15th Annual Snapshot Day Report

A Lake Tahoe Basin and Truckee Watershed Citizen Monitoring Event

(May 15 & 16, 2015)

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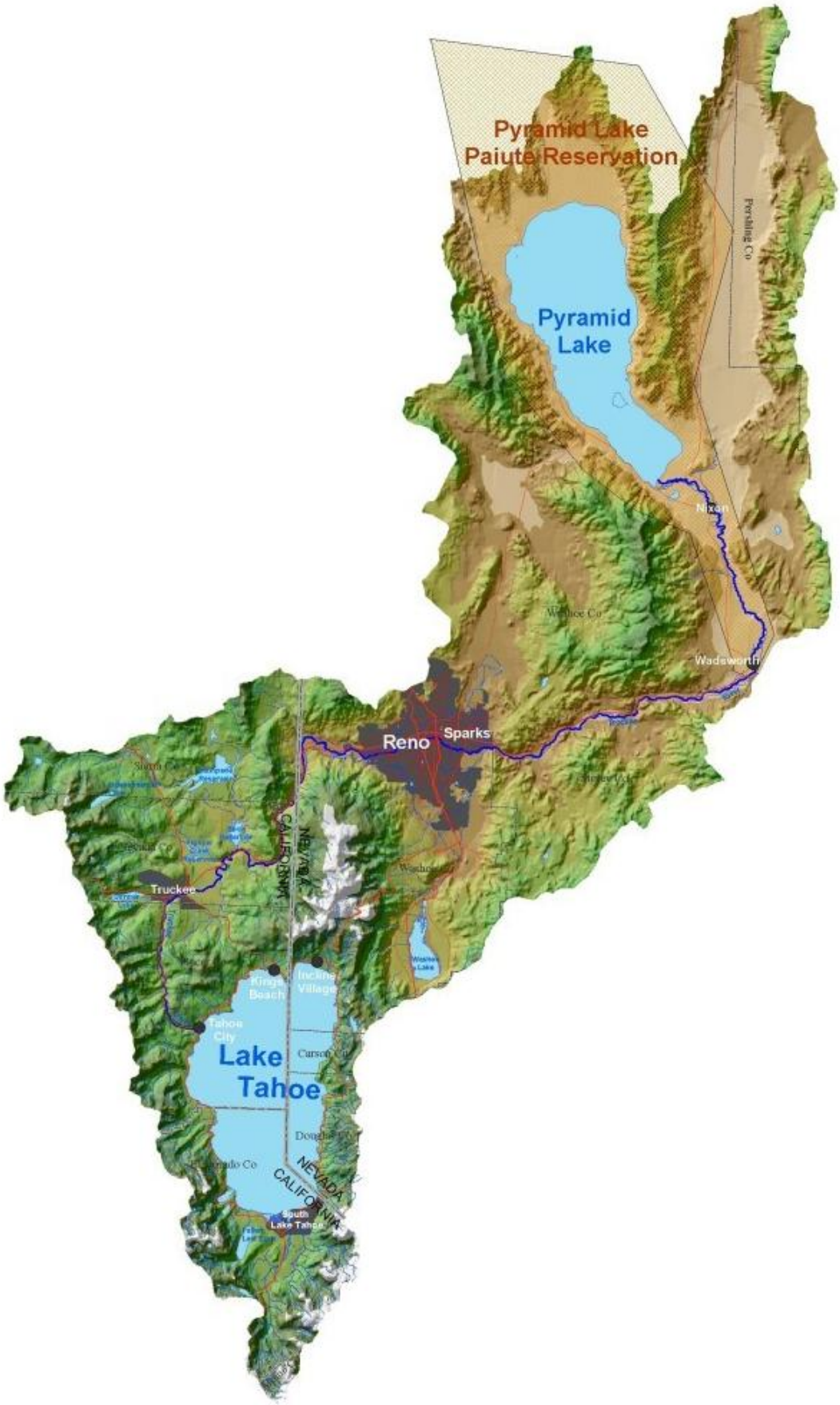
Pyramid Lake
Paiute Reservation
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Tahoe
City
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CALIFORNIA
South
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Introduction

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 15th Annual Snapshot Day was held on May 16, 2015. The sampling area included the entire Truckee River Watershed - from Lake Tahoe to the terminus at Pyramid Lake. Snapshot Day has been sustained by support from dedicated paid and unpaid staff, the funding of a few grants and donations, but mostly by the commitment of hundreds of citizens who value the public involvement to protect the watershed they live in. 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.

What are the objectives of Snapshot Day?

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 aquatic resources in the Truckee River Hydrologic Unit which includes 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.

The primary goals of this effort are two-fold:

1. Promote environmental education and stewardship
2. Collect valuable water quality information

In addition this effort aims to:

- 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 the 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 some pre and post data for evaluating the effectiveness of restoration activities

Snapshot Day 2015

2015 Event Summary

Snapshot Day provides an annual opportunity to highlight the contributions of "citizen science". Snapshot Day 2015's data analysis demonstrates good water quality overall for the Tahoe-Truckee-Reno watershed, with very few water quality issues indicated. Water quality parameters such as fecal coliform and dissolved oxygen were somewhat elevated from previous years, but the majority of samples collected meet the standards set for their region.

In 2015, Snapshot Day reached its 15th year anniversary. It remains one of the longest running citizen watershed monitoring events on the US west coast. Snapshot Day continues to highlight successful engagement with the public in active watershed stewardship, while providing valuable data to the responsible agencies. As previous data sets are compiled and date storage is improved, this program has the ability to show long term trends and better assist agencies in watershed conditions analysis.

Volunteers and locations

Snapshot Day 2015 was a collaborative effort between the North Shore Lake Tahoe, South Shore Lake Tahoe, Middle Truckee River, and Lower Truckee River.

Volunteer and monitoring site location information:

	Volunteers	Locations
North Shore Lake Tahoe	22	16
South Shore Lake Tahoe	117	31
Middle Truckee River	50	22
Lower Truckee River	239	11
Totals for 2015	**428**	**80**

Table 1: Volunteer and monitoring site location

This collaborative effort was sponsored by Nevada Division of Environmental Protection, Incline Village General Improvement District, the League to Save Lake Tahoe, and the Truckee River Watershed Council. For an expanded list of involved organizations, resource partners, and education partners please see **Appendix A**.

Snapshot Day is a bi-state event and as such falls under two state-wide citizen-monitoring programs: the California State Regional Water Quality Control Board's (SWQCB) *Clean Water Team*, (http://www.swrcb.ca.gov/water_issues/programs/swamp/cwt_volunteer.shtml) and The Nevada equivalent under *Project WET* (http://ndep.nv.gov/bwqp/wet01.htm). Through this bi-state collaborative Snapshot Day is able to achieve a larger watershed approach to successful data collection.

Volunteers gathered data at a total of 80 locations from the upper watershed from Lake Tahoe and the Truckee River to its terminus at Pyramid Lake. A list of site names and codes can be found in **Appendix B**.

Lake Tahoe Tributaries, South Shore

- Angora Creek at View Circle
- Angora Creek above Lake Tahoe Blvd
- Angora Creek at Washoe Meadows
- Angora Creek at Truckee Confluence
- Burke Creek at Mouth
- Burke Creek below Hwy 50
- Cascade Creek at Mouth
- Cascade Creek above Hwy 89
- Cold Creek/Confluence with Trout Creek
- Cold Creek above Pioneer Trail
- Tahoe Keys Marina, Cove East
- Upper Truckee River at Mouth
- Eagle Falls Creek at Mouth
- Eagle Falls above Hwy 89
- Edgewood Creek at Mouth
- Fallen Leaf Lake
- Heavenly Creek at Confluence with Trout Creek
- Tahoe Keys West Channel
- North Zephyr Creek at Mouth

Lake Tahoe Tributaries, North Shore

- Barton Creek above Hwy 28
- Burton Creek at Star Harbor
- First Creek at mouth
- Griff Creek at mouth
- Hatchery Creek at Star Harbor
- Homewood Creek at mouth
- Lake Forest Creek at mouth
- Marlette Creek at mouth
- Mill Creek below Lakeshore Dr.
- Quail Lake Creek at mouth
- Second Creek above Lakeshore Dr.
- Secret Harbor Creek at mouth
- Slaughter House at the mouth
- Snow Creek at mouth
- Tahoe City Urban Ditch at lake
- Wood Creek at Lakeshore Dr.

Truckee River Watershed, Middle Truckee River

- Alder Creek
- Bear Creek
- Cabin Creek Basin
- Cold Creek at Donner Creek
- Donner at Donner Lake outflow
- Donner at Highway 89
- East Martis Creek at bridge
- Glenshire above pond
- Little Truckee River Below Boca Dam
- Little Truckee River Below Boca Dam
- Martis Creek at COE boundary
- Martis Creek at mouth
- Mouth of Summit Creek at inlet to Donner Lake
- Pole Creek
- Prosser at Highway 89
- Prosser Creek below dam
- Squaw Creek
- Trout Creek at Bennett Flat
- Trout Creek at mouth
- Truckee River at Regional Park
- Truckee River in Big Chief Corridor
- Union Valley Creek at SFFCC road

Truckee River Watershed, Lower Truckee River

- Galena Creek
- Hunter Creek
- North Truckee Drain
- Pyramid Lake
- Thomas Creek
- Truckee River at Idlewild Park
- Truckee River at McCarran Ranch
- Truckee River at Rock Park
- Truckee River above Nixon Bridge
- Truckee River at Wadsworth
- White's Creek

Methods of Data Collection

All observations, photos, field measurements and samples are taken on May 16, 2015 between 9:00 a.m. and 12:00 pm; this maintains the 'Snapshot' aspect of the project. Any samples submitted past 1:00 pm are evaluated at that time to determine what the value is of samples submitted.
Citizen monitoring "team leaders" are provided training prior to Snapshot Day each year prior to the event. Team leader trainings cover 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" is 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.

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. Monitoring results are compiled in **Appendix B**, which includes both the field measurements collected by volunteers and nutrient and bacteria analysis.

Visual observations and photo-documentation are performed according to the procedures developed by the SWRQB Clean Water Team. The standardized observation form, the *California Stream and Shore Walk Visual Assessment Form*, has been slightly revised to better apply to the region. At least three photos are 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 are initiated from a downstream position, traveling upstream.

