Creek
- Heavenly Creek below Pioneer Trail
- Meeks Creek at mouth
- Meeks Creek above meadow
- Saxon Creek at confluence with Trout Creek
- South Zephyr Creek at Mouth
- Tahoe Keys, Marina and Lagoon, East Channel
- Tahoe Keys Lagoon, West Channel
- Tallac Creek at mouth
- Tallac Creek abv Hwy 89
- Taylor Creek at mouth
- Trout Creek near confluence with Upper Truckee
- Trout Creek at Bellevue
- Upper Truckee River at mouth
- Upper Truckee River near airport meadow
- Upper Truckee River at Hwy 50 near Carrows

Lake Tahoe Tributaries, North Shore:

- Bonpland Creek at mouth
- Burton Creek at Star Harbor
- First Creek at mouth
- Griff Creek at mouth
- Homewood Creek at mouth
- Hatchery Creek near Star Harbor

- Lake Forest Creek at mouth
- Madden Creek at mouth

McKinney Creek at mouth

- Quail Lake Creek at mouth
- Secret Harbor Creek
- Snow Creek downstream of Highway 28
- Rosewood Creek abv Third Creek
- Tahoe City Urban Ditch
- Tunnel Creek at mouth
- Wood Creek at mouth
- Wood Creek at Tanager

Truckee River Watershed – Middle Truckee River:

- Alder Creek
- Bear Creek
- Little Truckee River below Boca Dam
- Little Truckee River at Boyington Mill
- Cold Creek
- Davies Creek
- Donner Creek at Hwy 89
- Donner at Donner Lake outlet
- East Martis Creek at bridge
- Union Valley Creek at Glenshire
- Martis Creek at mouth
- Martis Creek at ACOE upstream border
- Pole Creek
- Prosser Creek below dam
- Prosser Creek at Highway 89
- Sagehen Creek at Highway 89
- Squaw Creek
- Truckee River at three different locations:
  - Near Tahoe City
  - Near Goose Meadows
  - Regional Park
- Trout Creek at mouth
- Trout Creek at Bennett Flat
- Upper Little Truckee River at Highway 89

Truckee River Watershed – Lower Truckee River:

- Alum Creek
- Chalk Creek
- Chalk Creek West
- Chalk Creek East
- Dry Creek
- Evans Creek
- Galena Creek
- Pyramid Lake
- Thomas Creek
- Steamboat Creek
- Truckee River above Nixon Bridge

- Truckee River at Idlewild Park
- Truckee River at Rock Park
- Truckee River near Wadsworth Bridge

Results and Discussion

It is important to remember that the measurements made on Snapshot Day were designed to represent a single point in time and do not necessarily represent average conditions. Since these measurements are designed to supplement existing monitoring, but could be used to gage the results against standards.

Water quality standards are the foundation of the water quality-based control program mandated by the Clean Water Act. Water Quality Standards define the goals for a water body by designating its uses, setting criteria to protect those uses, and establishing provisions to protect water quality from pollutants. A water quality standard consists of four basic elements:

1. Designated uses of the water body (e.g., recreation, water supply, aquatic life, agriculture)
2. Water quality criteria to protect designated uses (numeric pollutant concentration and narrative requirements)
3. An anti-degradation policy to maintain and protect existing uses and high quality waters, and
4. General policies addressing implementation issues (e.g., low flows, variances, mixing zones).

The US EPA has recommended criteria for nutrients and turbidity, and Nevada, California, and the TRPA have specific water quality standards and indicators generally more stringent in the Lake Tahoe Basin than elsewhere in the watershed. Table 2 lists some of these standards.

Table 2: Examples of Lake Tahoe Water Quality Standards

Parameter	Standard
Temperature	Shall not exceed 15° C, surface waters of Fallen Leaf Lake (CA)
pH	7.0 - 8.4 in Lake Tahoe (CA and NV)
TDS	Shall not exceed 60 mg/L average in Lake Tahoe (CA and NV)
Dissolved Oxygen	Mean no less than 6.5 and minimum of 4.0 mg/L for Lahontan waters designated as "cold freshwater habitat" (CA)
Turbidity	Shallow water shall not exceed 3 NTU near tributaries and 1 NTU not directly influenced by streams (TRPA)
Secchi Depth	December-March average of not less than 33.4 meters for Lake Tahoe (TRPA), and a mean of 18.5 meters for Fallen Leaf Lake (Lahontan Region, CA)
Algae	Lahontan RWQCB waters shall not contain biostimulatory substances (nutrients) that cause algae to become a nuisance or to affect the water's beneficial uses (CA)
Total Nitrogen	Mean of no more than 190 ppb (CA)
Inorganic Nitrogen	Mean of no more than 25 ppb for most tributaries to Lake Tahoe, Nevada side of Lake Tahoe (TRPA)
Total Phosphorous	Annual average of no more than 50 ppb for most tributaries, Nevada side of Lake Tahoe (NV) and no more than 30 ppb for most tributaries, California side of Lake Tahoe (CA)
Soluble Reactive Phosphorous	Mean of no more than 7 ppb for Lake Tahoe, Nevada side (TRPA)
Fecal Coliform	Log mean of 20 CFU (30 day period) and maximum of 40 CFU, (Lahontan Region, CA)

Lahontan Water Quality Control Board has Objectives for the whole Truckee shown in Table 3. Note the units for these tables are in parts per billion rather than the more common parts per million or mg/L for most water quality measurements. This reflects the much lower concentrations in the upper watershed, and in fact there can be no direct graphing of the Lake and Middle Truckee to the Lower Truckee because of this major difference.

Table 3. Examples of California State Water Quality Objectives for the Truckee River Hydrologic Unit

Surface Water	Site ID	Total P (ppb)	NO3-N (ppb)	Total N (ppb)	TKN (ppb)
Trout Creek at Mouth	MTR-TROU-00	40	50	150	100
Squaw Creek at Mouth	MTR-SQCR	20	50	180	130
Bear Creek at Mouth	MTR-BEAR	20	50	150	100
Truckee River at Lake Tahoe outlet	MTR-TR01	10	20	120	100

The selected standards shown in Table 4 are for the Lower Truckee River watershed.

Table 4. Examples of Nevada State Water Quality Standards for the Truckee River

Parameter	Truckee River at Idlewild (LTR-IDL)	Truckee River at Wadsworth (LTR-WADS)
Temp	≤13°	≤14°
Dissolved Oxygen	≥5 mg/l	≥6 mg/l
pH	6.5-9.0	6.5-9.0
Chlorides	≤250 mg/l	≤250 mg/l
Total Phosphates	Annual average ≤ 0.10 mg/l	Annual average ≤ 0.05 mg/l
Ortho-phosphate	≤0.05 mg/l	NA
Nitrate	≤2.0 mg/l	≤2.0 mg/l
Nitrite	≤0.04 mg/l	≤0.04 mg/l
Total Nitrogen	NA	≤1.2 mg/l
Turbidity	≤10 NTU	≤10 NTU
Fecal coliform	≤200/400[a] No./100ml	≤200/400[a] No./100ml
E. coli	≤410 No./100ml	≤410 No./100ml

[a] Based on the minimum of not less than 5 samples taken over a 30-day period, the fecal coliform bacterial level may not exceed a geometric mean of 200 per 100 ml nor may more than 10 percent of the total samples taken during any 30-day period exceed 400 per 100 ml.

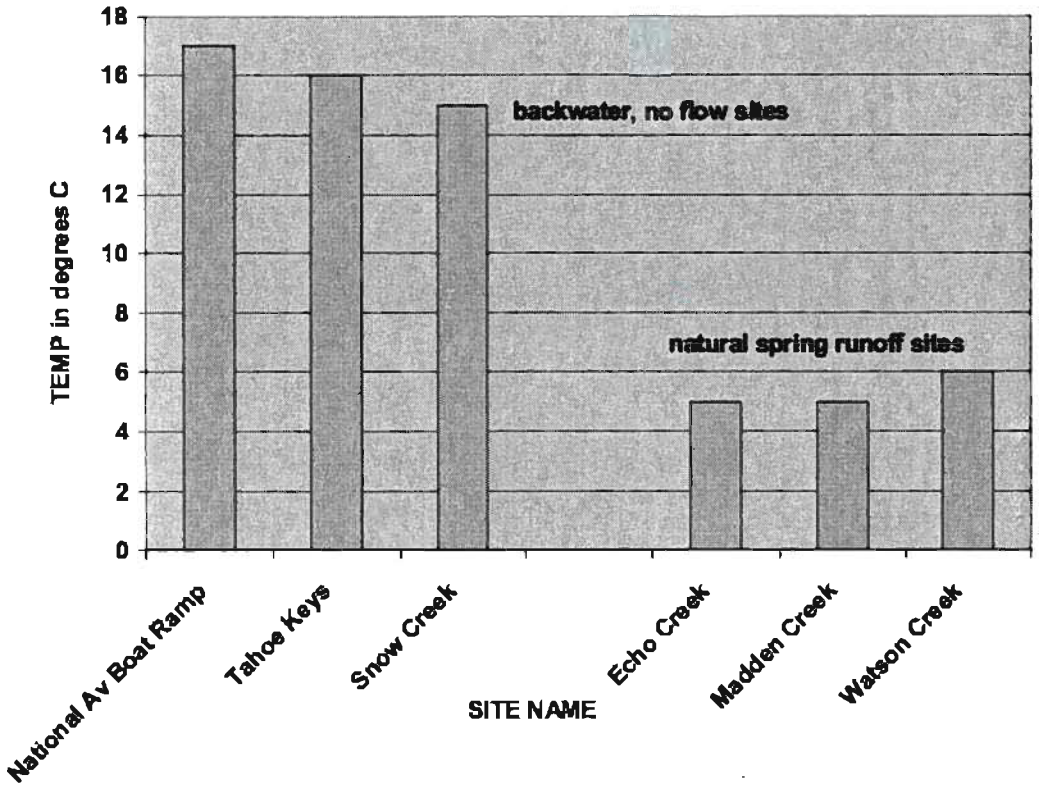
All standards listed in Table 4 are for a single value unless stated otherwise. These are the standards established to maintain beneficial uses.
For full and more detailed information on water quality objectives in California refer to the Lahontan Regional Water Quality Control Board *Basin Plan* at the following website: http://www.waterboards.ca.gov/lahontan/BPlan/BPlan_Index.htm. For water quality standards in Nevada see the following website: http://ndep.nv.gov/bwqp/standards.htm. For a .pdf version, visit: http://www.ndep.nv.gov/nac/445a-118.pdf. For the Tahoe Regional Planning Agency (TRPA) water quality standards, see the following website: http://www.trpa.org/Documents.htm and select "Environmental Threshold Carrying Capacities."

The following section gives a summary of this year's data, Appendix A gives all the results.

Water temperature for Lake Tahoe and the Truckee River watershed ranged from 4.9° Celsius (C) at Pole Creek to 17°C at the somewhat enclosed marina at National Av. There were only 4 measurements in the Lower Truckee River watershed and all were over 20 °C, much higher than the upper watershed.

Generally, cooler water temperatures are considered better habitat for aquatic life in mountain streams and lakes since colder water contains more dissolved oxygen, an essential ingredient for fish and invertebrates. Higher temperatures promote nutrient solubility and can occur as a result of low flow (shallow) conditions, and/or a lack of canopy (tree) cover along stream banks, which acts to shade and thus prevent solar heating of the water.

Figure 1. Water temperature for selected sites, May 16, 2009.



In many Sierra streams, propagation of cold-water fish (i.e. trout or salmon) is a designated beneficial use of the water. In such streams, numerical and narrative water quality standards generally are set at levels that will "support the beneficial use" of a cold water fishery. Such streams generally require cooler temperatures (ranges adequate for Rainbow trout survival shown below) and higher dissolved oxygen content than water in streams and lakes that do not have cold-water fishery as a designated beneficial use. Cold-water fish also require habitat characteristics that promote spawning (clear gravel beds, riffles), rearing habitat (glides and pools) and adequate food sources such as macroinvertebrates (mayfly, nymphs, stonefly nymphs, and caddisfly larvae). Such characteristics can be monitored, but they do not usually have numeric standards.

(Note that dissolved oxygen, temperature, total suspended solids (TSS) and turbidity are parameters directly related to habitat for which most waters generally have standards. Because macroinvertebrates are believed to be a primary indicator of stream health as related to fisheries, both LRWQCB and NDEP have developed or are in the process of developing an Index of Biologic Integrity (IBI). These are basically standards for benthic macroinvertebrates.)

Table 5: Beneficial Uses of the State's Waters

Species	Growth	Maxima	Spawning*	Embryo Survival**
Rainbow Trout	19°C (66 °F)	24°C (75 °F)	9°C (48 °F)	13°C (55 °F)

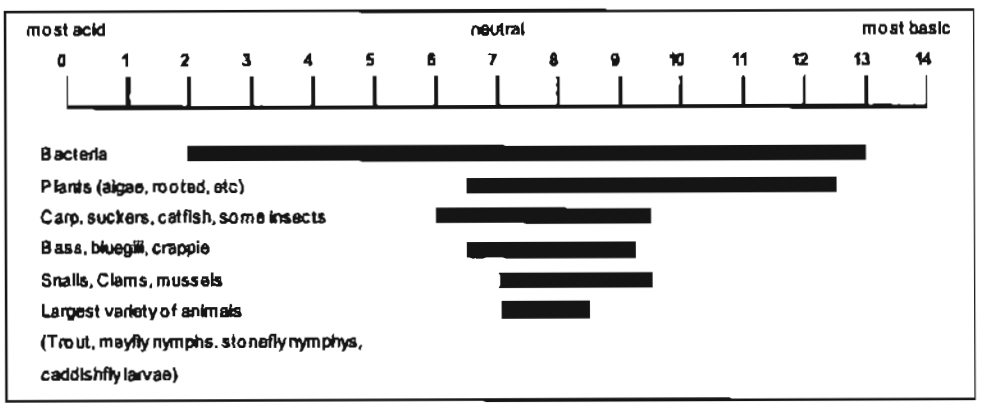
* The optimum or mean of the range of spawning temperatures reported for the species.
** The upper temperature for successful incubation and hatching reported for the species.
Adapted from EPA's Draft Volunteer Stream Monitoring: A Methods Manual.

