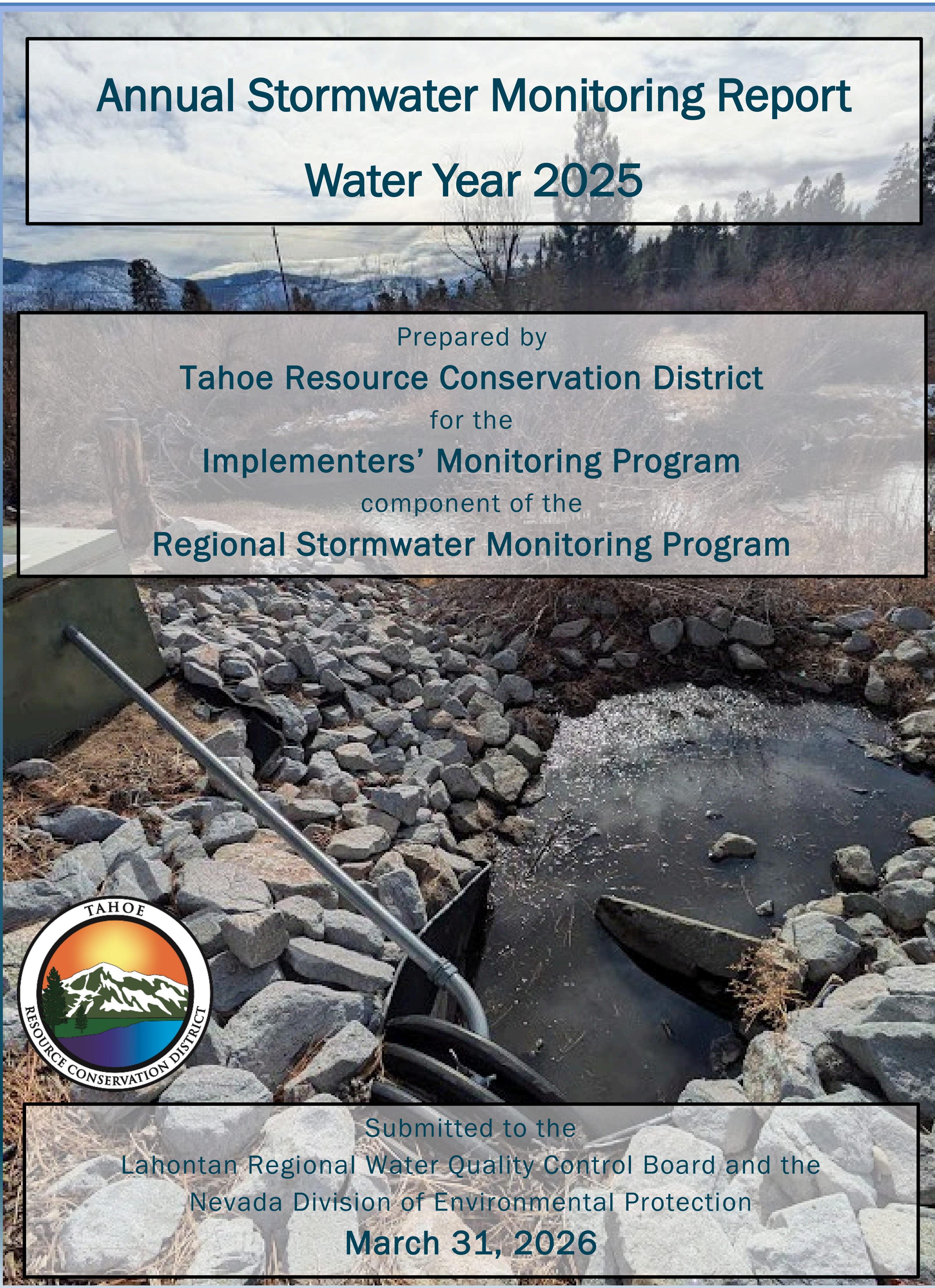

Annual Stormwater Monitoring Report

Water Year 2025

Prepared by

Tahoe Resource Conservation District

for the

Implementers' Monitoring Program

component of the

Regional Stormwater Monitoring Program

Submitted to the

Lahontan Regional Water Quality Control Board and the

Nevada Division of Environmental Protection

March 31, 2026

Annual Stormwater Monitoring Report

Implementers’ Monitoring Program (IMP), component of the Regional Stormwater Monitoring Program (RSWMP)

Funding for this project is currently provided in full through agreements with the City of South Lake Tahoe, El Dorado County, Placer County, Douglas County, Washoe County, the California Department of Transportation, and the Nevada Department of Transportation.