A variety of instruments and kits are used on Snapshot Day by the volunteers. Much of the equipment has been purchased through the years with grants or donations; the remainder of the equipment was borrowed from various partners. All of the instruments and kits are calibrated and tested/standardized at a quality control session held prior to the event. For additional information on the monitoring equipment used see **Appendix C**.

Water Quality Standards

The US EPA has recommended criteria for nutrients and turbidity. Nevada, California, and the TRPA have specific water quality standards and indicators generally more stringent in certain subwatersheds and creeks, such as the Tahoe Basin, than elsewhere in the watershed. **Table 1** lists some of these standards for the Tahoe Basin. The selected standards shown in **Table 2** are from the Nevada Division of Environmental Protection for the Lower Truckee River Watershed.

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 0.15-19 mg/l (CA)
Soluble inorganic Nitrogen	Mean of no more than 0.06 mg/l for most tributaries to Lake Tahoe, Nevada side of Lake Tahoe (NDEP)
Total Phosphorous	Annual average of no more than 0.05 mg/l for most tributaries, Nevada side of Lake Tahoe and no more than 0.03 mg/l for most tributaries, California side of Lake Tahoe
Soluble Reactive Phosphorous	Annual average of no more than .007 mg/l (combination of organic and inorganic) for Lake Tahoe, Nevada side (NDEP)
Fecal Coliform	Log mean of 20 CFU (30 day period) and maximum of 40 CFU, (Lahontan Region, CA)

Table 2: Examples of Lake Tahoe water quality standards

Parameter	Truckee River at Idlewild (LTR-IDL)	Truckee River at Wadsworth (LTR-WADS)
Temp	≤13º (month dependent)	≤14º (month dependent)
Dissolved Oxygen	≥5 mg/l (April-October) ≥ 6 mg/l November-June)	≥5 mg/l (April-October) ≥ 6 mg/l November-June)
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	≤1000 No./100ml	≤1000 No./100ml
E. coli	≤410 No./100ml single value or ≤ 126 No./100ml annual geometric mean	≤410 No./100ml single value or ≤ 126 No./100ml annual geometric mean

Table 3: Examples of Nevada state water quality standards for the Truckee River

For additional information on water quality objectives in California refer to the Lahontan Regional Water Quality Control Board *Basin Plan* at the following website:
www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/references.shtml

For additional information on water quality standards in Nevada refer to the following website:
www.leg.state.nv.us/NAC/NAC-445A.html#NAC445ASec11704

NDEP's Water Quality Standards Branch has created new web pages that educators and students may find useful. The Water Quality NAC Index page will help you and your students easily locate a specific water body or stream section and identify its designated beneficial use. On the webpage under Resources find the new link to WQ Standards NAC Index. You are able to sort a column by clicking on the column header to easily search, for example, a particular water name or County.

Data Results

This section gives an overview of the parameters measured and the data results. All of the measured parameters will be discussed and some of the high and low measurements will be highlighted for each of the measured parameters. Specific sites in figures are referred to by code which can be cross referenced by site names in **Appendix B**.

Water temperature

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 (vegetation) cover along stream banks, which acts to shade and thus prevent solar heating of the water.

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 and higher dissolved oxygen content than water in streams and lakes that do not have cold-water fishery as a designated beneficial use. Rainbow trout prefer water temperatures between 12.8 and 15.6°C and the upper incipient lethal temperature (temperature at which 50% of the population survives 60 days) is 14.3°C.

77 sites were sampled for water temperature. The minimum recorded temperature recorded from Snapshot Day 2015 was 3.0°C in the South Lake Tahoe watershed at the Upper Truckee River at Elks Club Bridge sampling location. The highest recorded temperature was 15.2°C also in the South Lake Tahoe Watershed at Cascade Creek at Mouth. Figure 1 below represents the minimum and maximum temperatures for each of the four regions sampled during the 2015 event. During the 2015 snapshot day event there were no samples taken above 15.6°C the maximum optimal temperature for Rainbow trout and 76 sample sites had temperatures below the minimum optimal temperature range.

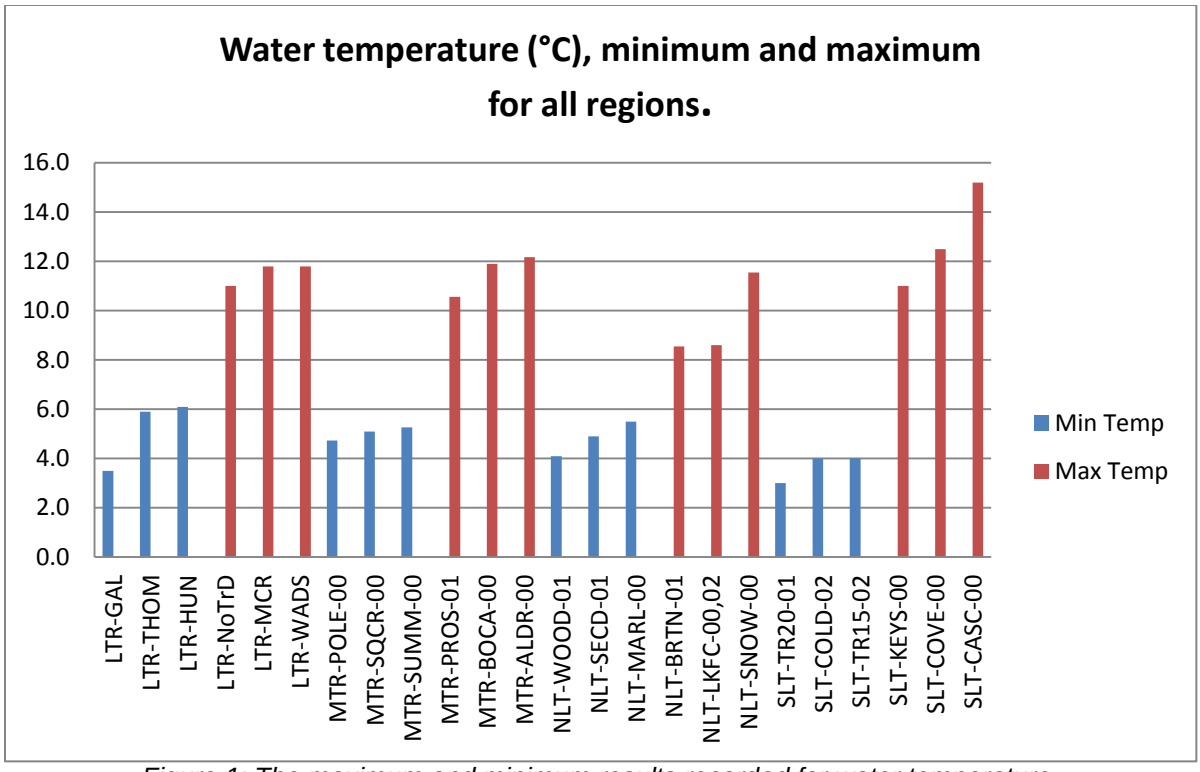
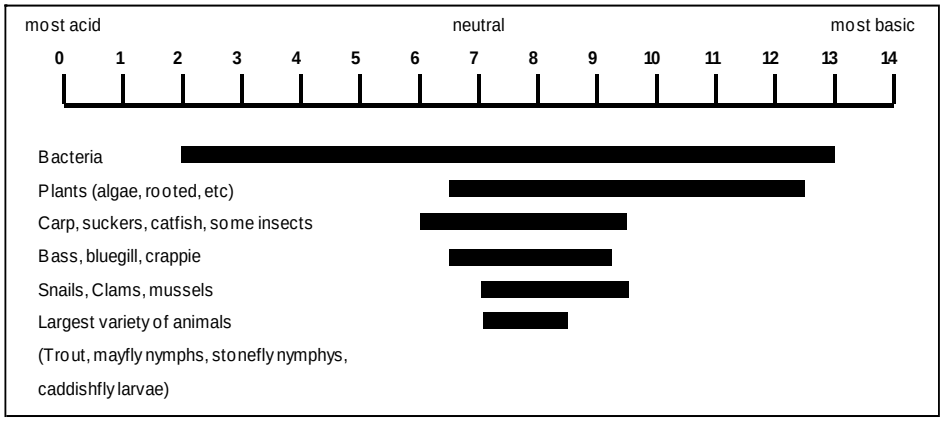


Figure 1: The maximum and minimum results recorded for water temperature.

pH

PH is a measurement of the degree to which water is “acidic” or “basic.” PH is measured on a scale of 0 (very acidic) to 14 (very basic) with 7 in the middle as “neutral.” Most aquatic life prefers a pH close to 7. **Figure 2** displays the pH ranges that support aquatic life.



pH ranges that support aquatic life.

Figure 2: pH range that supports aquatic life

Water in California within the Lake Tahoe Basin should not be below 7 or above 8.4. Water within the Nevada Truckee Region should not be below 6.5 or above 9.0. The Regional Board recognizes that some waters of the Region may have natural pH levels outside the 7.0 to 8.5 range, and this is commonly found in the tributaries to Lake Tahoe.

The minimum recorded pH was 5.5 and was recorded in all regions except the Middle Truckee River. The highest recorded pH was 9.2 from the Tahoe Keys Marina, Cove East in the South Lake Tahoe Region. Of the 72 sample sites 13 sites had recorded pH below the optimal range and 9 sample sites had a recorded pH value above the optimal range.