All measured **pH values** fell between 4.5 and 9.2, which is typical of fresh water streams or lakes in the Sierra Nevada Mountains. In fresh water, pH in the range of 6.5 to 8.5 should protect most organisms. The high value of 9.2 was from Pyramid Lake, exactly the same as last year. The highest reported value from a stream was 8.7 (First Creek at North Lake Tahoe).

Many sites had pH values lower than 6.5, with several sites showing valid responses of 5.5-4.5. It has not been unusual to see low values in Tahoe during spring runoff.

The range of pH tolerated by organisms is shown in Table 6 below. This table comes from the *SWRCB Clean Water Team pH Fact Sheet.* An analysis of aquatic life (bio-assessment) might provide better information for determining if the pH is acceptable within these streams.

Table 6: pH Ranges that Support Aquatic Life



pH ranges that support aquatic life.

Dissolved oxygen measurements ranged between 4.8 and 13.6 mg/L, all within reasonable levels for streams. Cold, clean water usually has levels of dissolved oxygen averaging above 6.0 mg/L, and single-measurement levels below 5 mg/L are considered dangerous for cold water aquatic life. While water quality objectives for dissolved oxygen will vary from region to region, waters that support coldwater fishes usually require that the average dissolved oxygen concentration shall not fall below 6 to 8 mg/L.

Conductivity measurements ranged from 0.9 to 7,775 µS/cm (micro Siemens per centimeter, the units used for conductivity measurements in fresh water), the highest at Pyramid Lake, a natural alkaline system. Conductivity is used as an indicator of dissolved solids (e.g., minerals or salts), with higher levels associated with degraded water quality. Conductivity will vary with water source inputs from natural sources such as groundwater seepage, springs and/or geothermal activity can affect the readings. Anthropogenic sources that may affect conductivity include drainage from agricultural fields, wastewater discharge, or inputs stemming from deicing materials on the roadways.

Conductance tends to be lower as water volume increases due to dilution, and generally increases with higher turbidity (Figure 2). Although Snapshot Day occurred close to peak spring run off, the total volume of water was fairly low this year compared to previous years (see streamflow section below). Therefore, conductivity levels were expected to be higher than in years when Snapshot Day occurred on the tip of spring runoff during heavy snow years (2003, 4 and 5).

Bijou Park Drainage, as a very urban area, has typically been very high in conductivity and 2009 was no exception. All 3 of the samples sites were close or above 500 µS/cm, as compared to the undeveloped sites such as Eagle and Madden Creeks. The highest on Middle Truckee River was Union Valley Creek, similar to other years.

Lower Truckee River sites had higher overall conductivity than sites higher in the watershed, which is what is usually found on Snapshot Day. Because Pyramid Lake is a desert terminal lake it usually has much higher conductivity than other sites measured on Snapshot Day. The other site in the Lower Truckee River that had high conductivity were the Chalk Creek sites at 1990 µS/cm.

Figure 2: Specific Conductivity and Turbidity at Selected Sites

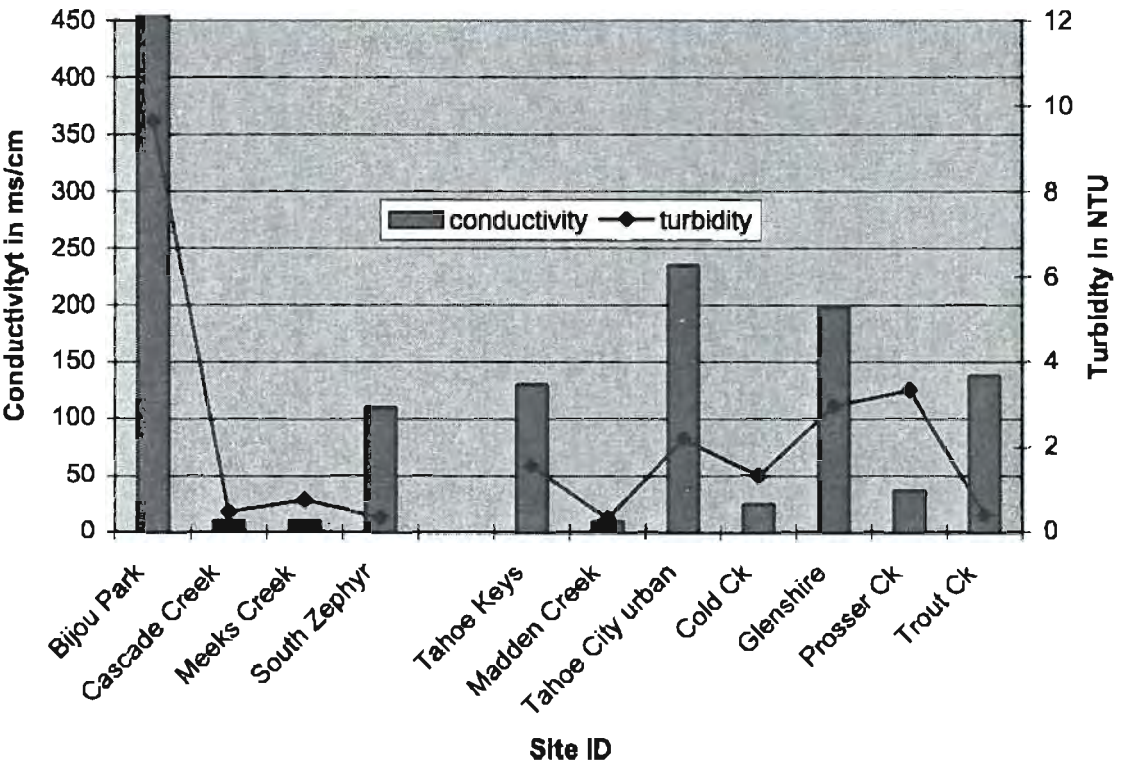


Figure 2: Specific Conductivity and Turbidity at Selected Sites

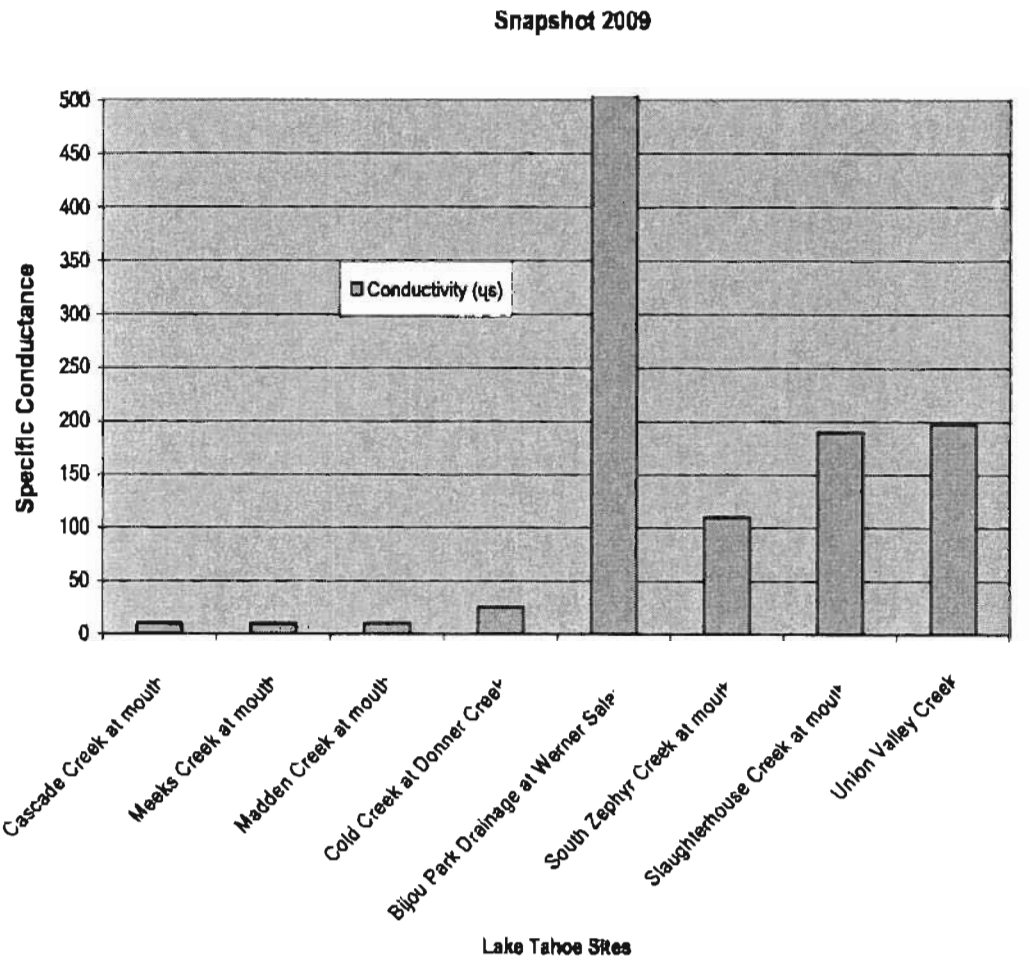


Table 4: Acceptable Ranges for Water Conductivity

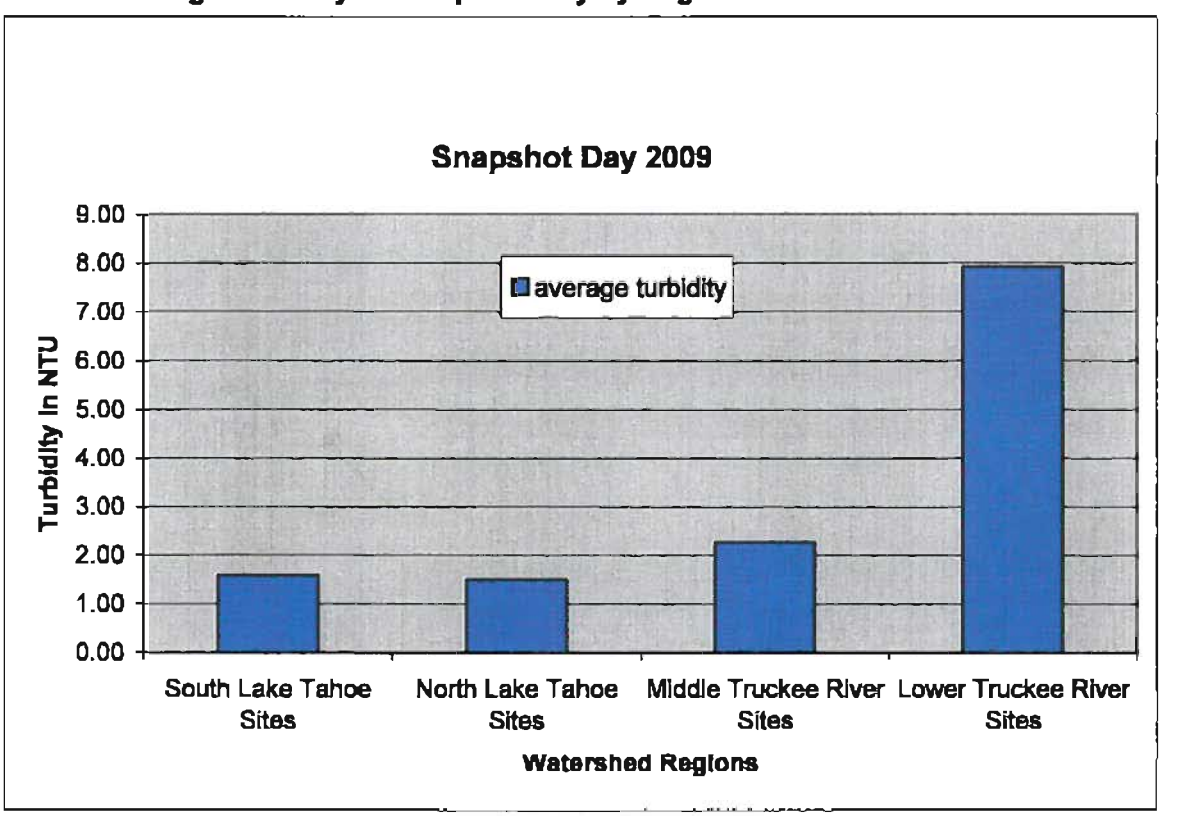
Water Type	Conductivity µS/cm (micro Siemens per centimeter)
Distilled Water	0.5 - 3.0
Melted snow	2 - 42
Potable water in U.S.	30 - 1500
Irrigation Supply Water	< 750

Turbidity is a measure of the amount of suspended particles in the water. Algae, suspended sediment, organic matter, and some pollutants can cloud the water making it more turbid. Suspended particles diffuse sunlight and absorb heat, which can increase temperature and reduce light available for algal photosynthesis. If the turbidity is caused by suspended sediment, it can be an indicator of erosion, either natural or man-made. High sediment loads can clog the gills of fish, foul gravel beds and smother fish eggs and benthic insects. The sediment can also carry pathogens, pollutants and nutrients.

The US EPA's recommended criteria for turbidity in streams in Eco-Region II (forested mountains in the western U.S.), is at or below **1.3 NTU** (Nephelometric Turbidity Units) or less (*US EPA Ambient Water Quality Criteria Recommendations).* Higher NTU levels indicate poorer water clarity. TRPA has a near shore turbidity standard of 1-3 NTUs, which is rarely exceeded in the lake. The Lahontan Regional Water Quality Control Board (LRWQCB) has established a standard of 3 NTUs for the Middle Truckee River, as measured by mean of monthly means. The standard for the Truckee River in the State of Nevada is generally 10 NTU (single value measurement).