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Submitted by:

California

El Dorado County

Placer County

City of South Lake Tahoe

California Department of Transportation

Nevada

Douglas County

Washoe County

Nevada Department of Transportation

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List of Acronyms

AC	Autosampler Composite Sample
Autosamplers	ISCO brand automated samplers
BMP	Best Management Practice
cf	cubic feet
cfs	cubic feet per second
CI	Contech MFS Inflow
CICU	Commercial, Industrial, Communications, Utilities
CMP	Corrugated Metal Pipe
CPP	Corrugated Plastic Pipe
CO	Contech MFS Outflow
CPC	Characteristic Pollutant Concentration
CRC	Characteristic Runoff Concentration
DMS	Data Management System
EC	Elks Club
EDCY	El Dorado County Yard meteorological station
EMC	Event Mean Concentration
FB	Field Blank
FIG	Framework and Implementation Guidance document for RSWMP
FSP	Fine Sediment Particles
GS	Grab Sample
IMP	Implementers' Monitoring Program
JI	Jellyfish Inflow
JO	Jellyfish Outflow
Lahontan	Lahontan Regional Water Quality Control Board
LS	Lakeshore
MS	Manual Sample
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NPDES	National Pollutant Discharge Elimination System
NTU	Nephlometric Turbidity Units
PD	Pasadena
PI	Pasadena Inflow
PO	Pasadena Outflow
PLRM	Pollutant Load Reduction Model
PSD	Particle Size Distribution
QAPP	Quality Assurance Project Plan
QAQC	Quality Assurance, Quality Control
ROW	Right-of-Way
RSWMP	Regional Stormwater Monitoring Program
SAP	Sampling and Analysis Protocol

SB	Speedboat
SR431	State Route 431
TA	Tahoma
Tahoe RCD	Tahoe Resource Conservation District
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
TV	Tahoe Valley
USDA	United States Department of Agriculture
UT	Upper Truckee
WY	Water Year

1. Monitoring Purpose

Stormwater monitoring began in 2013 under the Implementers' Monitoring Program (IMP) to collectively fulfill California National Pollutant Discharge Elimination System (NPDES) Permit requirements and Nevada Interlocal Agreement commitments. IMP is a partnership between the California and Nevada implementing jurisdictions and was inspired by permit language that encouraged jurisdictions to comply collaboratively with regulatory requirements to promote cost savings through economies of scale. IMP is a partnership between the City of South Lake Tahoe, El Dorado County, Placer County, the California Department of Transportation (Caltrans), Douglas County, Washoe County, and the Nevada Department of Transportation (NDOT). Regulations require that California and Nevada jurisdictions in the Lake Tahoe Basin take measures to decrease pollutant loading from stormwater runoff in urbanized areas by implementing pollutant controls to decrease fine sediment particles (FSP, particles less than 16 microns) and nutrient inputs to Lake Tahoe. The Regional Stormwater Monitoring Program (RSWMP) was developed by Tahoe Resource Conservation District (Tahoe RCD) in partnership with IMP in 2015. The NPDES permit issued to California jurisdictions for the second five-year term aligned all monitoring activities with the 2017 update of the RSWMP Framework and Implementation Guidance Document (RSWMP FIG, Tahoe RCD et al 2017). In the second permit term (WY17-WY21), California jurisdictions were collectively required to monitor urban catchment outfalls at a minimum of six sites and Best Management Practices (BMPs) at a minimum of two sites for flow volumes and pollutant loads. No changes were made to the permit requirements in the third permit term (WY22-WY26). The Nevada Interlocal Agreements require participation in IMP. Monitoring provides empirical data that will be used to assess nutrient and sediment loading in chosen catchments and evaluate BMP effectiveness at chosen BMPs.