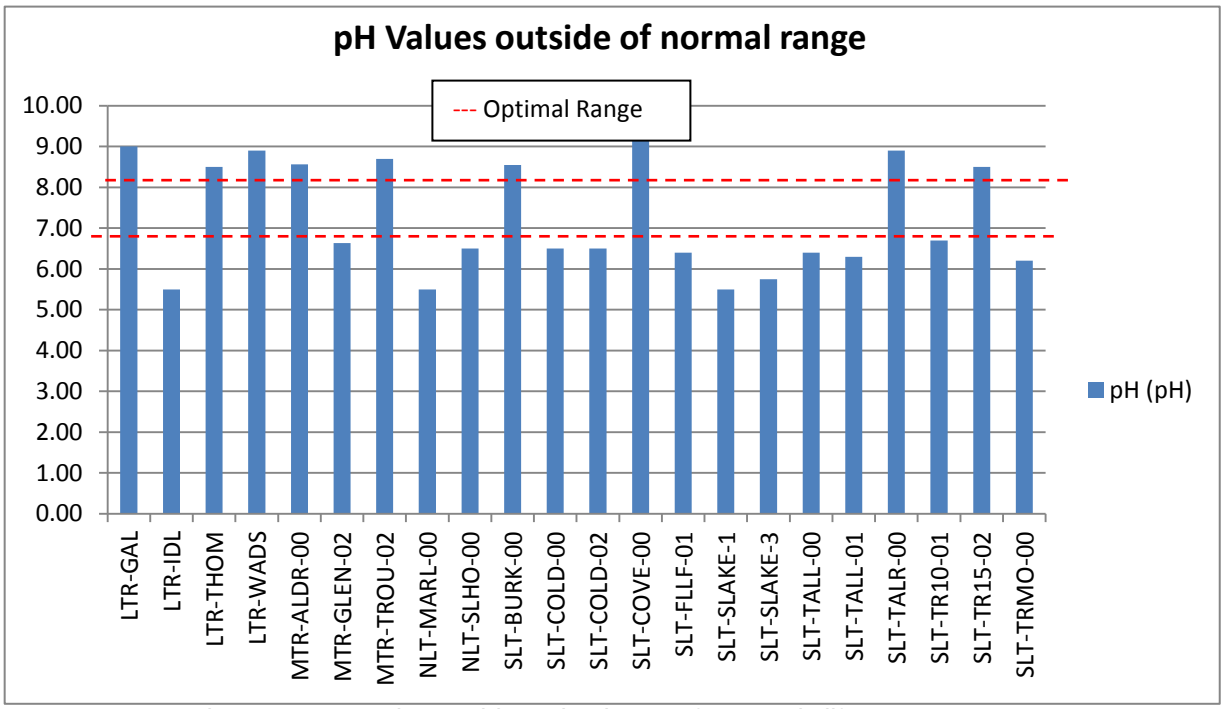


Figure 3: pH results outside optimal range for aquatic life.

Dissolved Oxygen (DO)

Dissolved oxygen is a measure of the amount of gaseous oxygen (O2) dissolved in water. Dissolved oxygen is necessary to maintain adequate water quality and support aquatic life. Stress occurs in aquatic life, especially fish, when dissolved oxygen levels drop too low.

Low dissolved oxygen concentrations are typically the result of:

- Warming water: warmer water is able to dissolve and hold less oxygen than cooler water
- Excess nutrients: too many nutrients in the water can fuel algae and bacteria growth which consume oxygen
- Slow or stagnant water: movement allows for oxygen and water to mix

Water quality objectives for dissolved oxygen vary from region to region, most water within the Lake Tahoe Basin must have a dissolved oxygen concentration of 8.0 mg/L. Water within the Truckee River basin mush had a dissolved oxygen concentration of 5.0 mg/L or 6.0 mg/Ldepending on the reach of the river. Measurements below 5 mg/L are considered dangerous for cold water aquatic life.

The minimum dissolved oxygen content measured was 3.0 mg/L at Burton Creek at Star Harbor. The highest recorded dissolved oxygen content was 11.0 mg/L at the Squaw Creek. Dissolved oxygen content was measured at 74 sites. 3 of the 29 Truckee River tests had a reading above 6.0 mg/L and only one test was below 5mg/l. 39 of the 45 sample tests from the Lake Tahoe Basin were below the 8.0 mg/L standard and 9 sample tests were below 5mg/L.

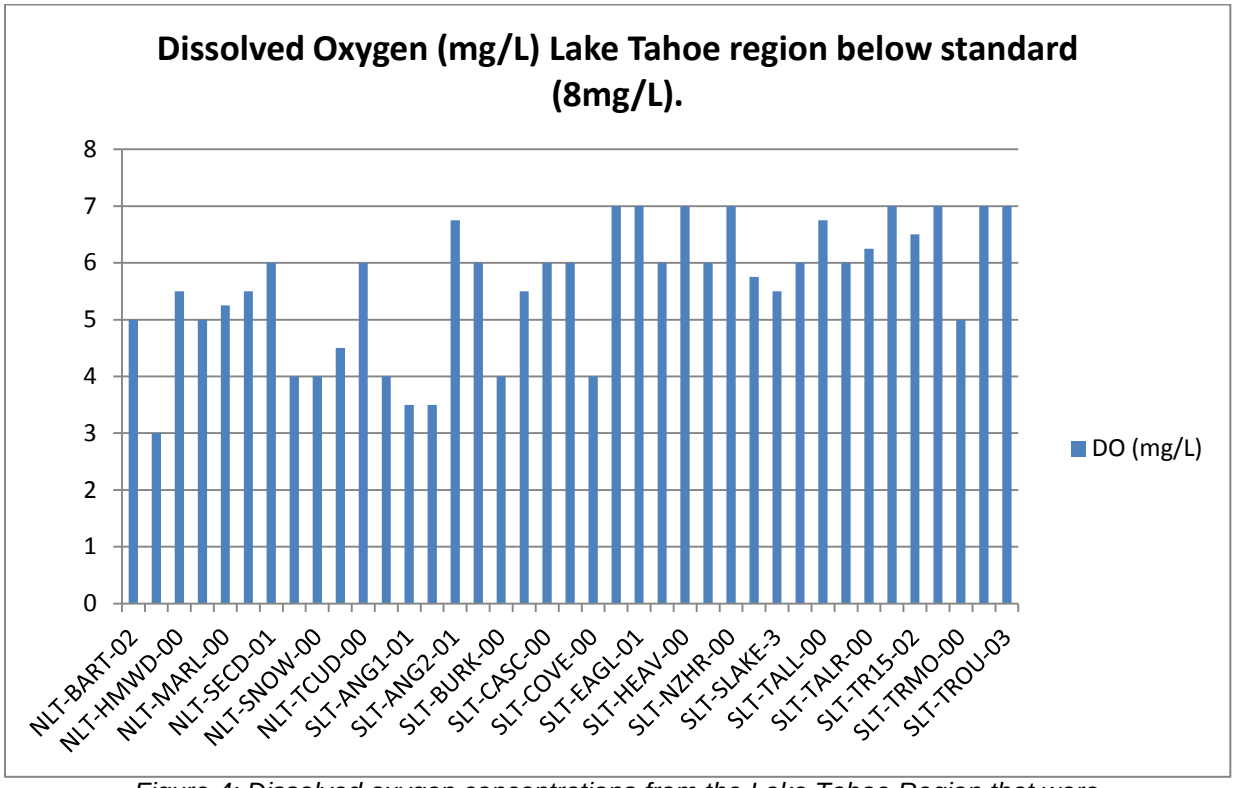


Figure 4: Dissolved oxygen concentrations from the Lake Tahoe Region that were below the 8mg/L standard.

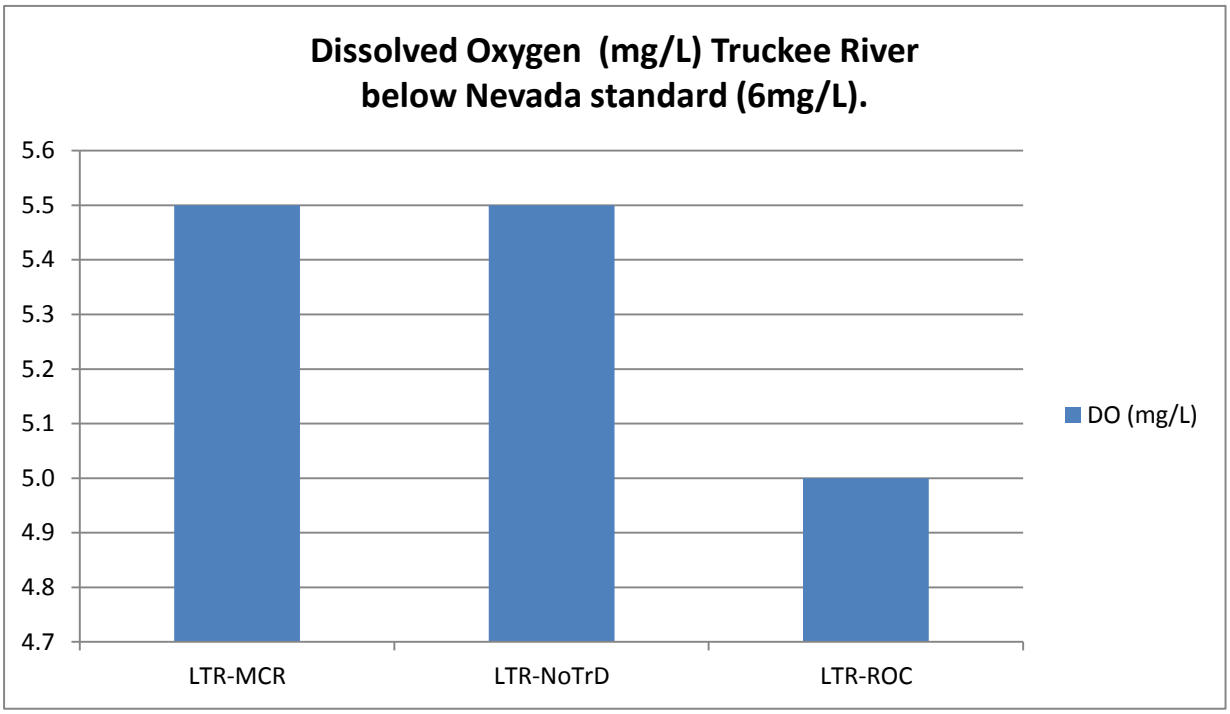


Figure 5: Dissolved oxygen concentrations from the Truckee River that were below the 6mg/L standard.

Turbidity

Turbidity is a measure of the amount of suspended particles in the water. Turbidity is measured in NTUs (Nephelometric Turbidity Units); high NTU levels often indicate poorer water clarity. Algae, suspended sediment, organic matter, and some pollutants can cloud the water making it more turbid. High sediment loads can clog the gills of fish, negatively affect gravel beds and smother fish eggs and benthic invertebrates. The sediment can also carry pathogens, pollutants and nutrients that affect Lake Tahoe's water quality.