Valid turbidity data from the grab samples was determined for 81 sites. Values for Lake Tahoe area ranged from a low of 0.01 and 0.40 on the relatively undisturbed Tunnel and Eagle Creeks respectively, to a high of 36 on Steamboat Creek in the Lower Truckee. Middle Truckee River sites were all very high with only 2 of the 22 sites below 1.0 NTU. Five of the Middle Truckee River sites had values greater than 3 NTU (Squaw Creek, Prosser Creek at Hwy 89, Prosser Creek below the dam, Martis Creek at Martis Lake, and Alder Creek. All of the Lower Truckee River sites were below the Nevada State standard (10 NTU) for the Truckee River with the exception of the high measurement of Steamboat Creek.

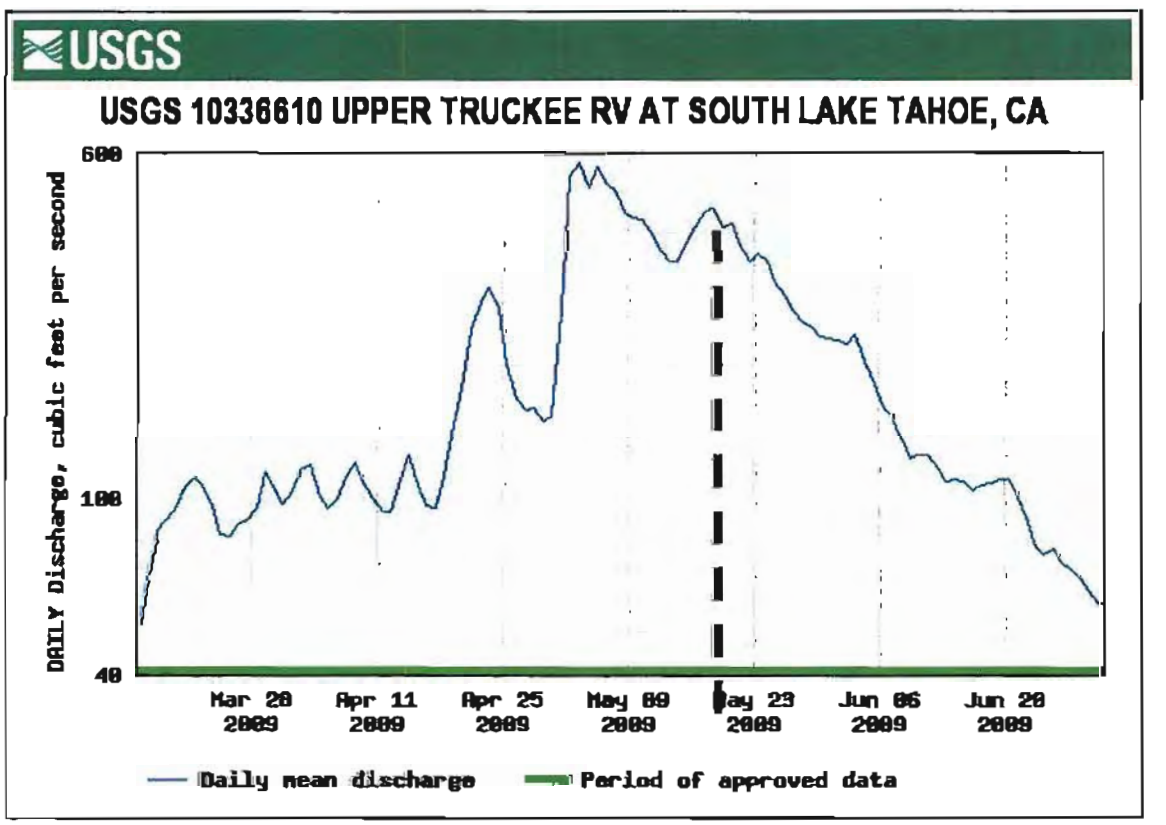
Table 5: Average Turbidity for Snapshot Day by Region



Streamflow is the measurement of how much water is following, which varies with precipitation. One of the major goals of Snapshot Day, besides the public involvement and education, is to gain information on the vast numbers of streams and creeks that are not routinely measured for water quality or streamflow (volume of water). The Tahoe Basin has about 13 streams that are regularly measured out of 64. The Middle and Lower Truckee have even less under regular monitoring. Stream flow data for those sites that are measured was obtained for May 16, 2009 was obtained from USGS gaging stations and is entered into the summary table in Appendix A. Hydrographs of the flow for selected streams are shown below. As can be seen, the 2009 flow data, the peak of runoff was earlier in May than the day of sampling. The North Lake Tahoe sampling was the closest to the peak followed by South Lake Tahoe. Middle and Lower Truckee River were about 2 weeks past the peak of runoff. This could be reflected by higher conductivity and temperature (less dilution) in the water quality data.

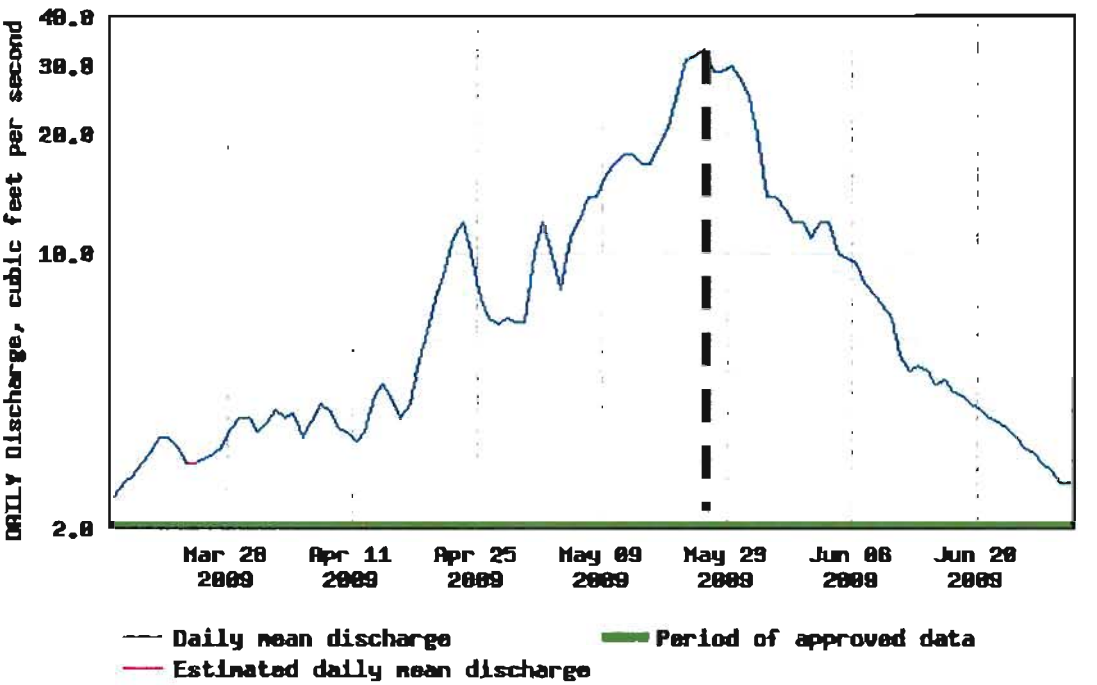
Average snow pack as of the *June 2009 NRCS Water Supply Outlook Report* for the Lake Tahoe Basin was 38.3 percent, with the Truckee River at 65.6 percent. Reported **precipitation** for June 2009 was 90 percent of average in the Lake Tahoe Basin and 89 percent of average for the Truckee River. Reported **stream flow** forecasts were expected to be well below average for the Lake Tahoe and Truckee River watershed as of May 1, 2009.

Figure 4: Stream Flow of Selected Streams on Snapshot Day



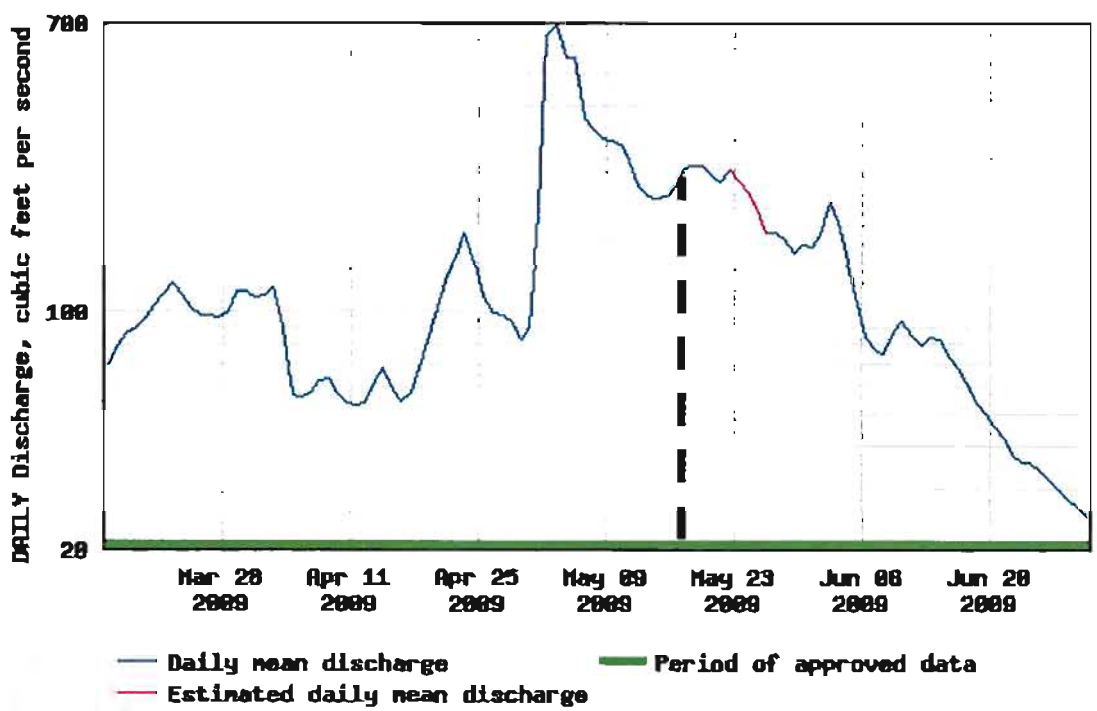
USGS

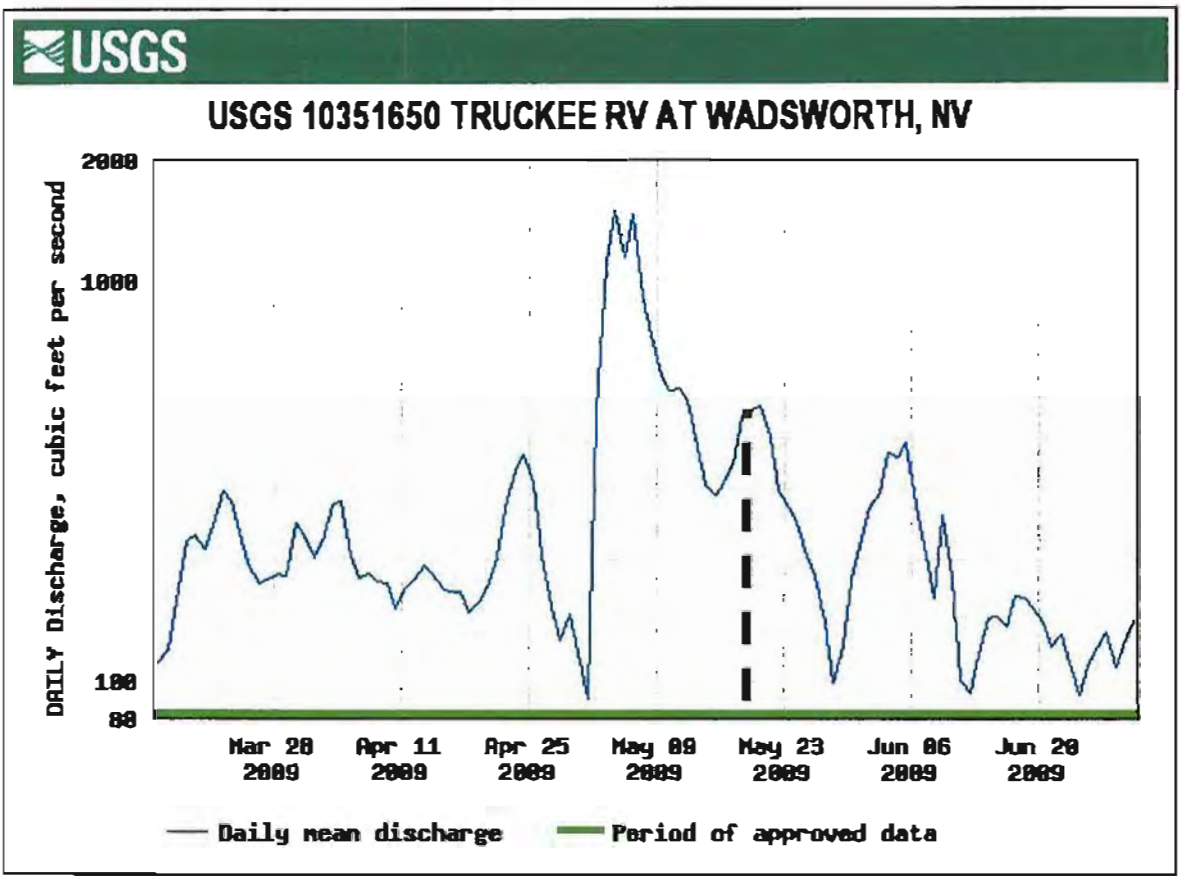
USGS 10336698 THIRD CK NR CRYSTAL BAY, NV



USGS

USGS 10338700 DONNER C AT HWY 89 NR TRUCKEE CA





Visual observations at most of the study locations were indicative of generally good water quality conditions. Algae were reported at 30 of the 91 sites, not too bad considering the low flow year. Litter was only reported at 10 sites overall with 7 of the 10 sites in the Lower Truckee locations Water with a rotten egg smell was reported from Bijou Park at Verdon Rd. South Zephyr Creek at the large Zephyr Cove Marina has observations of algae, oily sheen, form/suds and litter.