All data is collected in a manner consistent with RSWMP monitoring protocols outlined in the RSWMP FIG designed to provide consistent data collection, management, analysis, and reporting approaches so that results can easily align with RSWMP objectives. Data collected for permit and agreement compliance initiate efforts to satisfy RSWMP's primary objective of establishing sites around the Lake Tahoe Basin for long-term stormwater monitoring. Long-term data are useful in identifying status and trends in the watershed.

2. Study Design

During Water Year 2025 (WY25), nine catchments (monitoring sites) were monitored for continuous flow and sampled for water quality at twelve monitoring stations. The monitoring stations include seven catchment outfall monitoring sites (seven catchments - seven stations), one BMP monitoring site at the outfall of the Elks Club catchment (one catchment - one station), and one BMP monitoring site at SR431, a side-by-side BMP study that monitors the inflows and outflows of two BMPs (one catchment - four stations). This exceeds the minimum regulatory requirement of six monitored catchment outfalls and two monitored BMPs by one additional outfall. At the August 2019 IMP meeting, it was agreed that all seven outfalls would continue to be monitored during WY20 and WY21 to support continuity of data. In the summer of 2021, IMP agreed to make no changes to the monitoring network for WY22. No changes were made for WY23, WY24 or WY25 either. The two side-by-side BMPs at SR431 are supported through additional funding from the Nevada Department of Transportation. The catchments were chosen because of their direct hydrologic connectivity to Lake Tahoe, diversity of urban land uses, range of sizes, and a reasonably equitable distribution among the participating jurisdictions. BMP effectiveness sites were selected because of their potential efficacy in treating storm water runoff characteristic of the Lake Tahoe Basin, the broad interest in data regarding the efficiency of the selected BMPs in reducing runoff volumes and pollutant loads (especially FSP), and the importance of determining maintenance intervals required to retain effectiveness. Eight meteorological stations, each located within two miles of their paired monitoring site, are monitored for precipitation and temperature. One of the meteorological stations is shared by two monitoring sites. See Figure 1 for stormwater monitoring sites and meteorological station locations.