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. California is located within this Eco-Region, but the state of Nevada is located right outside this Eco-Region. The TRPA and the Lahontan Regional Water Quality Control Board (LRWQCB) have a near shore turbidity standard of 1-3 NTUs (measured by monthly means) in Lake Tahoe. This standard is rarely exceeded in Lake Tahoe. The standard for the Truckee River and many nearby streams in the State of Nevada is 10 NTU.

Most turbidity samples were indicative of good water quality. For the Truckee River 33 samples were analyzed for turbidity and only one site had a reading above 10 NTU, the Middle Truckee River at Gelnshire above pond with a read of 11.81 NTU. The Lake Tahoe watershed was sampled at 45 locations, of these 8 locations had results above the nearshoe turbidity standard. The highest turbidity reading of the 2015 Snapshot Day event was 16.0 NTU from Snow Creek. This sample contained insect and possible insect larva which caused the high reading, the presence of macro invertebrates is an indicator of stream health even though the turbidity level was high.

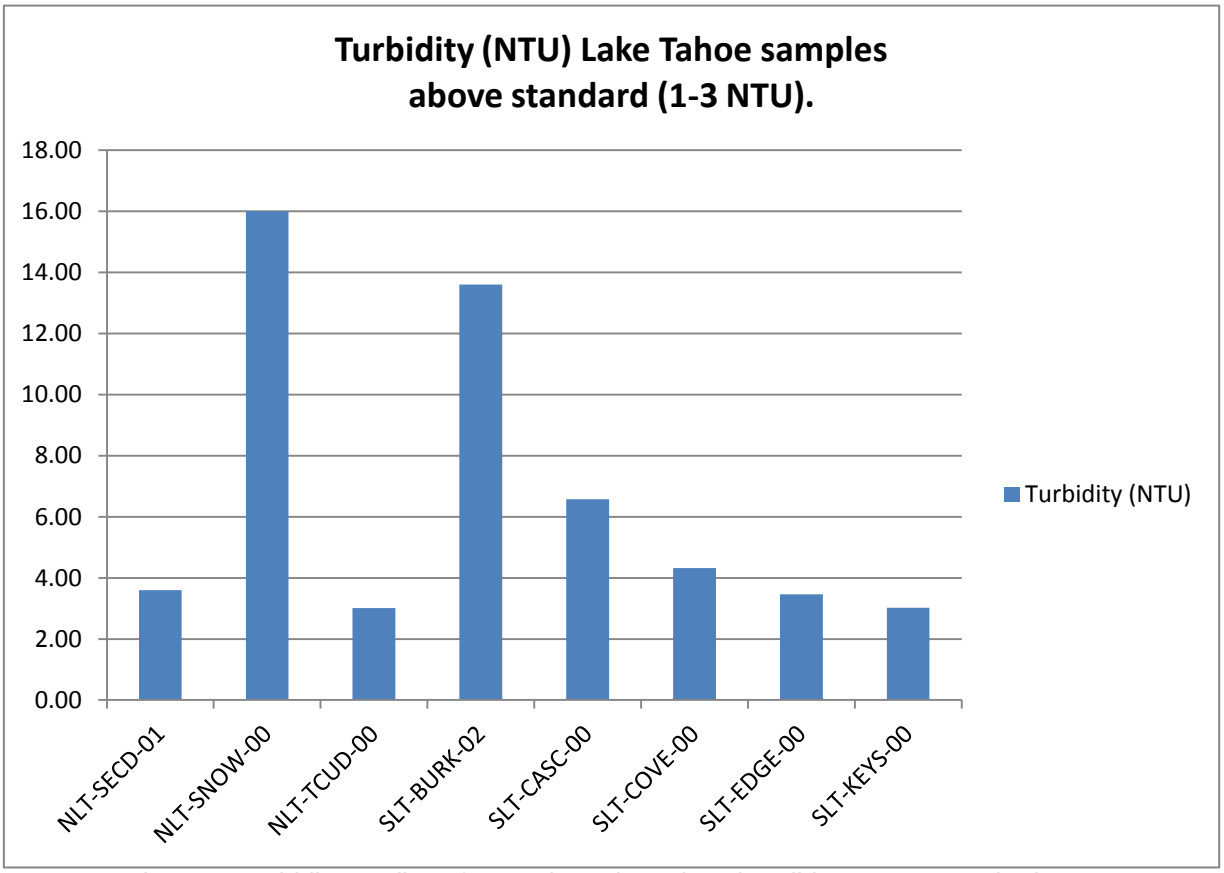


Figure 6: Turbidity readings from Lake Tahoe sites that did not meet standard.

Stream Flow

Stream flow is the measure of the volume of water that is flowing, which varies with precipitation. Due to an extremely low snowpack, as of March 2015 the snow depth within the Tahoe Basin was 37 inches, the lowest value ever recorded. The snowpack across Nevada and the eastern Sierra ranged from 0%-36% as of May 1 2015. Flows on all rivers and streams in Nevada and Eastern California are expected to be below normal this spring and summer 2016.

One of the major goals of Snapshot Day is to gain information on the vast numbers of streams and creeks that are not routinely measured for water quality or stream flow. 13 out of 64 streams in the Tahoe are regularly measured. The Middle and Lower Truckee have fewer streams under regular monitoring.

Volunteers classified the observed stream flow for 39 of the 80 sample sites. Stream flow was classified as follows:

Dry creek bed	Isolated pools	Trickle	Slow to smooth	Moderate to rippling	Rapid to turbulent	Flooding
1	0	6	12	16	4	0

Table 4: Number of monitored sites given the designated stream flow classification

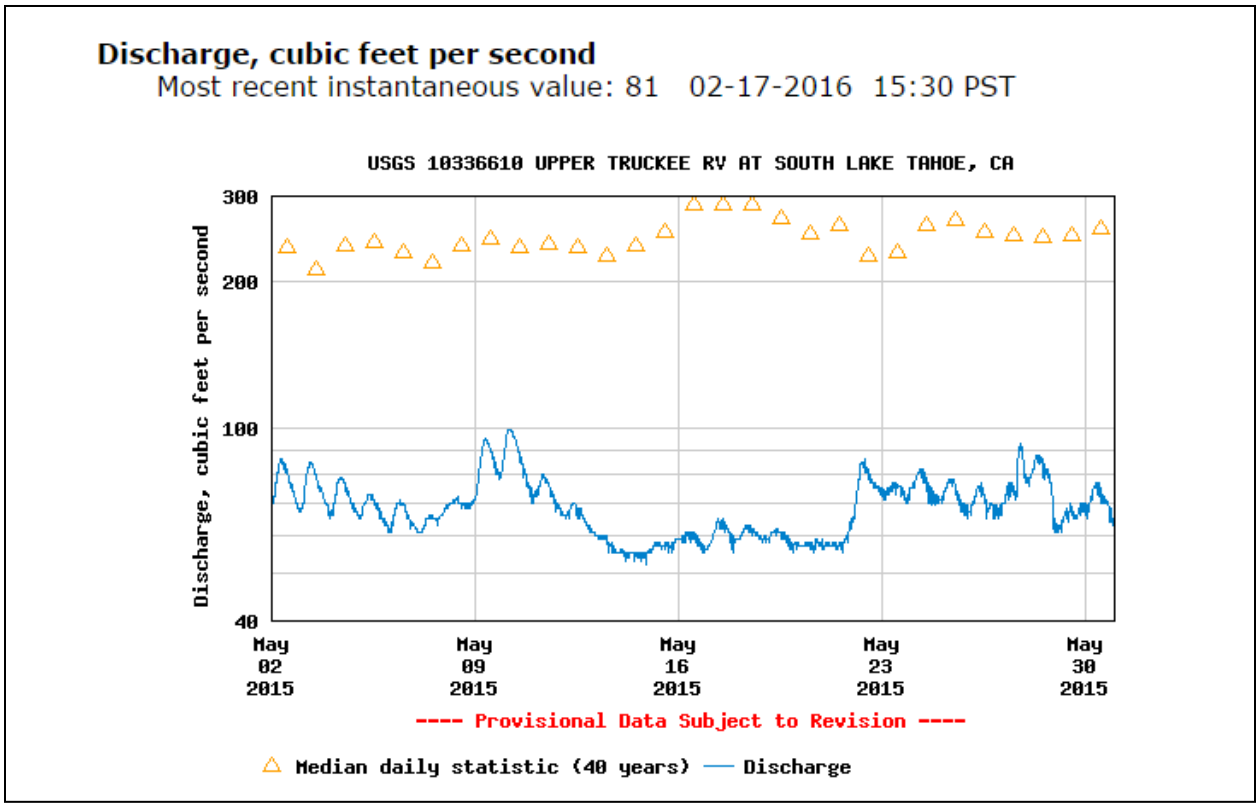


Figure 7: Stream flow data from Upper Truckee River at South Lake Tahoe, California