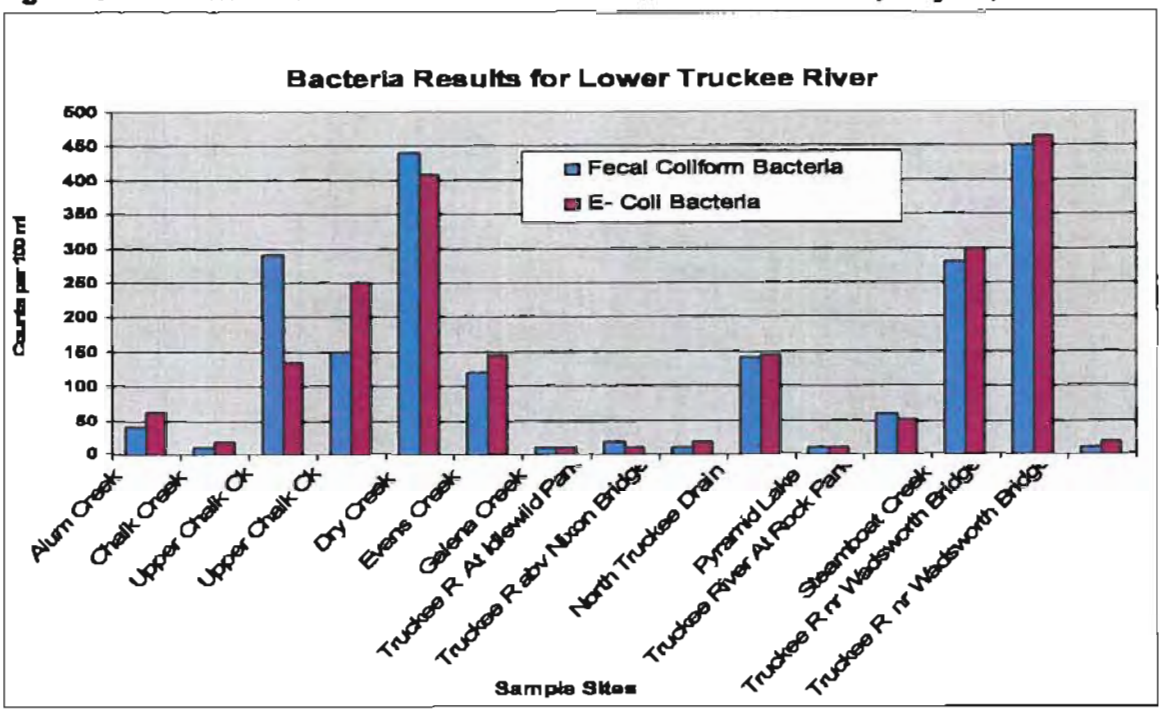
Coliform bacteria are a group of bacteria that are mostly found in the feces of warm-blooded animals, including humans, pets, livestock, beavers, and birds. Coliform is measured in colony forming units counted per 100 mL of water (CFU/100mL). CFU are roughly equivalent to the number of bacteria cells. The Lahontan Regional Board standard for coliform is 20 counts per 100 ml for a single occurrence. There are also standards for longer sampling periods.

There were few hits of bacteria in the upper watersheds, with only 2 counts above the CA standard at South Zephyr and Burke Creek. South Zephyr has a riding stable within close proximity to the stream that has had numerous violations in the past. Burke Creek is a popular dog walking area, and has benefited from a recent Eagle Scout Project that installed a dog waste station near the parking lot. This was not installed until after Snapshot Day so it will be interesting to see if subsequent years show decrease in values.

Lower Truckee River bacteria samples all measured some bacteria. The lowest levels (at 4 sites) were 10 CFU/100 mL, with the highest at 450 at Truckee River near Wadsworth Bridge. This area is surrounded by agricultural and grazing land uses. The Nevada State standard for E. Coli for is 410 CFU/100 mL (single value measurement) for most of the Truckee River. There were 2 sites on the Truckee River that exceeded this standard for E.

Coli, at Upper Chalk Creek at the head of the samplings sites and again at Wadsworth Bridge at the lowest sampling site. See Appendix A for more data and Table 7 for a further explanation of Nevada State coliform standards.

Figure 5: Bacteria measurements for Lower Truckee River sites, May 16, 2009



Nutrients

Sixty-five samples were analyzed for nitrogen and phosphorus that are of most concern for algae growth, which is the reason why Snapshot Day volunteers monitor for these specific nutrients. Along with excess algae growth, nutrient concentrations that are too high can lead to odors, discolored waters, loss of clarity, and nighttime oxygen depletion, which can cause fish kills in extreme cases. In looking at the data be aware of the difference in reporting units as they are not the same for the upper vs lower watersheds. The higher quality waters of Lake Tahoe and the Middle Truckee report concentrations in parts per billion (ppb) while the Lower Truckee is in the more common parts per million (ppm), please note when looking at the data. The discussion is separated accordingly.

Nitrogen is required by all organisms for the basic processes of life to make proteins, to grow, and to reproduce. Nitrogen is very common and found in many forms in the environment. Inorganic forms include nitrate, nitrite, ammonia, and nitrogen gas. Organic nitrogen is found in the cells of all living things and is a component of proteins, peptides, and amino acids. Nitrogen is a nutrient that stimulates the growth of algae in streams and lakes. Algae include benthic forms, attached to the rocks and sediment of the streambeds (as observed by the monitors), as well as phytoplankton.

The TRPA standard for inorganic nitrogen is 25 ppb, and only 4 sites in the Lake Tahoe and middle Truckee exceed this limit, and by orders of magnitude. The CA standards for Total Nitrogen ranges from 150-190 ppb, and though quite a few sites exceed this limit, note this is an annual average

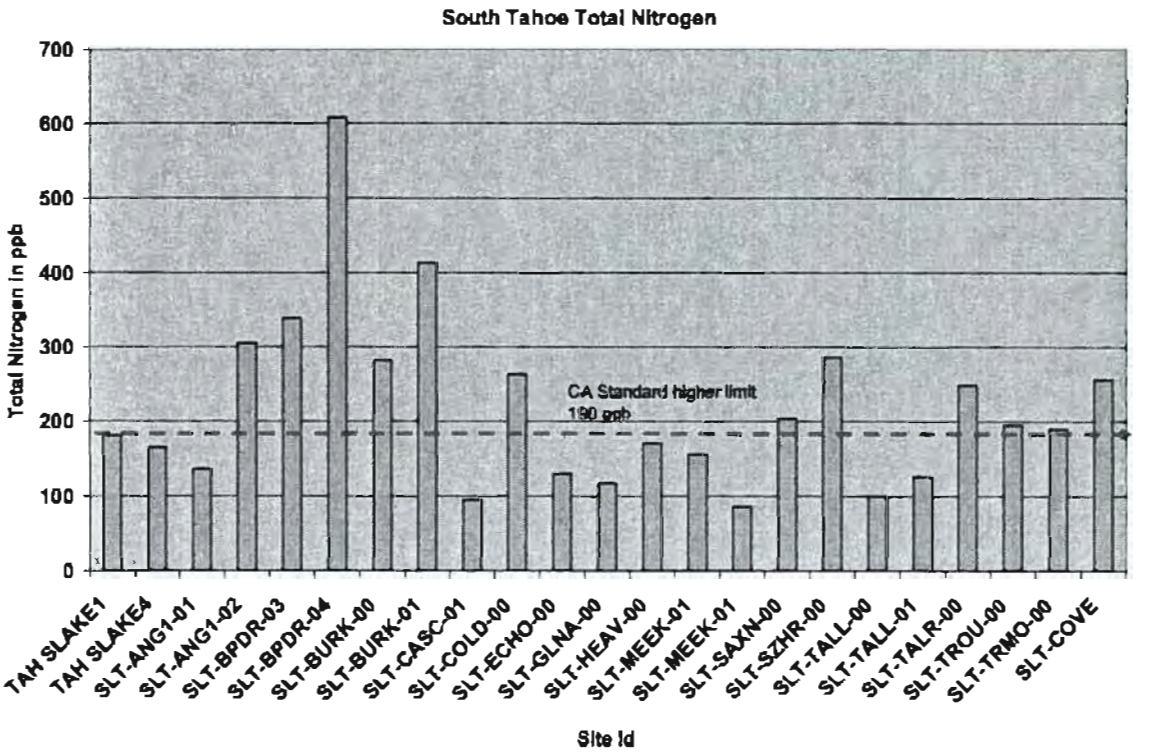
Nutrients

Sixty-five samples were analyzed for nitrogen and phosphorus that are of most concern for algae growth, which is the reason why Snapshot Day volunteers monitor for these specific nutrients. Along with excess algae growth, nutrient concentrations that are too high can lead to odors, discolored waters, loss of clarity, and nighttime oxygen depletion, which can cause fish kills in extreme cases. In looking at the data be aware of the difference in reporting units as they are not the same for the upper vs lower watersheds. The higher quality waters of Lake Tahoe and the Middle Truckee report concentrations in parts per billion (ppb) while the Lower Truckee is in the more common parts per million (ppm), please note when looking at the data. The discussion is separated accordingly.

Nitrogen is required by all organisms for the basic processes of life to make proteins, to grow, and to reproduce. Nitrogen is very common and found in many forms in the environment. Inorganic forms include nitrate, nitrite, ammonia, and nitrogen gas. Organic nitrogen is found in the cells of all living things and is a component of proteins, peptides, and amino acids. Nitrogen is a nutrient that stimulates the growth of algae in streams and lakes. Algae include benthic forms, attached to the rocks and sediment of the streambeds (as observed by the monitors), as well as phytoplankton.

The TRPA standard for inorganic nitrogen is 25 ppb, and only 4 sites in the Lake Tahoe and middle Truckee exceed this limit, and by orders of magnitude. The CA standards for Total Nitrogen ranges from 150-190 ppb, and though quite a few sites exceed this limit, note this is an annual average

Figure 6: Total Nitrogen



Conclusion

AS seen the overall water quality for 2009 was quite good, with very few major issues. Turbidity was somewhat elevated, typical for spring runoff, and the same 'hot spot' sites in each region continue to bear closer scrutiny.

The most amazing result in the now 9 years of Snapshot Day is not only how possible it is to successfully engage the public in active watershed stewardship, but to also provide valuable data to the responsible agencies. This event not been funded except though efforts by Various grants and donations, but large support has come the Nevada State Lands Commission through the selling of license plates for conservation. The staff is also mostly volunteer and yet the collaboration and continued dedication of citizen volunteers makes the event happen. Many residents have committed to the sampling near their homes to insure high quality data is collected for the protection of the waters in our region. The successes of this type of event show how average homeowners and residents can provide invaluable data collection and have fun at the same time!

For more information about how to get involved with water quality monitoring activities contact the following agencies:

- *South Lake Tahoe* – Contact Jenny Hatch, Executive Director of CalTrout, at (530) 542-2571.
- *Fallen Leaf Lake* – Grant Adams, Fallen Leaf Lake Research, (530) 541-8535
- *North Lake Tahoe - Incline Village* – Contact Incline Village GID Waste Not/Incline Village Clean Water Team, (775) 832-1284.
- *Middle Truckee River (Tahoe City to Nevada State Line)* – Contact Beth Christman, Truckee River Watershed Council, (530) 550-8760
- *Lower Truckee River (Nevada Stateline to Pyramid Lake)* – Contact Mary Kay Wagner, Nevada Division of Environmental Protection, (775) 687-9454

- *Middle Truckee River (Tahoe City to Nevada State Line)* – Contact Beth Christman, Truckee River Watershed Council, (530) 550-8760

- *Lower Truckee River (Nevada Stateline to Pyramid Lake)* – Contact Mary Kay Wagner, Nevada Division of Environmental Protection, (775) 687-9454

Bibliography

Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion II, U.S. Environmental Protection Agency, December 2000

California State Water Resources Control Board website: http://www.swrcb.ca.gov/

EPA's Draft Volunteer Stream Monitoring: A Methods Manual, U.S. Environmental Protection Agency

Nevada Administrative Code (NAC), Chapter 445A, Nevada Division of Environmental Protection, 1995 Revision

Particle Size Analysis for Snapshot Day – Lake Tahoe Basin, Department of Civil and Environmental Engineering, Environmental Dynamics Laboratory, University of California, Davis, Rabidoux and Schladow, September 18, 2003 and 2005.