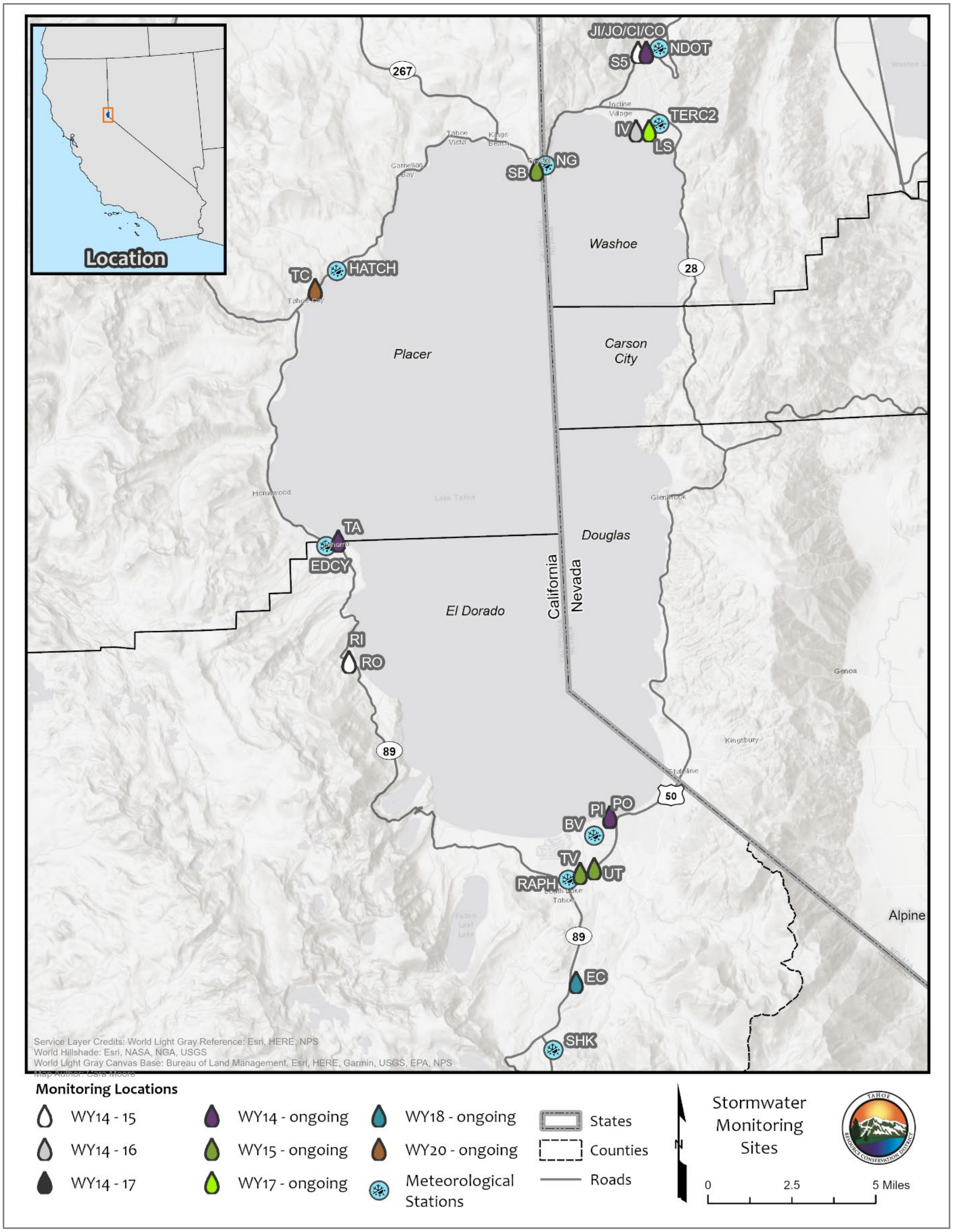

Figure 1 Past and current stormwater monitoring sites and ongoing meteorological stations. Stormwater Monitoring Stations - Jellyfish Inflow (JI), Jellyfish Outflow (JO), Contech MFS Inflow (CI), Contech MFS Outflow (CO), SR431 outfall (S5), Incline Village (IV), Lakeshore (LS), Speedboat (SB), Tahoma (TA), Rubicon Inflow (RI), Rubicon Outflow (RO), Tahoe City (TC), Tahoe Valley (TV), Upper Truckee (UT), Pasadena Inflow (PI), Pasadena Outflow (PO), and Elks Club (EC). Meteorological Stations – NDOT (NDOT), TERC2 (TERC2), Nugget (NG), Hatchery (HATCH), El Dorado County Yard (EDCY), Raph's Shop (RAPH), Bellevue (BV), Shakori (SHK).

Table 1 summarizes the selected catchments and their corresponding designation as a catchment outfall monitoring site and/or BMP effectiveness monitoring site. Also included are the number of monitoring stations in the catchment, jurisdiction, total catchment area, percent impervious area, and dominant land uses in each catchment.

Table 1 Monitoring site specifics. Dominant urban land use is highlighted in dark pink, second most dominant in medium pink, and the third most dominant in light pink. The vegetated class was not considered in this ranking. SR431 has two checkmarks under BMP because there are two different treatment types at this site.

							Landuse					
Catchment Name	Outfall	BMP	# Monitoring Stations	Jurisdiction	Total Acres	Impervious Area	Single Family Residential	Multi-Family Residential	CICU*	Primary Roads	Secondary Roads	Vegetated
SR431		√√	4	NDOT	1.4	89%	0%	0%	0%	89%	0%	11%
Elks Club		√	1	El Dorado	14.4	29%	50%	0%	0%	9%	19%	22%
Lakeshore	√		1	Washoe	97.8	41%	2%	43%	31%	1%	10%	13%
Pasadena	√		1	CSLT	78.8	39%	52%	13%	5%	0%	16%	14%
Speedboat	√		1	Placer	29.0	30%	49%	3%	9%	4%	10%	25%
Tahoe City	√		1	Placer, Caltrans	4.4	62%	12%	10%	23%	49%	0%	6%
Tahoe Valley	√		1	CSLT, Caltrans	338.4	39%	19%	12%	20%	2%	13%	34%
Tahoma	√		1	Placer, El Dorado, Caltrans	49.5	30%	41%	4%	12%	3%	15%	25%
Upper Truckee	√		1	CSLT, Caltrans	10.5	72%	14%	7%	39%	14%	18%	8%