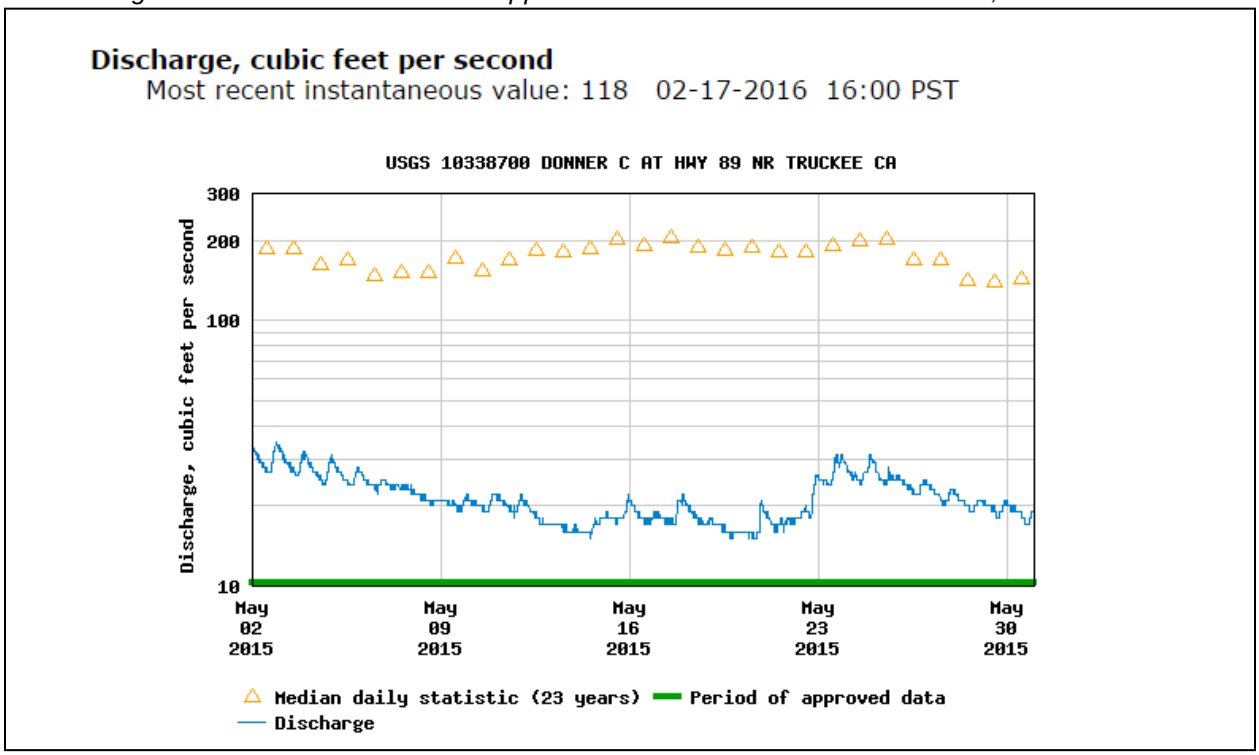


Figure 8: Stream flow data from Donner Creek at Highway 89 near Truckee, California

Conductivity

Conductivity is a measure of waters ability to pass an electric current. In water conductivity is affected by the presence of inorganic dissolved solids such as chloride, nitrate, calcium, sulfate and others. Conductivity in rivers and streams is mainly influenced by the geology through which the water flows.

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

Table 5: Acceptable conductivity for different water types

Abrupt changes in conductivity may indicate that new water sources or wastes are being diverted into a stream or river. Acceptable ranges for water conductivity are dependent on the water type. **Table 5** displays acceptable conductivity ranges for several water types. Conductivity was measured at 73 sample sites. The minimum tested conductivity was 10 µS/cm measured at three locations in the South Lake Tahoe region: Cascade Creek above Hwy 89, Eagle Falls Creek at Mouth, and Eagle Falls above Hwy 89. The highest tested conductivity was 550 µS/cm at the Truckee River at McCarran Ranch.

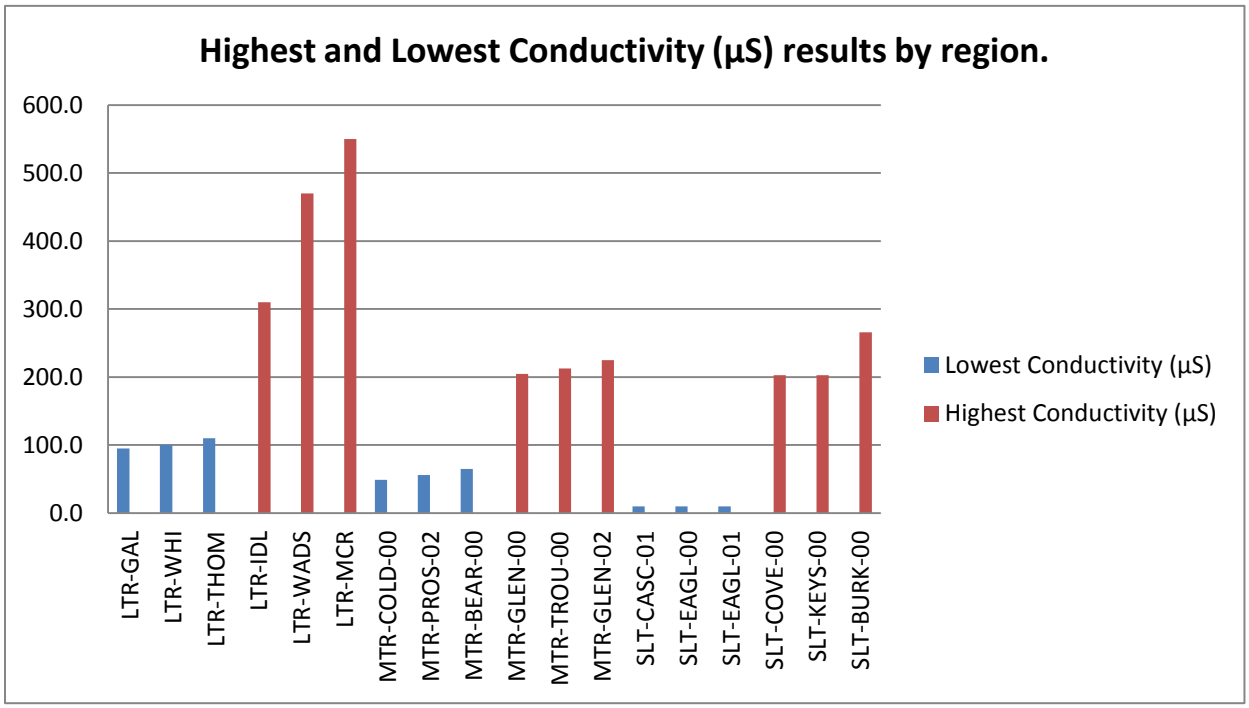


Figure 9: 10 highest and lowest conductivity values from Snapshot Day 2015 by region.

Total Dissolved Solids

Total dissolved solids (TDS) is a measurement of the combine inorganic and organic substances suspended in a liquid. Similarly to conductivity, total dissolved solids is typically not considered a primary pollutant, but is considered an indicator for the presence of nutrients and particles that can affect water quality such as nitrate, phosphorus, silt and clay particles, and algae. Abrupt changes in total dissolved solids can indicate new sources of pollution. High total dissolved solids often make water difficult for fish to spawn in and can make it inhospitable to juvenile fish.

In Nevada, most water bodies should have a total dissolved solids reading of less than 500 mg/L for both a single value reading and annual average. In California, the total dissolved solids standards reading is dependent of the water body. For example in Lake Tahoe the standard is 70mg/L(single sample value), in the Upper Truckee River the standard is 55mg/L, and in Burton Creek the standard is 90 mg/L. The EPA has a maximum standard of 500mg/L for total dissolved solids in drinking water.

Total dissolved solids was measured at 22 sites. The minimum recorded measurement was 35 mg/L at North Lake Tahoe, Quail Lake Creek at mouth. The highest recorded total dissolved solids measurement was 310 mg/L at Lower Truckee River at McCarran Ranch. 3 of the 15 total dissolved solids measurements from Lake Tahoe fell below the 70mg/L standard.