The California Streamside Biosurvey: An Introduction to Using Aquatic Invertebrates as Water Quality Indicators, California State Water Resources Control Board, September 2001

Water Quality Control Plan for the Lahontan Region, California Regional Water Quality Control Board, Lahontan Region, 1993 Revision

Water Supply Outlook, Natural Resource Conservation Service website,

Acknowledgements

2009 SNAPSHOT DAY SPONSORS

Albertson's
AMEC
California State Water Resource Control Board
California Tahoe Conservancy
Farr West Engineering
Lahontan Regional Water Quality Control Board
Lake Tahoe Community College
Marine Research & Education, Inc.
Nevada Division of Environmental Protection
Nevada Division of State Lands
Nevada State Health Laboratory
Nevada Tahoe Conservation District
Port of Subs
Quad Knopf
Sierra Nevada College
Starbucks
Summit Engineering
Tahoe Environmental Research Center
Tahoe Regional Planning Agency
Tahoe Resource Conservation District
Tahoe Water Suppliers Association
Truckee River Watershed Council
Truckee River Foundation

Truckee River Fund
Truckee Tahoe Community Foundation
University of California Cooperative Extension
University of Nevada Cooperative Extension
University of Nevada Reno Electrical Engineering Department
USDA Forest Service
United States Geologic Survey
Washoe County
Waste Not, Incline Village General Improvement District

Citizen Monitoring Working Group Snapshot Day Planning Committee:

Beth Christman (Truckee River Watershed Council)
Rebecca Sawyer (Incline Village General Improvement District)
Jenny Francis (Director, CalTrout)
Jason Kuchnicki (Nevada Division of Environmental Protection)
Mary Kay Riedl (Nevada Division of Environmental Protection)
Susie Kocher (University of California Cooperative Extension)
Rita Whitney (Tahoe Regional Planning Agency)

Equipment:
Carson Valley Subconservancy District
Environmental Protection Agency
Fallen Leaf Lake Citizen Group
Incline Village General Improvement District
Lake Tahoe Community College
Nevada Division of Environmental Protection
Tahoe Regional Planning Agency
Truckee River Watershed Council
United States Geological Survey
University of California, Davis
University of Nevada, Reno

Laboratory Analysis (Nutrients and Bacteria):
High Sierra Water Lab
Nevada State Health Laboratory
Lahontan Regional Water Quality Control
United States Geologic Survey

Special Thanks To

Albertson's (South McCarran Avenue in Reno) for food donations
AMEC for financial contributions
Beth Christman, for report writing
California Tahoe Conservancy for data entry
Dr. John Kleppe, University of Nevada Electrical Engineering, for providing funding for equipment and continued support
Farr West Engineering, for financial contributions
Jason Kuchnicki for continued support
Kim Meacham for assistance with LTR powerpoint production
Lake Tahoe Community College and Sierra Nevada College for the use of their campus and instruments
Marine Research & Education for sampling and use of the research vessel "Prophet"
Mark Palmer, High Sierra Water Lab for nutrient analysis, Lake Tahoe and Middle Truckee
Nevada Division of Environmental Protection for funding report writing, production and volunteer thank you party
Nevada Division of State Lands for funding nutrient analysis
Nevada State Health Lab for Lower Truckee River laboratory analyses
Paul Honeywell, U.S. Geologic Survey, Carnelian Bay office, for coordinating Lake Tahoe bacterial analysis
Quad Knopf, for financial contributions
Red Cross South Lake Tahoe for food donations
Rita Whitney, TRPA, for report writing & editing
Shasta Ferranto, for creation of maps
Sierra Nevada Alliance for financial support
Starbucks (Lakeside Dr. in Reno) for food donations
Summit Engineering Corporation, for financial contributions
Tahoe Regional Planning Agency, for technical assistance, report printing and binding
Tahoe Water Suppliers Association, for report printing and binding
Truckee Meadows Water Reclamation Facility for nutrient analysis, Lower Truckee River
Volunteer coordination by Jaymee Willison, Susie Kocher, Domi Fellers, Beth Christman, and Mary Kay Riedl

And all the volunteers that made it happen!

Appendices

Appendices:

A. 2007 Summary of Field and Lab Data

B. Map of Sampling Locations

Note: Data collected as part of the Snapshot activities is available electronically. Contact Marie Bledsoe, TRPA, at (775) 588-4547

APPENDIX A

Snapshot Day May 16, 2009 Summary Field and Lab Data

SITE ID	Station Name	Conductivity (µs)	DO (ppb)	Water Temperature (°C)	pH	Turbidity (NTU) (1)	Ammonia NH3-N (ppb) (2,3)	Dissolved Inorganic Nitrogen DIN-N (ppb) (2,3)	Total Keldahl Nitrogen TKN (ppb)	Total Nitrogen TN (ppb)	Soluble Reactive Phos. SRP-P (ppb) (2, 3)	Dissolved Phos. SRP-P (ppb) (2, 3)	Total Phosphorus TP-P (ppb) (2, 3)	Particulate Phos. PP	Fecal Coliform Bacteria No. of Colonies per 100 mL (4)	E- Coli Bacteria No. of Colonies per 100 mL (4)
Lake Sites																
TAH SLAKE1	Ski Run Marina	-	-	-	-	-	10	3	178	181	2	4	21	17	-	-
TAH SLAKE4	Reagan Beach	-	-	-	-	-	12	1	164	165	3	11	14	3	-	-
TAH NLAKE5	National Av Boat Ramp	300	7	17	7	-	5	1	318	319	1	8	22	14	-	-
South Lake Tahoe Sites																
SLT-ANG1-01	Angora abv Lake Tahoe Blvd	20	10	12.5	7.3	0.56	10	6	130	136	4	9	12	3	-	-
SLT-ANG1-02	Angora abv View Circle	20	9	12	7.2	1.06	17	1	304	305	7	23	30	7	-	-
SLT-ANG1-03	Angora blw View Circle	30	8	12.8	7.3	0.78	-	-	-	-	-	-	-	-	-	-
SLT-ANG2-00	Angora at Wahoe Meadows	10	8	12.2	7.0	-	-	-	-	-	-	-	-	-	-	-
SLT-ANG3-00	Angora at LT golf course	30	7	15	6.9	1.35	-	-	-	-	-	-	-	-	-	-
SLT-BPDR-02	Bijou Park Drainage at Werner Salas	530	5	13.7	7.0	0.71	-	-	-	-	-	-	-	-	2	1
SLT-BPDR-03	Bijou Park Drainage b/l Hansen's Resort	500	8	12.0	6.5	9.64	6	172	167	339	16	41	46	5	17	17
SLT-BPDR-04	Bijou Park Drainage at Verdon Rd.	470	8	10.5	6.5	-	5	373	235	608	11	17	45	28	-	-
SLT-BURK-00	Burke Creek nr Pump st. @ end of Campground Rd.	190	7	10.7	7.6	1.33	10	1	281	282	4	18	27	9	3	3
SLT-BURK-01	Burke Creek blw Hwy 50	140	6	10.8	7.9	2.6	15	11	402	413	9	18	44	26	65	65
SLT-CASC-01	Cascade Creek at mouth	10	8	13.2	5.25	0.48	2	14	81	95	1	2	4	2	0	0
SLT-COLD-00	Cold Creek abv Pioneer Trail	40	9	8.5	7.6	2.45	7	16	247	263	6	27	33	6	0	0
SLT-EAGL-01	Eagle Creek abr Hwy 89	10	7.5	5.8	5.0	0.27	-	-	-	-	-	-	-	-	4	3
SLT-ECHO-00	Echo Creek at Upper Truckee	-	10	5.0	6.7	0.4	4	12	118	130	1	2	5	3	3	1
SLT-FLLF	Fallen Leaf Lake-200 yds off Stanford Camp	19.4	9.22	10.25	6.1	-	-	-	-	-	-	-	-	-	-	-
SLT-GLNA-00	Glen Alpine Creek at Fallen Leaf Lake	10.3	10.7	5.0	6.2	-	7	18	99	117	2	3	6	3	1	1
SLT-HEAV-00	Heavenly Creek nr confluence @ Trout Creek	30	9	10.0	7.3	0.98	9	1	170	171	11	21	28	7	2	2
SLT-HEAV-01	Heavenly Creek above Pioneer Trail	30	7	7.0	7.5	1.96	-	-	-	-	-	-	-	-	-	-
SLT-MEEK-01	Meeks Creek at mouth	10	7	9.25	5.5	0.76	4	1	155	156	1	4	10	6	-	-
SLT-MEEK-01	Meeks Creek Above Meadow	-	8.8	8.25	-	-	2	1	85	86	1	4	5	1	-	-
SLT-SAXN-00	Saxon Creek abv Trout Creek	20	9	5.0	7.7	0.87	6	9	195	204	6	12	26	14	0	0
SLT-SZHR-00	South Zephyr Creek at mouth	110	5	11.7	7.3	0.36	5	2	284	286	4	19	24	5	130	43
SLT-TALL-00	Tallac Creek at mouth	20	4.8	11.25	5.0	0.79	3	2	98	100	5	14	15	1	-	-
SLT-TALL-01	Tallac Creek upstream of Hwy 89	20	7	6.75	5.25	0.79	4	11	115	126	2	6	11	5	-	-
SLT-TALR-00	Taylor Creek at mouth	20	6.3	10.5	5.0	0.49	8	2	247	249	1	4	7	3	1	1
SLT-TROU-00	Trout Creek nr confluence w/Upper Truckee	40	6	11.0	5.5	0.51	5	1	195	196	8	14	24	10	14	14
SLT-TROU-02	Trout Creek at Bellevue	30	9	9.0	5.25	2.2	-	-	-	-	-	-	-	-	25	25
SLT-ELKS-00	Upper Truckee River at Elks Club Bridge	20	9	6.0	7.5	3.7	-	-	-	-	-	-	-	-	-	-
SLT-TRMO-00	Upper Truckee River at mouth	30	7	8.5	5.25	2	9	5	185	190	7	13	34	21	6	5
SLT-AIRP-00	Upper Truckee River nr Airport Meadow	20	9	7.0	7.35		-	-	-	-	-	-	-	-	-	-
SLT-TROU-10	Upper Truckee River nr Carrows	20	7	6.0	7.25	2.56	-	-	-	-	-	-	-	-	-	-
SLT-COVE	Tahoe Keys Cove 5	130	9	16.0	7.0	1.57	11	1	255	256	2	12	18	6	-	-