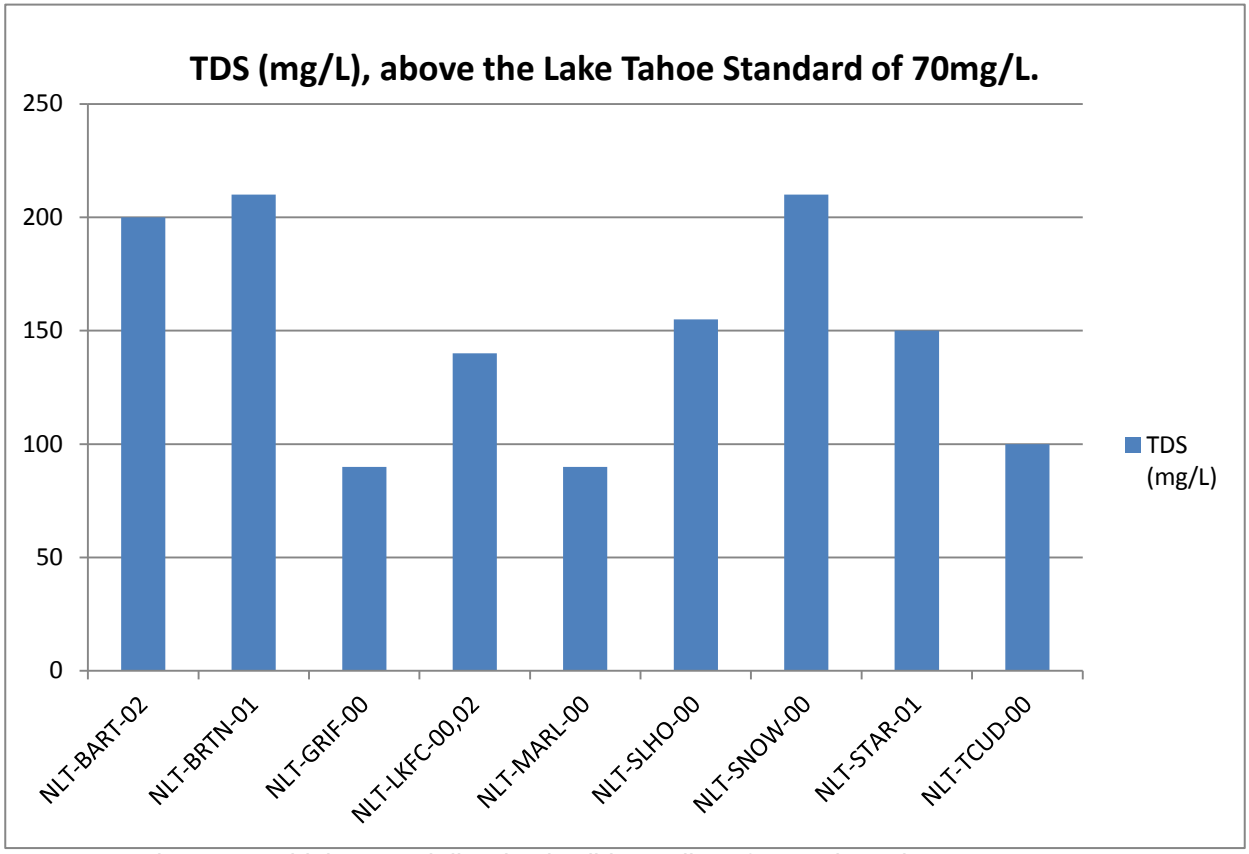


Figure 10: 5 highest total dissolved solids readings from Lake Tahoe

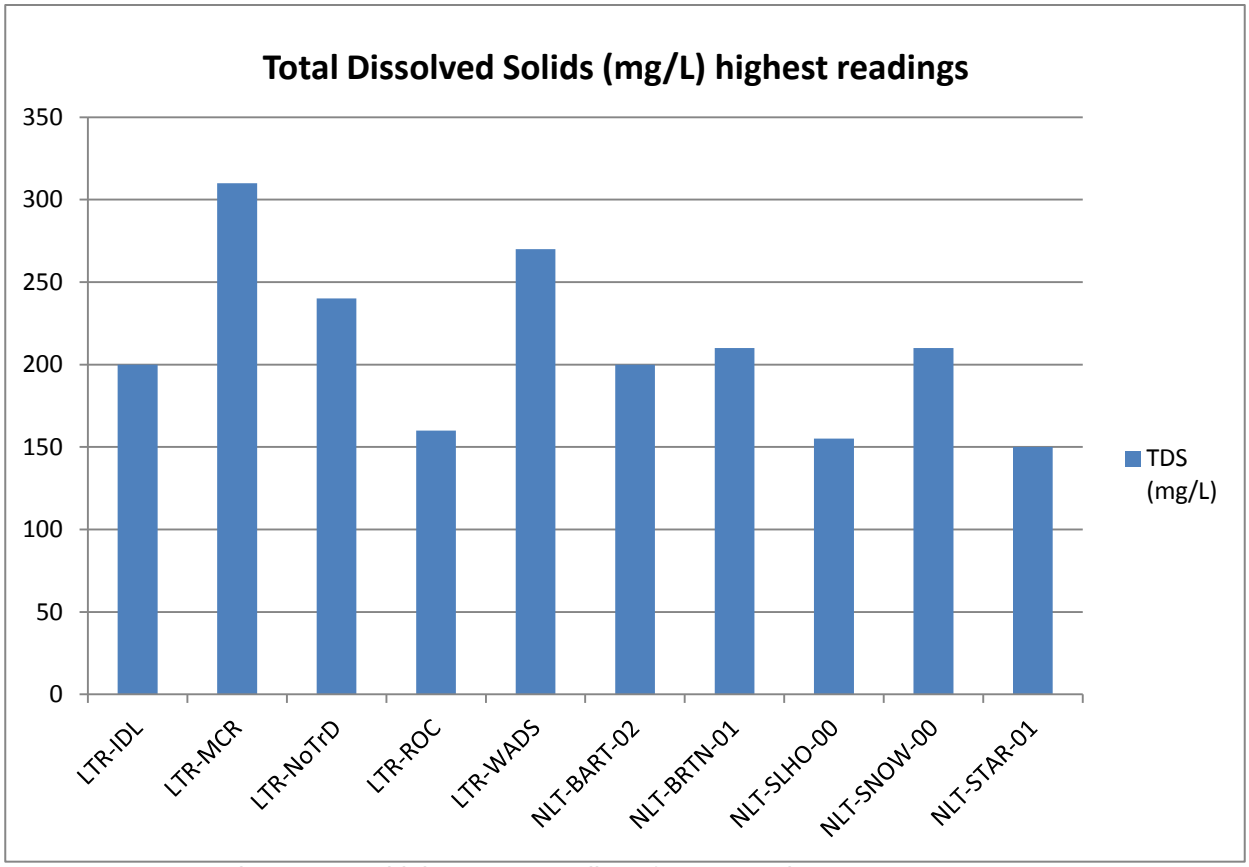


Figure 11: 10 highest TDS readings from Snapshot Day 2015

Fecal Coliform Bacteria

Coliform bacteria are found in the feces of warm-blooded animals, including humans, pets, livestock, beavers, and birds. Fecal coliform is measured in colony forming units counted per 100 milliliters of water (CFU/100ml). CFU are roughly equivalent to the number of bacteria cells. The Lahontan Regional Water Quality Control Board standard for fecal coliform is 20 counts per 100 ml for a single occurrence.

Fecal coliform was measured at 39 locations. 5 of these samples had readings greater than 20 CFU/100ml. 3 samples had zero bacteria recorded. 2 sample locations form the Lower Truckee region had fecal coliform readings of greater than 600 CFU/100ml. These three locations were: North Truckee drain, and Truckee River at Rock Park.

Additionally 61 locations were measured for E. coli coliform. 9 of these locations had reading greater than 20 CFU/100ml, 26 samples had zero bacteria recorded. The maximum E. coli coliform reading was 845 CFU/100ml and was taken at the Truckee River at Rock Park.

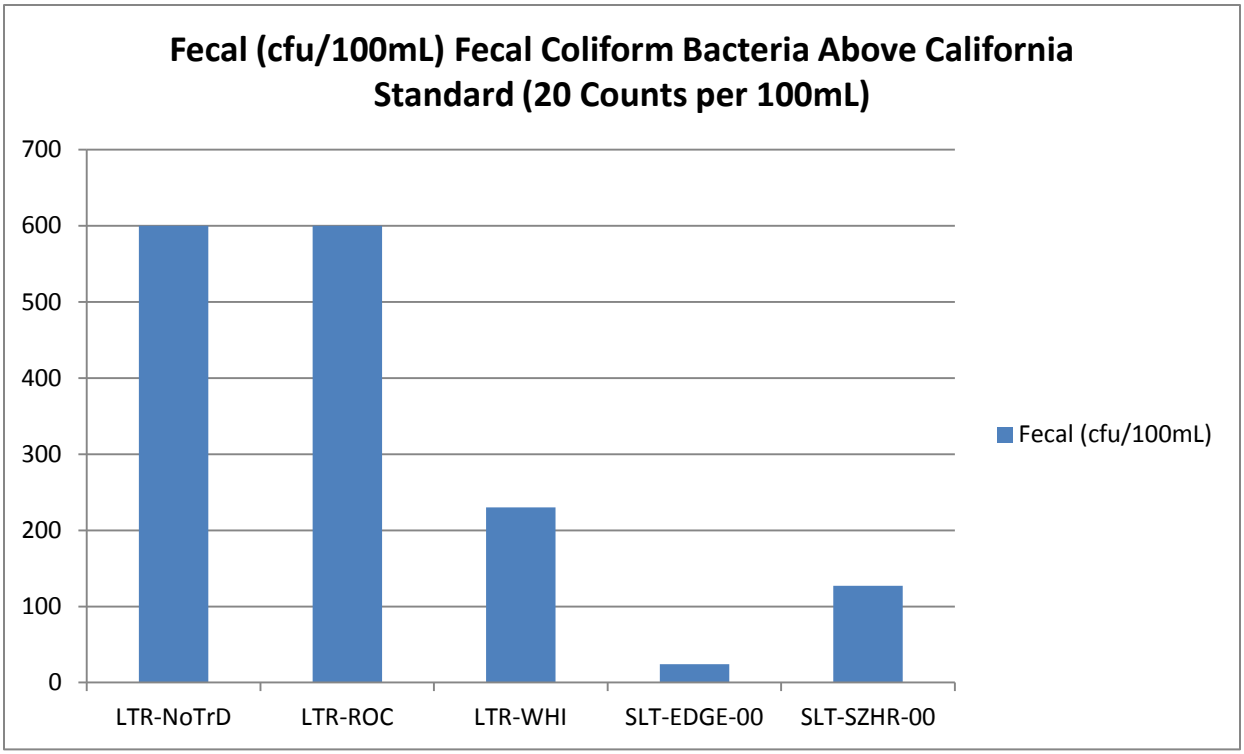


Figure 12: Fecal coliform bacteria counts above California standard

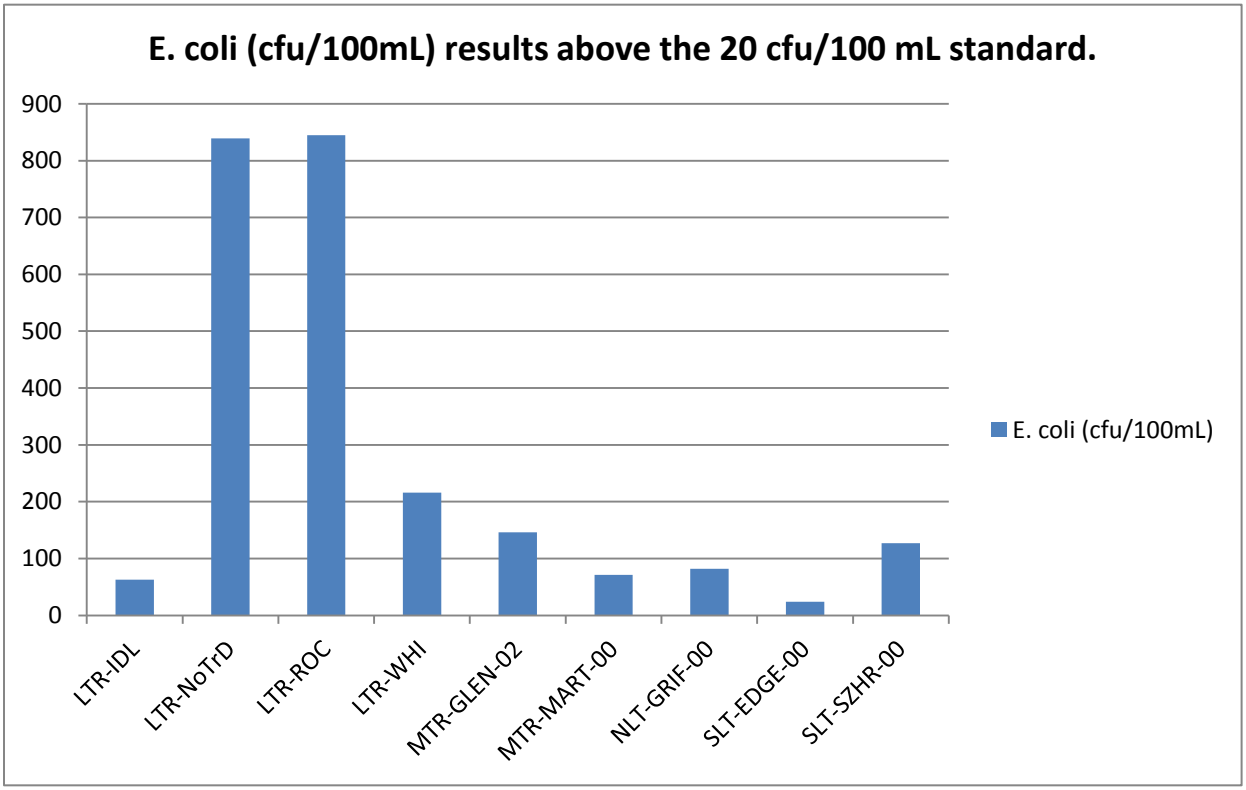
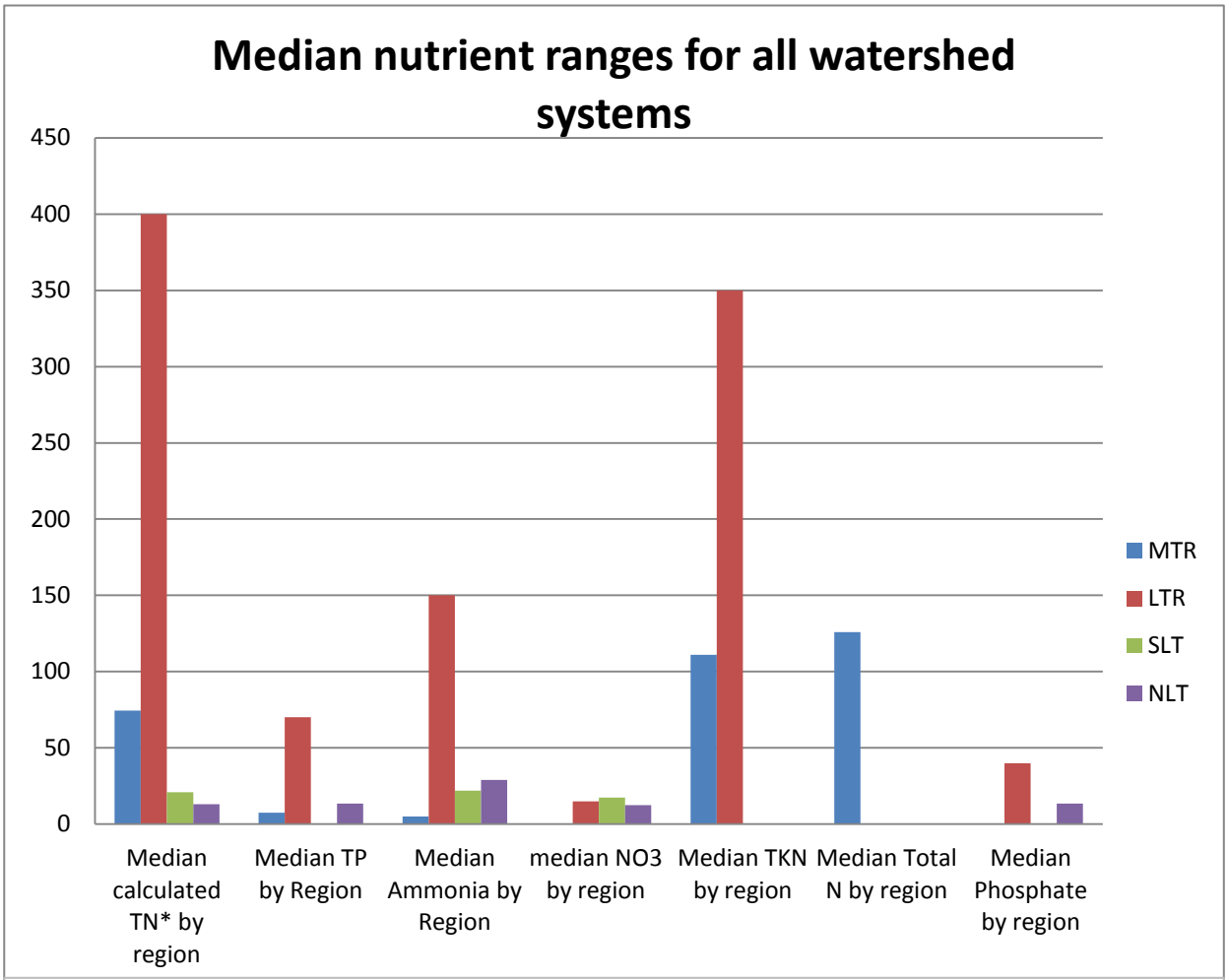


Figure 13: E. coli coliform bacteria counts above California standard

Nutrients

Fifty-three samples were analyzed for nitrogen and phosphorus, which are of most concern for algae growth and water clarity. 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.



* Calculated Total Nitrogen results for Lake Tahoe regions, are not inclusive of a TKN value and represent the sum of all nitrogen values available.

Figure 14: Median nutrient ranges for all watershed systems.

Nitrogen:

Nitrogen naturally occurs in any watershed, but excessive amounts are damaging as stated above. Nitrogen is very mobile so the dissolved portion is generally of greater concern.

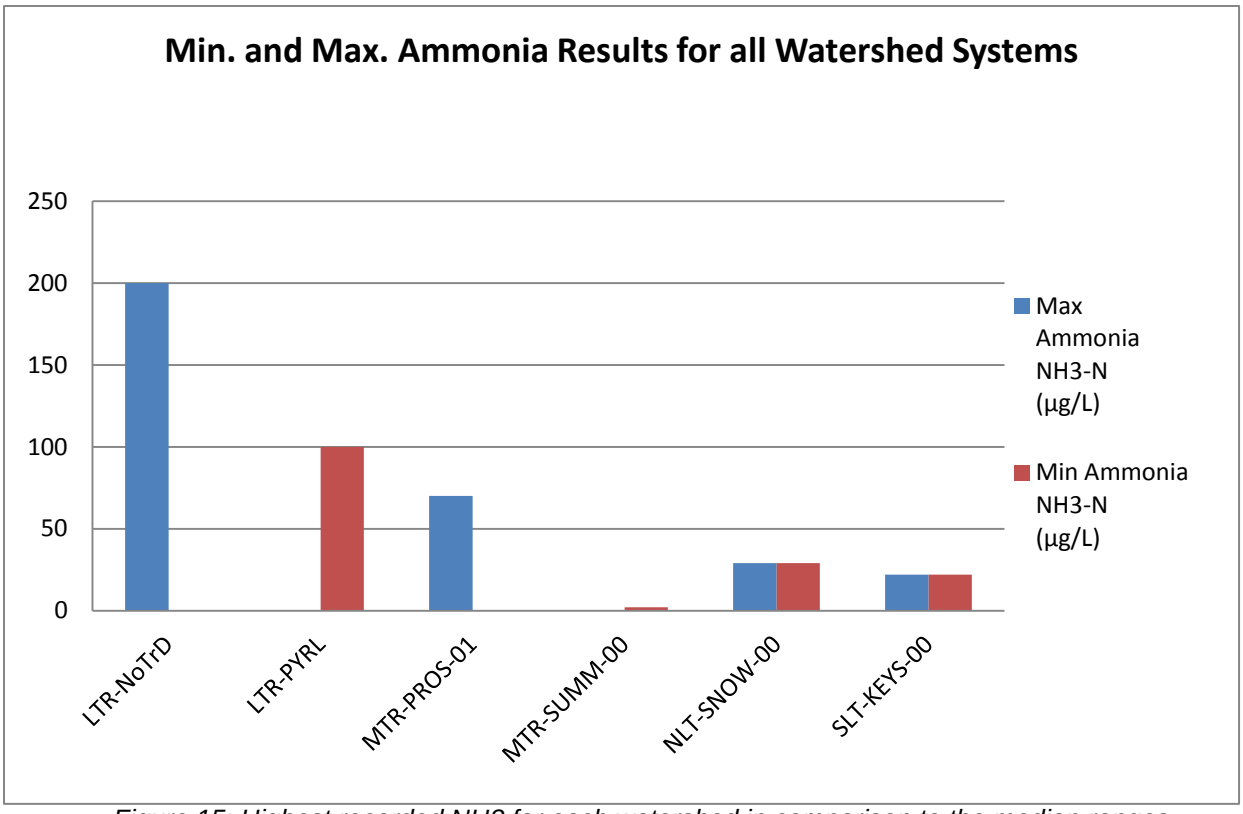


Figure 15: Highest recorded NH3 for each watershed in comparison to the median ranges.

Visual Observations

Visual observations were recorded at 39 of the 80 sample sites. Most recorded observations were indicative of good water quality conditions. 34 samples locations noted that water samples had no odor and 3 sample locations noted a fresh algae sample. 24 sample locations noted the presence of algae or water plants, 5 locations noted foam or suds, and 2 sites noted an oily sheen. Litter or trash was noted at 1 Middle Truckee River location.

Sample Odor

None	Fresh algae	Chlorine	Rotten eggs	Sewage	Other
34	3	0	0	0	0

Table 6: Number of monitored sites given the sample odor classification

Other presence

Algae or other water plants	Oily Sheen	Foam or suds	Litter or trash	Other
24	2	5	1	1

Table 7: Number of monitored sites with the presence of the objects noted

Discussion

The data collected for Snapshot Day 2015 is indicative of overall water quality with very few major issues. As discussed in previous sections, the majority of the samples collected meet the standards for their region. Parameters such as fecal coliform and dissolved oxygen were somewhat elevated, and many of the "hot spot" sites from previous years continue to need closer scrutiny. As previous data sets are compiled and date storage is improved, this program will have the ability to show long term trends and better assist agencies. This event is in its 15th year. It has been funded primarily through local, state and private agencies. The extensive event coordination is partner driven, and participation by an almost entirely volunteer participant base is exceptional. The collaboration and continued dedication of those involved – from dedicated staff to engaged citizen volunteers, makes Snapshot Day a success each year. The ongoing success of this type of event exemplifies the value of citizen science, and shows how community members can provide invaluable data collection and learn about their watershed at the same time.