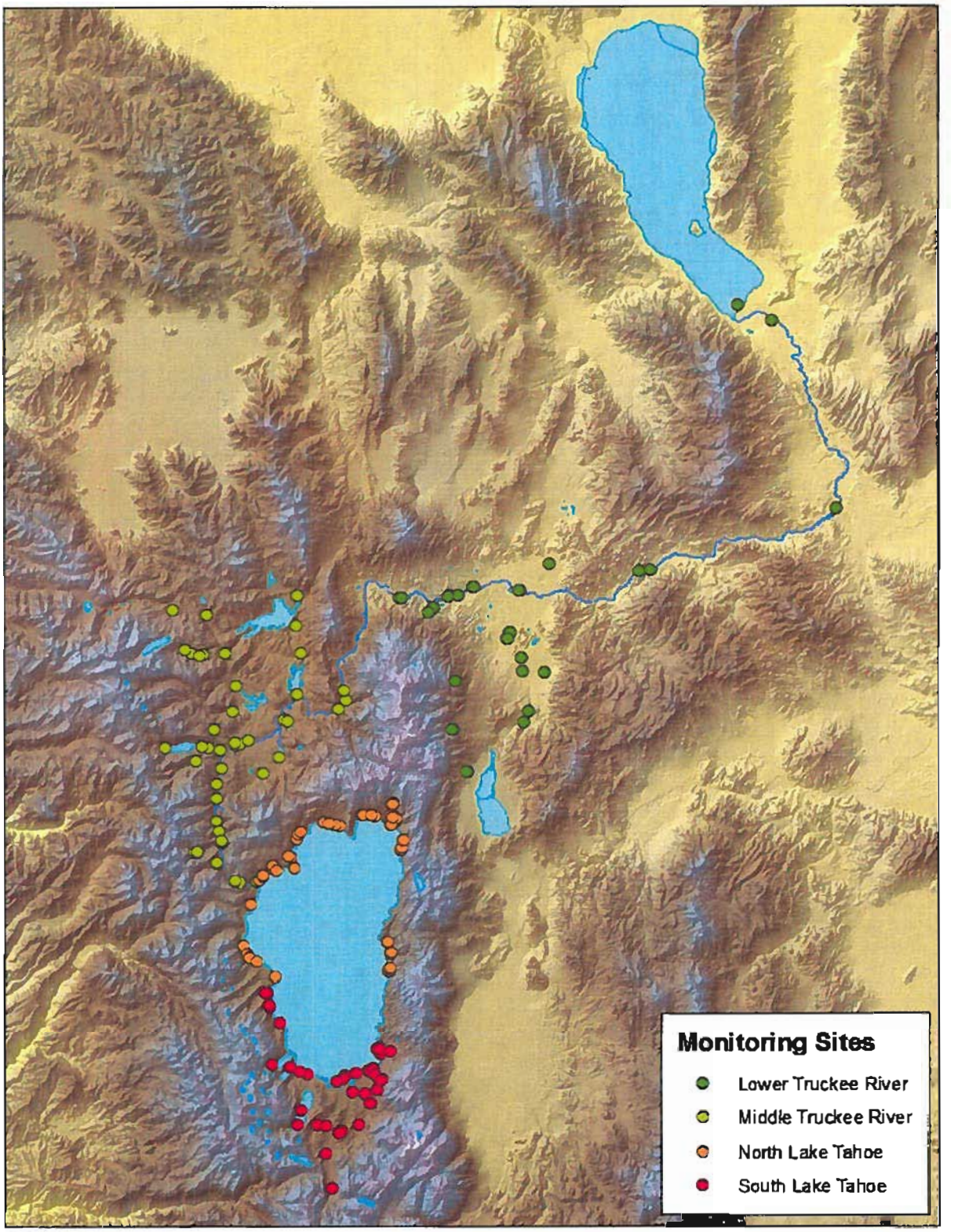
North Lake Tahoe Sites														
NLT-BONP-00	Bonpland Creek at mouth	70	8	8.0	5.5		-	-	-	-	-	-	-	-
NLT-BRTN-01	Burton Creek at Star Harbor	50	7	9.7	7.8	0.8	-	-	-	-	-	-	-	-
NLT-FRST-00	First Creek at mouth	60	6	7.0	8.7	1.05	7	1	99	100	7	12	29	17
NLT-GRIF-00	Griff Creek at mouth	45	7	8.0	8.1	2.37	2	2	135	137	4	14	22	8
NLT-HMWD-00	Homewood Creek at mouth	20	10	5.0	5.0	0.36	4	15	121	136	2	7	16	9
NLT-LKFC-00	Lake Forest Creek at mouth	125	11	9.4	5.5	2	11	15	98	113	24	36	52	16
NLT-MADC-00	Madden Creek at mouth	10	12	5.0	5.0	0.32	7	14	87	101	2	7	13	6
NLT-MKNY-00	McKinney Creek at mouth	15	7	8.0	4.5	0.28	-	-	-	-	-	-	-	-
NLT-QULC-00	Quail Creek at mouth	30	7	9.5	4.5	0.8	4	14	135	149	4	9	22	13
NLT-SCRT-00	Secret Harbor Creek at mouth	90	10.5		4.8	1.51	4	17	241	258	7	21	28	7
NLT-SNOW-00	Snow Creek at mouth	155	5.5	15.0	6.8	4.36	-	-	-	-	-	-	-	-
NLT-SLHO-00	Slaughterhouse Creek at mouth	190		12.0	5.5	0.82	9	2	431	433	15	25	36	11
NLT-STAR-00	Hatchery Creek at Star Harbor	85	8.5	8.9	5.0	2.67	10	1	341	342	29	42	115	73
NLT-RSWD-01	Rosewood Creek abv Third Creek	200	8	10.0	6.0	1.03	4	15	168	183	11	18	38	20
NLT-TCUD-00	Tahoe Creek Urban Ditch at mouth	235	10	9.0	6.3	2.2	2	277	191	468	8	18	38	20
NLT-TUNN-00	Tunnel Creek at mouth	80	7	12.0	5.5	0.1	-	-	-	-	-	-	-	-
NLT-WATS-00	Watson Creek at mouth	40	8.5	6.0	5.5	1.51	5	2	151	153	2	10	17	7
NLT-WOOD-00	Wood Creek at mouth	40	8	8.5	6.5	2.15	4	3	170	173	14	22	49	27
NLT-WOOD-01	Wood Creek at Tanager	45	8	6.9	6.4	2.65	3	5	166	171	11	17	41	24
Middle Truckee River Sites														
MTR-ALDR	Alder Creek	63	9.4	7.5	6.8	3.91	4	9	110	119	4	10	17	7
MTR-BEAR-00	Bear Creek	43	8.6	6.6	7.5	3.91	2	13	87	100	1	4	12	8
MTR-BIGC	Truckee River in Big Chief Corridor	65	8	7.4	5.5	1.14	-	-	-	-	-	-	-	-
MTR-BOCA	Little Truckee River Below Boca Dam	110	4.8	10.7	5.5	2.03	-	-	-	-	-	-	-	-
MTR-BOCA-01	Little Truckee River at Boyington Mill	65	8	11.0	6.1	1.28	-	-	-	-	-	-	-	-
MTR-COLD-00	Cold Creek at Donner Creek	25	9.3	5.0	7.4	1.33	5	7	96	103	1	5	18	13
MTR-DMCB	Davis Creek	96	8.5	10.9	5.5	2.01	-	-	-	-	-	-	-	-
MTR-DONN	Donner at Highway 89	64	9.2	7.5		0.65	4	1	147	148	1	3	12	9
MTR-DONN	Donner at Donner Lake outflow	92	6	11.0	5.5	1.83	5	6	83	89	1	5	15	10
MTR-EMAR	East Martis Creek at bridge	138	9.3	9.0		0.98	8	1	180	181	12	23	37	14
MTR-GLEN-00	Union Valley Creek	198	8.1	12.0	6.5	2.98	2	350	121	471	18	24	33	9
MTR-MART-00	Martis Creek at Martis Creek Lake	110	9.5	11.4	8	1.93	6	11	191	202	9	16	31	15
MTR-MART-01	Martis Creek	80	9.2	8.2	7.8	3.92	2	13	106	119	7	13	26	13
MTR-POLE-00	Pole Creek	51	10	4.9	5.75	1.86	-	-	-	-	-	-	-	-
MTR-PROS-01	Prosser Creek below dam	50	9.4	6.6	7.7	3.33	-	-	-	-	-	-	-	-
MTR-PROS-01	Prosser Creek at Hwy 89	37	10	7.1	5	3.34	-	-	-	-	-	-	-	-
MTR-SAGE	Sagehen Creek at Hwy 89	60	9	6.7	5.4	3.99	-	-	-	-	-	-	-	-
MTR-SQCR	Squaw Creek	58	8.4	5.5	7.5	1.99	4	51	62	113	1	2	8	6
MTR-TOWN	Truckee River at Regional Park	65	11	12.3	7.6	2.20	9	10	107	117	1	5	15	10
MTR-TR001	Truckee River near Tahoe City	98	10.3	-	8.1	3.12	-	-	-	-	-	-	-	-
MTR-TROU-00	Trout Creek Lower	138	8.4	-	6.3	0.43	7	1	136	137	10	17	26	9
MTR-TROU-02	Trout Creek at Bennett Flat	107	8	-	6	1.67	-	-	-	-	-	-	-	-

Lower Truckee River Sites																
LTR-ALU	Alum Creek	440	6	-	7.0	4.5	0.1	0.1	0.4	0.6	0.05	-	0.10	-	40	63
LTR-CHA-01	Chalk Creek	1990	10	-	7.1	1.1	0.1	2.4	0.5	3	0.24	-	0.30	-	10	20
LTR-CHA-02	Upper Chalk Creek - West	1990	5.5	-	6.8	3.3	0.1	5.1	0.5	5.7	0.32	-	0.37	-	290	135
LTR-CHA-03	Upper Chalk Creek - East	1990	6	-	6.2	3	0.1	0.1	0.3	0.5	0.57	-	0.66	-	150	249
LTR-DRY	Dry Creek	350	11	25	8.3	8.2	0.1	0.3	1.0	1.4	0.13	-	0.21	-	440	408
LTR-EVA	Evans Creek	250	11	28.5	8.6	9.4	0.1	0.2	1.1	1.4	0.06	-	0.14	-	120	145
LTR-GAL	Galena Creek	80	7	-	8.5	5.2	0.1	0.1	0.2	0.4	0.01	-	0.03	-	10	10
LTR-IDL	Truckee River At Idlewild Park	0.9	9	21	6.4	9.1	0.1	0.1	0.2	0.4	0.01	-	0.02	-	20	10
LTR-NIXB	Truckee River above Nixon Bridge	257	9.5	-	8.0	7.5	0.1	0.1	0.3	0.5	0.03	-	0.09	-	10	20
LTR-NTD	North Truckee Drain	580	7	-	8.1	6.5	0.1	0.4	0.2	0.7	0.05	-	0.09	-	140	145
LTR-PYRL	Pyramid Lake	7776	13.6	-	9.2	1.8	0.1	0.1	0.8	1	0.44	-	0.44	-	10	10
LTR-ROC	Truckee River At Rock Park	100	10	-	6.6	5.1	0.1	0.1	0.2	0.4	0.01	-	0.03	-	60	52
LTR-STE-01	Steamboat Creek	900	8	25	6.5	36	0.1	0.1	1.2	1.4	0.3	-	0.45	-	280	299
LTR-THO	Truckee River Near Wadsworth Bridge	-	-	-	-	9.7	0.1	0.1	0.5	0.7	0.05	-	0.11	-	450	464
LTR-WADS	Truckee River Near Wadsworth Bridge	182	8.47	-	7.8	8.3	0.1	0.1	0.4	0.6	0.03	-	0.08	-	10	20
Minimum Value		**0.9**	**4.8**	**4.9**	**4.5**	**0.1**	**0.1**	**0.1**	**0.2**	**0.4**	**0.01**		**0.02**		**0**	**0**
Maximum Value		**7776**	**13.6**	**28.5**	**9.2**	**36.0**	**17.0**	**373.0**	**431.0**	**608.0**	**29.0**		**115.0**		**450.0**	**464.0**
Count (# of valid responses)	91	86	87	74	85	81	65	65	65	65	65	50	65	50	32	31

Notes:

Note 1: Turbidity (NTU) lab analysis conducted at the four collection sites (Sierra Nevada College, Lake Tahoe Community College, Truckee and Washoe-Storey Conservation District).
Note 2: Lake Tahoe and Middle Truckee River Watershed nutrient analysis conducted by High Sierra Water Lab. Concentrations in Parts Per Billion (PPB).
Note 3: Lower Truckee River Watershed nutrient analysis conducted by Truckee Meadows Water Reclamation Facility. Concentrations in Parts Per Billion (PPB).
Note 4: Fecal Coliform analysis conducted at Lahontan Regional Water Quality Control Board. Value represents number of colonies per 100 mL. Coliform value of zero is equal to "Non-Detect" less than one. Feca

APPENDIX B

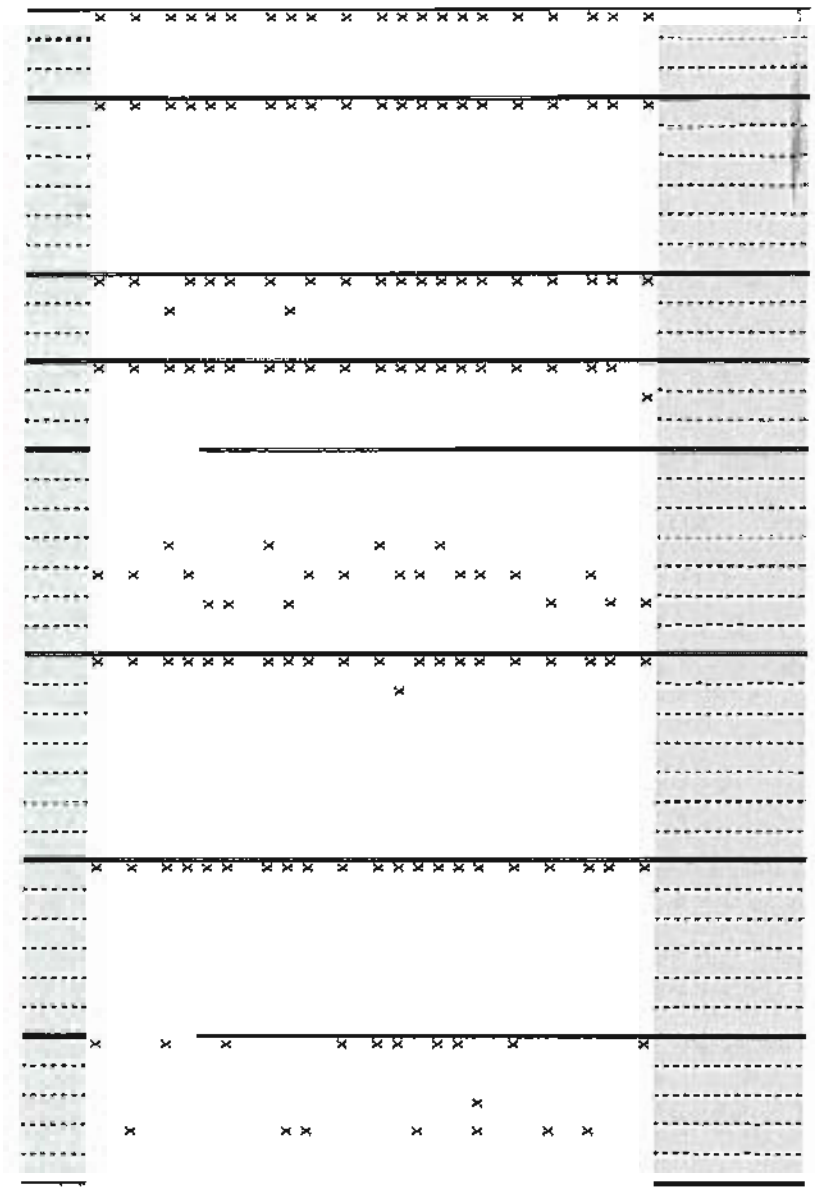

Monitoring Sites
Lower Truckee River
Middle Truckee River
North Lake Tahoe
South Lake Tahoe

Water-shed	Name	Reach	Stream Full Name	Team Leader	Num. Of Volunteers (w/team leader)	Date	Time	Channel Geometry Width (ft)	Depth (ft)	Bankfull Width (ft)	Reach Length (ft)	Instrument ID	Conductivity (uS) 1st Test	2nd Test	Avg.	Instrument ID	Dissolved Oxygen (mg/L) 1st Test	2nd Test	Avg.	Instrument ID	H2O Temperature (deg C) 1st Test	2nd Test	Avg.	Instrument ID	pH 1st Test	2nd Test	Avg.	Lab Instrument ID	Turbidity (NTU) @ Lab 1st Test	2nd Test	Avg.
Lake Tahoe Sites																															
SLT	ANGI	-01	Angora Creek at Lake Tahoe Blvd.	Russ Wigart	1	5/16/2009							20				10				12.5				7.3				0.52	0.59	0.56
SLT	ANGI	-02	Angora Creek abv View Circle	Russ Wigart	1	5/16/2009							20				9				12				7.2				1.28	0.83	1.06
SLT	ANGI	03	Angora Creek blw View Circle	Russ Wigart	1	5/16/2009							30				8				12.8				7.3				0.73	0.82	0.78
SLT	ANG2	-00	Angora Creek at Washoe Meadows	John Roos	3	5/16/2009							10				8				12.2				7						
SLT	ANGJ	-00	Angora Creek at LT Golf Course	John Roos	3	5/16/2009							30				7				15				6.9				1.21	1.48	1.35
SLT	BPDR	-01	Bijou Park Drainage at Warner Salas	Eric Winford	1	5/16/2009	10:04					SNA-TBS-2	530	530	530.0000	SDDO5	5	5	5	GHD(PH9)	13.7	13.7	13.7	GHD(PH9)	7	7	7		0.69	0.72	0.71
SLT	BPDR	-02	Bijou Park Drainage blw Hansen's Resort	Sarah Green	1	5/16/2009	11:13	2.5	0.3			AWG-TDS-3	500	500	500.0000	IVGID-SSD 4	8		8	AWG2	12		12	PHSTTRWC10	6.5		6.5		9.45	9.82	9.64
SLT	BPDR	-03	Bijou Park Drainage at Verdon Rd.	Sarah Green	1	5/16/2009	9:45	4.1	0.3			AWG-TDS-3	470	470	470.0000	IVGID-SSD 4	8		8	AWG2	10.5		10.5	PHSTTRWC10	6.5		6.5				
SLT	BURK	-00	Burke Creek nr Pump st. @ end of Campground Rd.	Stephanie Vidoli	1	5/16/2009	9:30	3.3	0.3			ECNSF110	190	190	190.0000	STMEEHDO3	7	7	7	AWGTH3	10.5	10.9	10.7		7.6	7.6	7.6		1.27	1.39	1.33
SLT	BURK	-02	Burke Creek blw Hwy 50	Nichole Zaborsky	2	5/16/2009	10:08	2.0	0.3			LTEEC-4EV	140		140.0000	DOCTRWC6	6		6	PH3/AWG	10.8		10.8	PH3/AWG	7.9		7.9		2.52	2.67	2.60
SLT	CASC	-00	Cascade Creek at mouth	Greig Barnhart	2	5/16/2009	12:00	20	1.8			SNA-TDS-3	10		10.0000	SDDO20	8		8	LTCC-5	13.2		13.2	PHSTTRWC5	5.25		5.25		0.46	0.49	0.48
SLT	COLD3	-01	Cold Creek abv Pioneer Trail	Sarah Ford	4	5/16/2009	11:15	10.0	1.2			AWG-TDS-9	40		40.0000	SDDO14	9		9	SNA ? 2	8.5		8.5	AWG IVGID 12	7.6		7.6		2.43	2.47	2.45
SLT	EAGL	-01	Eagle Creek abv Hwy 89	Greig Barnhart	2	5/16/2009	10:30	20.0	18.0			SNA-TDS-3	10		10.0000	SDDO20	7.5		7.5	LTCC-5	5.8		5.8	PHSTTRWC5	5		5		0.26	0.27	0.27
SLT	ECHO	-00	Echo Creek at Upper Truckee	Joy Peterson	3	5/16/2009										DOCTRWWO3	10		10	AGTH4	5		5	PH8AWG	6.7		6.7		0.42	0.38	0.40
SLT	FLLF		Fallen Leaf Lake-200 yds off Stanford Camp	Glenn Adams	1	5/16/2009	10:11					JKO17, JKO18	18.85	20	19.4250	JKO20	9.2		9.22	LTCC-6, JKO19	10.7	9.8	10.25	PHSTTRVC16	6.1		6.1				
SLT	GLNA	-00	Glen Alpine Creek at Fallen Leaf Lake	Glenn Adams	1	5/16/2009	9:10	26.0	3.0			JKO17, JKO18	10		10.2500	JKO20	10.65		10.65	LTCC-6, JKO20	5		5	PHSTTRVC16	6.2		6.2				
SLT	HEAV	-00	Heavenly Creek nr confluence @ Trout Creek	Amy Erickson	3	5/16/2009	9:35	2.5	0.3			SNA-TDS-1	30		30.0000	DOCTRWC2	9		9	THTRUC4	10		10	SNA-PH-4	7.3		7.3		0.93	1.00	0.98
SLT	HEAV2	-02	Heavenly Creek above Pioneer Trail	F. Ted Finkler	3	5/16/2009	9:33	2.8	0.6			SNA-TDS-5	30	30	30.0000	LTCC-STRAIN "Scott"	7	7	7	SNA-M-8	7	7	7	SNA-PH-3	7.5	7.5	7.5		1.67	2.05	1.86
SLT	MEEK	-00	Meeks Creek at mouth	Joy Peterson	0	5/16/2009	10:50	15.0	2.5			EC NSF 101	10	10	10	Chemical Licks	7		7	Therm	9.5	9	9.25	PH 1-AW%	5.6	5.4	5.60		0.76	0.76	0.76
SLT	MEEK	-03	Meeks Creek Above Meadow	Joy Peterson	0	5/16/2009	12:10	12.0	2.0			EC NSF 101	Mis Scc			K 7512	8.5	9	8.75	Therm	8	8.5	8.25	AWG-PH							
SLT	NZHR	-00	North Zephyr Creel at mouth	John Garotales		5/16/2009	10:15	3.0	0.3			EC NSF 083	140		140	DOCTRWC1	8		8	PH 2	10.2		10.2	PH 2	7		7		0.84	0.89	0.87
SLT	SAXN	-00	Saxon Creek abv Trout Creek	J. Shope	2	5/16/2009		10.0	1.8			LTEEC-8-eg	20		20	DOCTRWC4	9		9	AWGTH6	5		5	SNA-PH-5	7.7		7.7		0.36		0.36
SLT	SZHR	-00	South Zephyr Creek at mouth	Nicole Z.	2	5/16/2009	11:20	3.0	0.2			LTEEC-4-EV	110		110	DOCTRWC6	5		5	AWG PH3	11.7		11.7	AWG PH3	7.3		7.3		0.81	0.76	0.79
SLT	TALL	-00	Tallac Creek at mouth	Jennifer Smith	3	5/16/2009	10:20					SNA-TDS-6	20	20	20	SDDO16	4.5	5	4.75		11.5	11	11.25	PHSTTCNCR	5	5	5		0.8	0.78	0.79
SLT	TALL	-02	Tallac Creek upstream of Hwy 89	Sarah Ford	2	5/16/2009	10:00		0.6			TDS-5	20	20	20	SDDO17	6	8	7		6.5	7	6.75	TNTRWC	5	5.5	5.25		0.5	0.48	0.49
SLT	TALR	-00	Taylor Creek at mouth	Jennifer Smith	3	5/16/2009						SNA-TDS-6	20	20	20	SDDO16	5.5	7	6.25	SNA Air temp-5	10.5	10.5	10.5	PHSTTRWC	5	5	5		0.47	0.54	0.51
SLT	TROU	-00	Truckee	Taylor Farnum		5/16/2009	10:15	20.0	2.0			UMRWC	40		40	SDDO19	6		6	LTCC-4	11		11	PHSTTRWC11	5.5		5.5		1.76	2.64	2.20
SLT	TROU	-01	Trout Creek at Bellevue	Michael Pook	2	5/16/2009	9:55	29.0	2.0				30	30	30		9	9	9		9	9	9		5	5.5	5.25		3.86	3.53	3.70
SLT	ELKS	-03	Upper Truckee River at Elks Club Bridge	Caroly Roheuse	3	5/16/2009	9:50	30.0	4.0				20		20		9		9		6		6		7.5		7.5		2.03	1.96	2.00
SLT	TRMO	-00	Upper Truckee River at mouth	Taylor Farnum		5/16/2009	11:30	65.6					30		30		7		7		8.5		8.5		5.25		5.25				
SLT	TR15	-02	Upper Truckee River nr Airport Meadow	R. Patrucinio	2	5/16/2009	11:32	30.0	2.0			LTEEC-TDS-15	20	20	20	AWG	9		9	SSHORE-2	7		7	SNA-PH-1	7.5	7.2	7.35		2.57	2.54	2.56
SLT	TR10	-01	Upper Truckee River nr Carrows	R. Patrucinio	2	5/16/2009	9:40	60.0	5.0			LTEEC-TDS-15	20	20	20	AWG	7		7	SSHORE-2	6		6	SNA-PH-1	7.3	7.2	7.25				
SLT	COVE	-00	Tahoe Keys Cove	Tim Rowe	2							SNA-TDS-2	130	130	130	SDDO38	9	9	9	Hand Held	16	16	16	PHSTTRWC4	7	7	7		1.62	1.52	1.57
Lake Tahoe Sites					57																										
NLT	BONP	-00	Bonpland Creek at mouth										70		70		8		8		8		8		5.5		5.5				
NLT	BRTN	-01	Burton Creek at Star Harbor			5/16/2009							50	50	50		6	8	7		9.8	9.6	9.7		7.5	8	7.75		0.8		0.80
NLT	FRST		First Creek at mouth			5/16/2009							60	60	60		6	6	6		7	7	7		8.6	8.8	8.7		1.05		1.05
NLT	GRIF	-00	Griff Creek at mouth			5/16/2009							40	50	45		7	7	7		8		8		8.2	8	8.1		2.37		2.37
NLT	HMWD	-00	Homewood Creek at mouth			5/16/2009							20		20		10		10		5		5		5		5		0.36		0.36
NLT	LKFC	-00	Lake Forest Creek at mouth			5/16/2009							120	130	125		11		11		9.4		9.4		5.5	5.5	5.5		2		2.00
NLT	MADC	-00	Madden Creek at mouth			5/16/2009							10		10		12		12		5		5		5		5		0.32		0.32
NLT	MCNY	-00	McKinney Creek at mouth			5/16/2009							10	20	15		7		7		8		8		4.5	4.5	4.5		0.28		0.28
NLT	QUAC	-00	Quail Creek at mouth			5/16/2009							30	30	30		7		7		9.5		9.5		4.5	4.5	4.5		0.8		0.80
NLT	SCRT	-00	Secret Harbor Creek at mouth			5/16/2009							90	90	90		10	11	10.5						5	4.5	4.75		1.51		1.51
NLT	SNOW	-00	Snow Creek at mouth			5/16/2009							150	160	155		5.5		5.5		15		15		6.5	7	6.75		4.36		4.36
			Slaughterhouse Creek at mouth														190		190		12				5.3		5.5		0.82		0.82
NLT	STAR	-01	Hatchery Creek at Star Harbor			5/16/2009							80	90	85		9	8	8.5		8.9		8.9		5	5	5		2.67		2.67
NLT	RSWD	-02	Rosewood Creek abv Third Creek			5/16/2009							200		200		8		8		10		10		6		6		3.03		3.03
NLT	TCUB	-00	Tahoe Creek Urban Ditch at mouth			5/16/2009							230	240	235		8	12	10		9		9		6		6		2.2		2.20
NLT	TUNN	-00	Tunnel Creek at mouth			5/16/2009							80	80	80		7		7		12		12		5.5	5.5	5.5		0.11		0.11
			Watson Creek at mouth										40	40	40		8	9	8.5		6				5.5	5.5	5.5		1.51		1.51
NLT	WOOD	-00	Wood Creek at mouth			5/16/2009							40	40	40		8	8	8		8.3	8.5	8.4		6.4	6.5	6.45		2.2		2.15
NLT	WOOD	-02	Wood Creek at Tanager			5/16/2009							40	50	45		8	8	8		7	6.8	6.9		6.35	6.5	6.425		2.65		2.65
TAH	NLAKES		National Av Boat Ramp										310	290	300		7		7		17		17		7.5	7	7.25				