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

- *North Lake Tahoe Incline Village:* Sarah Vidra (775) 832-1284; Incline Village GID Waste Not
- *South Lake Tahoe:* Savannah Rundroff (530) 541-5388; League to Save Lake Tahoe
- *Middle Truckee River (Tahoe City to Nevada State Line)*: Erin Casey, (530) 550-8760, x7; Truckee River Watershed Council
- *Lower Truckee River (Nevada Stateline to Pyramid Lake)* Contact Mary Kay Wagner,(775) 687-9454; Nevada Division of Environmental Protection,

References

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Water Supply Outlook, Natural Resource Conservation Service website, www.nrcs.us.gov

Appendix A – Resource Partners

2015 Snapshot Day sponsors

- California State Water Resource Control Board
- Lahontan Regional Water Quality Control Board
- Lake Tahoe Community College
- Nevada Division of Environmental Protection
- Nevada Division of State Lands
- Nevada State Health Laboratory
- Pyramid Lake Paiute Tribe
- Tahoe Environmental Research Center
- Tahoe Regional Planning Agency
- Tahoe Water Suppliers Association
- Truckee River Watershed Council
- United States Geologic Survey
- League to Save Lake Tahoe
- Waste Not, Incline Village General Improvement District

Citizen Monitoring Working Group Snapshot Day Planning Committee

- Erin Casey (Truckee River Watershed Council)
- Mary Kay Wagner (Nevada Division of Environmental Protection)
- Savannah Rudroff (AmeriCorps Volunteer, League to Save Lake Tahoe)
- Sarah Vidra (Incline Village General Improvement District)
- Joe Hill (AmeriCorps Volunteer, Incline Village General Improvement District)
- Madonna Dunbar (Tahoe Water Suppliers Association)

Organizations involved in putting on Snapshot Day 2015

- Incline Village General Improvement District
- League to Save Lake Tahoe
- Nevada Division of Environmental Protection
- Truckee River Watershed Council
- Tahoe Water Suppliers Association (TWSA)
- The City of South Lake Tahoe
- Lahontan Regional Water Quality Control Board
- Nevada Division of State Lands (NDSL)
- Pyramid Lake Paiute Tribe (PLPT)
- University of Nevada Reno (UNR) Electrical Engineering Department
- US Geological Survey, Carnelian Bay Field Station

Laboratory Analysis (Nutrients and Bacteria)

- South Lake Tahoe Public Utility District
- Nevada State Health Laboratory
- Lahontan Regional Water Quality Control Board Laboratory
- United States Geologic Survey
- Incline Village General Improvement District
- High Sierra Water Lab

Equipment and Contact

- CA State Water Resource Clean Water Team, Erick Burres
- Incline Village General Improvement District, Sarah Vidra
- Lake Tahoe Community College, Kathy Strain

- Nevada Division of Environmental Protection, Mary Kay Wagner
- Tahoe Regional Planning Agency, Devin Middlebrook
- Truckee River Watershed Council, Erin Casey
- United States Geological Survey, Paul Honeywell

Education Partners

- Lake Tahoe Community College (LTCC)
- Mountain View Montessori
- Natchez Elementary School
- High Desert Montessori
- Sage Ridge Middle School
- Excel Christian School
- Spanish Springs High School
- Washoe Innovation High School
- Washoe County On-line School

Resource Partners

- NDEP staff
- U.S. Geological Survey
- Great Basin Institute
- WET Laboratory
- Washoe County School District
- Sierra Nevada Journeys
- City of Sparks Public Works
- City of Reno Public Works
- City of South Lake Tahoe
- Incline Village GID
- The Nature Conservancy
- NV Dept. of Transportation
- Pyramid Lake Environmental Staff

Special thanks to

- Lake Tahoe Community College
- Nevada Division of Environmental Protection for funding nutrient analysis for the Lower Truckee River monitoring sites
- 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, Truckee CA office, for coordinating bacterial analysis
- Truckee Meadows Water Reclamation Facility for nutrient analysis, Lower Truckee River
- Lisa Petrusa, LRWQCB, bacteria and turbidity sampling and analysis
- Rebecca Sawyer Williams, IVGID, turbidity analysis
- Waterman's Landing for hosting the North Lake Tahoe event
- **And all the volunteers that make Snapshot Day possible!**

Appendix B – Site names and codes

Snapshot Day site and site code are listed below.

South Lake Tahoe	
SLT-ANG1-02	Angora Creek above Lake Tahoe Blvd
SLT-ANG3-00	Angora Creek at Truckee Confluence
SLT-ANG1-01	Angora Creek at View Circle
SLT-ANG2-01	Angora Creek at Washoe Meadows
SLT-BURK-00	Burke Creek at mouth
SLT-BURK-02	Burke Creek below Hwy 50
SLT-CASC-01	Cascade Creek above Hwy 89
SLT-CASC-00	Cascade Creek at mouth
SLT-COLD-02	Cold Creek above Pioneer Trail
SLT-COLD-00	Cold Creek at Confluence with Trout Creek
SLT-EAGL-01	Eagle Falls above Hwy 89
SLT-EAGL-00	Eagle Falls Creek at mouth
SLT-EDGE-00	Edgewood Creek at mouth
SLT-FLLF-01	Fallen Leaf Lake
SLT-HEAV-00	Heavenly Creek at Confluence with Trout Creek
SLT-NZHR-00	North Zephyr Creek at mouth
SLT-SLAKE-1	Ski Run Marina
SLT-SZHR-00	South Zephyr Creek at mouth
SLT-COVE-00	Tahoe Keys Marina, Cove East
SLT-KEYS-00	Tahoe Keys West Channel
SLT-TALL-01	Tallac Creek above Hwy 89
SLT-TALL-00	Tallac Creek at mouth
SLT-TALR-00	Taylor Creek at mouth
SLT-SLAKE-3	Timber Cove
SLT-TROU-03	Trout Creek at Blackbart Bridge
SLT-TROU-01	Trout Creek at Confluence with UTR
SLT-TROU-02	Trout Creek at Grinding Stone
SLT-TR15-02	Upper Truckee River at Airport
SLT-TR20-01	Upper Truckee River at Elks Club Bridge
SLT-TRMO-00	Upper Truckee River at mouth
SLT-TR10-01	Upper Truckee River Below Lake Tahoe Blvd
North Lake Tahoe	
NLT-BART-02	Barton Creek above Hwy 28
NLT-BRTN-01	Burton Creek at Star Harbor
NLT-FRST-00	First Creek at mouth
NLT-GRIF-00	Griff Creek at mouth
NLT-STAR-01	Hatchery Creek at Star Harbor

North Lake Tahoe (continued)	
NLT-HMWD-00	Homewood Creek at mouth
NLT-LKFC-00,02	Lake Forest Creek at mouth
NLT-MARL-00	Marlette Creek at mouth
NLT-MILL-01	Mill Creek below Lakeshore Dr
NLT-QULC-00	Quail Lake Creek at mouth
NLT-SECD-01	Second Creek above Lakeshore Dr
NLT-SCRT-00	Secret Harbor Creek at mouth
NLT-SLHO-00	Slaughter House at the mouth
NLT-SNOW-00	Snow Creek at mouth
NLT-TCUD-00	Tahoe City Urban Ditch at lake
NLT-WOOD-01	Wood Creek at Lakeshore Dr
Middle Truckee River	
MTR-ALDR-00	Alder Creek
MTR-BEAR-00	Bear Creek
MTR-CABN	Cabin Creek Basin
MTR-COLD-00	Cold Creek at Donner Creek
MTR-DONN-03	Donner at Donner Lake outflow
MTR-DONN-01	Donner at Highway 89
MTR-EMAR	East Martis Creek at bridge
MTR-GLEN-02	Glenshire above pond
MTR-BOCA-00	Little Truckee River Below Boca Dam
MTR-BOCA-01	Little Truckee River Below Boca Dam
MTR-MART-01	Martis Creek at COE boundary
MTR-MART-00	Martis Creek at mouth
MTR-SUMM-00	Mouth of Summit Creek at inlet to Donner Lake
MTR-POLE-00	Pole Creek
MTR-PROS-02	Prosser at Highway 89
MTR-PROS-01	Prosser Creek below dam
MTR-SQCR-00	Squaw Creek
MTR-TROU-02	Trout Creek at Bennett Flat
MTR-TROU-00	Trout Creek at mouth
MTR-TOWN	Truckee River at Regional Park
MTR-BIGC	Truckee River in Big Chief Corridor
MTR-GLEN-00	Union Valley Creek at SFFCC road
Lower Truckee River	
LTR-GAL	Galena Creek
LTR-HUN	Hunter Creek
LTR-NoTrD	North Truckee Drain
LTR-PYRL	Pyramid Lake
LTR-THOM	Thomas Creek

Lower Truckee River (continued)	
LTR-IDL	Truckee River at Idlewild Park
LTR-MCR	Truckee River at McCarran Ranch
LTR-ROC	Truckee River at Rock Park
LTR-NIXB	Truckee River above Nixon Bridge
LTR-WADS	Truckee River at Wadsworth
LTR-WHI	White's Creek (Old Virginia Rd)

Appendix C – Monitoring equipment

The majority of the monitoring teams are 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). Turbidity meters, used at the staging locations, were supplied by TRWC and TRPA.

Nutrient and bacteria samples are kept chilled with ice or blue ice in coolers from the point of collection until arrival at the lab for analysis.. Bacteria samples are collected in sterile Whirl-packs and nutrient and turbidity samples were collected in clean (acid rinsed) Nalgene® plastic bottles.

Bacteria samples are then 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 Truckee. 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 method, SM9222 from Standard Methods for Water and Wastewater Analysis, 21 Edition, 2007.

Nutrient samples collected from Lake Tahoe and delivered to South Lake Tahoe Public Utility District in South Lake Tahoe within the allotted hold time, and can be several days as long as they are kept chilled to 4° Celsius. Lower Truckee River nutrient samples were taken to the Nevada State Health Lab for analysis. Middle Truckee River were processed in-house.