LAKE TAHOE WATER SHED																															
										MIN	2.00	0.10		MIN	10	10	10	MIN	4.5	5.0	5	MIN	5.0	7.0	5.0	MIN	5.0	5.0	5.0	MIN	0.3	0.3	0.3
										MAX	66	18		MAX	530	530	530	MAX	10.7	9.0	11	MAX	16.0	16.0	16.0	MAX	7.9	7.6	7.9	MAX	9.5	9.8	9.6
										AVERAGE	17.7	2.3		AVERAGE	88	144	180	AVERAGE	7.8	7.3	8	AVERAGE	9.8	10.2	9.2	AVERAGE	6.6	6.5	6.5	AVERAGE	1.9	1.7	1.6
MTR	ALDR		Alder	Dean Schaecher	3	5/16/2009	9:10	9.00		ECTrwc10	63	62	63	DOTrwc6	9.2	9.6	9.4	PHMtrwc10	7.6	7.4	7.5	PHMtrwc10	6.8	6.8	6.8	TRWC2	3.71	4.1	3.91
MTR	BEAR-00	-00	Bear Creek	Lisa Wandzell	3	5/16/2009	12:00	15.00		ECTrwc8	45	41	43	DOTrwc8	9.2	8	8.6	PHMtrwc8	6.4	6.7	6.6	PHMtrwc8	7.5	7.5	7.5	TRWC2	1.02	1.25	3.91
MTR	BIGC		Truckee River in Big Chief Corridor	Janet Zipkin	2	5/16/2009	10:20	60.00		ECTrwc5	63	67	65	DOCtrwc7	8	8	8.0	ECTrwc5	7	7.7	7.4	PHSTrwc7	5.5	5.5	5.5	TRWC2	2.13	1.93	1.14
MTR	BOCA	-00	Little Truckee River Below Boca Dam	Kevin Hall	4	5/16/2009	10:00			ECTrwc6	112	107	110	DOCtrwc10	5	4.5	4.8	ECTrwc6	10.7	10.7	10.7	PHSTrwc5	5.5	5.5	5.5	TRWC2	1.14	1.42	2.03
MTR	BOCA-01	-01	Little Truckee River at Boyington Mill	Rebecca Whitelock	2	5/16/2009	10:11	35.00		TDStrwc5	60	70	65	DOTrwc2	7.4	8.6	8.0	PHMtrwc9	11	10.9	11.0	PHMtrwc9	6.0	6.1	6.1	TRWC2	1.23	1.42	1.28
MTR	COLD-00	-00	Cold Creek at Donner Creek	Paul Raymore	1	5/16/2009	9:30	20.00		TDStrwc2	20	30	25	DOTrwc5	9.4	9.2	9.3	PHMtrwc4	5.1	4.8	5.0	PHMtrwc4	7.4	7.3	7.4	TRWC2	2.12	1 89	1.33
MTR	DMCB		Davis Creek	Kevin Hall	4	5/16/2009	9:30			ECTrwc6	95	96	96	DOCtrwc10	9	8	8.5	ECTrwc6	10.9	10.8	10.9	PHSTrwc5	5.5	5.5	5.5	TRWC2	1.02	0.27	2.01
MTR	DONN	-01	Donner at Highway 89	Alan Roth	4	5/16/2009	9:15	40.00		ECTrwc11	64	63	64	DOTrwc4	9.2	9.2	9.2	ECTrwc11	7.5	7.5	7.5					TRWC2	2.24	1.41	0.65
MTR	DONN	-00	Donner at Donner Lake outflow	Michael Holley	3	5/16/2009	10:08	18.00		ECTrwc3	92	91	92	DOCtrwc9	6	6	6.0	ECTrwc3	11.2	10.7	11.0	PHSTrwc13	5.5	5.5	5.5	TRWC2	1.21	0.74	1.83
MTR	EMAR	-00	East Martis Creek at bridge	Sara Taddo Jones	1	5/16/2009	8:30	2.00		ECTrwc9	139	137	138	DOTrwc3	9.4	9.2	9.3	ECTrwc9	9	9	9.0					TRWC2	3.24	2.71	0.98
MTR	GLEN-00	-00	Union Valley Creek	Dylan Farnsworth	1	5/16/2009	10:25	3.00		ECTrwc9	198		198	DOTrwc3	8.2	7.9	8.1	ECTrwc9	12		12.0	PHSTrwc6	6.5		6.5	TRWC2	1.72	2.14	2.98
MTR	MART-00	-00	Martis Creek at Martis Creek Lake	Karin McMahon	2	5/16/2009	11:00			TRAMEC1	110	110	110	DOTrwc10	9.8	9.2	9.5	PHMtrwc7	11.3	11.4	11.4	PHMtrwc7	8	8	8.0	TRWC2	4.72	3.11	1 93
MTR	MART-01	-01	Martis Creek	Karin McMahon	2	5/16/2009	9:30			TRAMEC1	80	80	80	DOTrwc10	8.9	9.4	9.2	PHMtrwc7	8.1	8.2	8.2	PHMtrwc7	7.8	7.8	7.8	TRWC2	1.53	2.18	3.92
MTR	POLE-00	-00	Pole Creek	Janet Zipkin	2	5/16/2009	9:15	15.00		ECTrwc5	51	51	51	DOCtrwc7	10	10	10.0	ECTrwc5	5.1	4.7	4.9	PHSTrwc7	5.75	5.75	5.8	TRWC2	3.63	3.03	1.86
MTR	PROS-01	-01	Prosser Creek below dam	Karen Sessler	2	5/16/2009	7:25	40		ECtrwc7	50	50	50	DOTrwc9	9.1	9.6	9.4	PHMtrwc3	6.5	6.6	6.6	PHMtrwc3	7.7	7.7	7.7	TRWC2	3.66	3.02	3.33
MTR	PROS-01	-01	Prosser Creek at Hwy 89	Rebekka Fine	3		10:50	25.00		ECTrwc4	38	36	37	DOCtrwc8	11	9	10.0	ECTrwc4	7.3	6.9	7.1	PHSTrwc18	5	5	5.0	TRWC2	4.12	3.85	3.34
MTR	SAGE		Sagehen Creek at Hwy 89	Rebekka Fine	3	5/16/2009	9:45	10.00		ECTrwc4	61	59	60	DOCtrwc8	9	9	9.0	ECTrwc4	6.7	6.7	6.7	PHSTrwc18	5.25	5.5	5.4	TRWC2	1.95	2.03	3.99
MTR	SQCR	-00	Squaw Creek	Lisa Wandzell	3	5/16/2009	10:30	20.00		ECTrwc8	58	57	58	DOTrwc8	8.8	8	8.4	PHMtrwc8	4.9	6	5.5	PHMtrwc8	7.6	7.4	7.5	TRWC2	2.22	2.18	1.99
MTR	TOWN		Truckee River at Regional Park	David Shaw	3	5/16/2009	11:55	40.00		ECTrwc2	68	62	65	BalanceYS155	11.2	10.7	11.0	ECTrwc2	13	11.5	12.3	TRAMPH2	7.6	7.6	7.6	TRWC2	3.39	2.85	2.20
MTR	TRC01		Truckee River near Tahoe City	David Shaw	3	5/16/2009	10:10	50.00		ECTrwc2	103	92	98	BalanceYS155	10.42	10.23	10.3					TRAMPH2	8	8.1	8.1	TRWC2	0.5	0.35	3.12
MTR	TROU-00	-00	Trout Creek Lower	Alan Roth	4	5/16/2009	11:00	27.00		ECTrwc11	138	138	138	DOTrwc4	8.6	8.2	8.4					PHSTrwcX	6.0	6.5	6.3	TRWC2	1.78	1.55	0.43
MTR	TROU-02	-02	Trout Creek at Bennett Flat	Michael Holley	3	5/16/2009	9:30	9.00		ECTrwc3	107	107	107	DOCtrwc9	8	8	8.0					PHSTrwc13	6	6	6.0	TRWC2	1.9	2.61	1.67
TAHOE RIVER WATERSHED					58			MIN	2.00	0.10		MIN	10	10	10	MIN	4.5	4.5	5	MIN	4.9	4.7	4.9	MIN	4.5	4.5	4.5	MIN	0.1	0.3	0.1
								MAX	66	18		MAX	530	530	530	MAX	198.0	12.0	190	MAX	17.0	16.0	17.0	MAX	8.6	8.5	8.7	MAX	9.5	9.8	9.6
							AVERAGE		21.3	2.9		AVERAGE	94	108	96	AVERAGE	10.5	8.2	11	AVERAGE	9.2	9.0	9.1	AVERAGE	6.4	6.4	6.4	AVERAGE	1.9	2.1	1.9

LTR	LTR-ALU					5/18/2006																									
	LTR-CHA					5/18/2006																									
	LTR-CHA-02					5/18/2006																									
	LTR-CHA-03					5/18/2006																									
	LTR-DRY					5/18/2006																									
	LTR-EVA					5/18/2006																									
	LTR-GAL					5/18/2006																									
	LTR-HUN					5/18/2006																									
	LTR-IDL					5/18/2006																									
	LTR-MCR					5/18/2006																									
	LTR-NOB					5/18/2006																									
	LTR-NTD					5/18/2006																									
	LTR-PYR					5/18/2006																									
	LTR-ROB					5/18/2006																									
	LTR-ROC					5/18/2006																									
	LTR-STE-01					5/18/2006																									
	LTR-STE-02					5/18/2006																									
	LTR-THO					5/18/2006																									
	LTR-WADS					5/18/2006																									
	LTR-WHI					5/18/2006																									
LEE RIVER WATERSHED							MIN	2.08	0.10	MIN	10	10	10	MIN	4.5	4.5	5	MIN	4.9	4.7	4.9	MIN	4.5	4.5	4.5	MIN	0.1	0.3	0.1
							MAX	66	18	MAX	530	538	538	MAX	190.9	12.8	190	MAX	17.0	16.0	17.8	MAX	8.6	8.8	8.7	MAX	9.5	9.8	9.6
							AVERAGE	27.4	4.4	AVERAGE	90	94	90	AVERAGE	14.3	8.3	14	AVERAGE	9.1	9.0	9.1	AVERAGE	6.3	6.4	6.3	AVERAGE	2.1	2.3	2.1

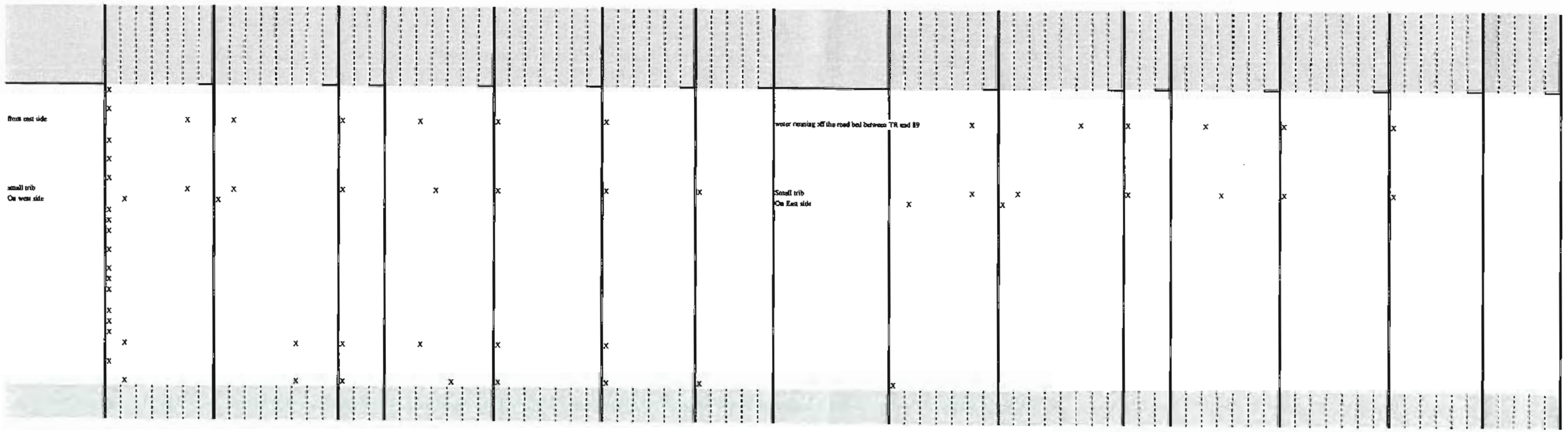
OBSERVATIONS FOR ENTIRE REACH		
Cloud Cover	no clouds	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x
	partly cloudy	
	cloudy sky	
Precipitation	none	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x
	foggy	
	misty	
	drizzle	
	rain	
	snow	
Wind	calm	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x
	breezy	x x x x x x x x x x x
	windy	x
Water Clarity	clear water	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x
	cloudy water (>4" visibility)	x x
	murky (< 4" visibility)	
In-Stream flow	dry creekbed	
	isolated pools	
	trickle	
	slow/smooth	x x x x x x
	moderate/rippling	x x x x x x x x x x x x x x x x x x x x x x x x x
	rapid/turbulent	x x x x x x x x x x x
	flooding	x
Sample Color	none	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x
	amber	x x
	yellow	
	green	
	brown	
	gray	
	other	
Sample Odor	none	x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x x
	fresh algae smell	
	chlorine	
	rotten eggs	
	sewage	
	other	
Other (presence)	algage or water plants	x x x x x x x x x x x x x x x x x x x x
	oily sheen	x
	foam or suds	x x x x x x x
	litter or trash	x x x
	other	x



WATER INPUTS or DISCHARGES - SITE # 1

Site Info	Input / Discharge Point									Type of Input / Discharge										Water Clarity			Flow Discharge							Sample Color							Sample Odor							Other (presence)						
Description of Site #1	none	pipe	concrete drain	clogged	earth drainage	ditch	swale	tributary	other	none	seep/spring	pond/marsh	industrial	sewage	storm water runoff	agricultural	other			clear water	cloudy water	murky water		dry riverbed	isolated pools	trickle	slow/smooth	moderate/rippling	rapid/turbulent	flooding			none	amber	cyclum	green	brown	gray	other			none	fresh algae smell	chlorine	rotten eggs	sewage	other				clear	pipe	jelly sheen	foam or suds	litter or trash	other	
blw view circle lge open meadow surrounded by forest habitat																																																	
first stbv confluence at beaver dam	x									x										x						x	x								x								x						
metal pipe culvert at road																																																	
entry point to culvert to cross verdon																																																	
creek not flowing to lake, stagnant, flowing upstream	x									x										x																x								x						
400 ft. abv mouth #3 bridge where creek meets Truckee					x						x									x						x									x														
150 ft. from mouth																																																	
50 ft abv Trout Creek pioneer and heavenly creek - steel culvert tests inc marina seawater based on conductance																																																	
150 ft. from mouth of stream	x									x										x							x								x														
mouth to lake blw Hwy 89	x									x										x						x								x								x						
blw 89 near USFS stream profile chamber at mouth of Lake Tahoe near Al Tahoe neighborhood	x									x										x						x								x														
mouth of Upper Truckee					x										x					x					x	x	x								x								x						
above Star Harbor blw Hwy 28 at condo's below Hwy 28 at culverts post office est. ~.75 cfs		x								x																																							
downstream from hwy 28 culvert																																																	
culvert onto Star Harbor east																																																	
water seeping from ground				x						x										x					x									x								x	x					
gage plate= 4.21																				x					x		x								x								x						

Site Info	Input / Discharge Point									Type of Input / Discharge										Water Clarity			Flow Discharge							Sample Color							Sample Odor							Other (presence)						
downstream survey stake	x									x										x						x									x								x						


from east side
small trib
On west side
water running off the road bed between TR and 19
Small trib
On East side

BARRIERS & CHANNEL MODIFICATIONS ALONG ENTIRE REACH

Land Use				Fish Passage Barriers						Water Diversion							Stream/Shore Modification							Stream Channel				
Reach Type (1)	Reach Type (2)	Reach Type (3)	Reach Type (4)	none	debris dam	beaver dam	man-made dam	culvert	disconnected	none	dam	agriculture	flume	pipe	private use	industrial	other	artificial	bank/grazing	recreational use	clearcut/vegetation	mining	road crossing	other	none	rip-rap	concrete	earthen	other
16	19	19	19		x														x							x		x	
1	2	19				x															x								
0	19	19	19				x													x			x					x	
17	19																												
8	0																												
17	19																												
2																													
1	2	0	19																										
17	18	0																											
2	0																												
1	6	19																											
0	20																												
2	0																												
17	19																												
17	2	0	19				x																	x			x		
0	18																												
0	17	18	19		x														x										
0	0																												
16																													
1																													
1	17	4	3			x																							
2	19	1			x																								
17	19							x																					
2	0	18	2																										
0	2	1																											
17	19	1							x																				
2	20	16																											
2																													
0	17	19																											
1																													
1