*Commercial, Industrial, Communications, Utilities

2.1 SR431 Catchment Description

The SR431 monitoring site was established WY14 and is located at about 6,800 feet on State Route 431 in Washoe County above Incline Village, Nevada. The 1.4-acre catchment encompasses NDOT right-of-way (ROW) of which approximately 89% is impervious. During winter months, when snow and ice occasionally block stormwater infrastructure (like drop inlets), this catchment area may increase, though this is difficult to verify. This is the smallest catchment monitored and the outfall discharges directly into a perennial stream called Deer Creek which connects with Incline Creek and discharges into Lake Tahoe, giving this site the distinction of being directly connected to the lake despite being 2.5 miles away. SR431 had a catchment outfall location that was monitored for two years (WY14-15), but this station gave very little useful information due to a variety of factors including redundancy with vault discharge measurements and it being poorly configured for monitoring equipment. SR431 is now only monitored for evaluating and comparing the effectiveness of two adjacent stormwater treatment vaults, the Contech MFS and the Jellyfish. The Contech MFS vault contains media filled cartridges and the Jellyfish vault contains filtering membranes (WY14 - ongoing). There are currently four monitoring stations at SR431: the inflow and outflow to the Contech MFS vault (CI, CO), and the inflow and outflow to the Jellyfish vault (JI, JO). Located in a rural area with moderate highway traffic density, SR431 is the only site that isolates runoff from primary roads and can therefore be used to characterize runoff from one land use type. In addition, SR431 is the only site currently available where a true side-by-side comparison of stormwater treatment types can be performed. In October of 2020, NDOT installed a Jensen Deflective Separator (hydrodynamic separator) between the existing drop inlet and the diversion manhole as a pre-treatment system to capture bulk sediment, trash, and debris before it enters the splitter chamber. With this system in place the existing media filtration systems are no longer overwhelmed with coarse sediment and can more effectively treat fine sediment.

Runoff enters a transverse drain across a parking pull-out directly adjacent to SR431. As of WY21, runoff then flows into the hydrodynamic separator installed in October 2020. It then flows through a pipe to a splitter chamber that should theoretically route equal amounts of flow through two inflow pipes, one to the Contech MFS inflow flume and then to the Contech MFS vault, and one to the Jellyfish inflow flume and then to the Jellyfish vault. This splitter chamber can fill with accumulated sediment and without proper consistent maintenance the volume often does not get split evenly. Though the hydrodynamic separator has alleviated this problem to some extent, flows are not necessarily always split evenly, though the quality of the water routed to each vault is equivalent. After the runoff has been treated in each vault, the flow exits the vaults through respective pipes that lead either to the Contech MFS outflow flume or the Jellyfish outflow flume and then to Deer Creek. The Jellyfish outflow may flow sooner than the Contech MFS outflow because the large Contech MFS vault capacity retains about 3000 cf before it flows out.

2.2 Elks Club Catchment Description

The Elks Club monitoring site was established WY18 and is located on the northwest corner of Elks Club Drive and Bel Aire Circle in El Dorado County. It is monitored as a BMP at one monitoring station (EC). At 14.4 acres, it is a relatively small catchment comprised primarily of single family residential and secondary road land uses. Elks Club Drive is fairly steep and serves as the primary access road for this neighborhood. Runoff is channelized along the north side of the road and routed directly to the monitoring location adjacent to the roadside.

Prior to the summer of 2018, Elks Club Drive was in poor condition, covered in cracks and potholes. Visual observations and a pilot study on Pioneer Trail in El Dorado County from 2012-2014 suggested that the degraded road surface itself was contributing a substantial amount of fine sediment to stormwater runoff. The Elks Club monitoring site was established to determine if improving road condition would result in decreased FSP loads in stormwater runoff from this catchment. In the summer of 2018, El Dorado County completed an erosion control project in this catchment that included completely reconstructing Elks Club Drive and armoring the road shoulders and roadside channels with asphalt and rocks. A repaved road is more durable and less likely to deteriorate under the heavy equipment and plow blades used for snow removal operations. The smooth surface is easier to sweep and therefore more road abrasives can be recovered. New roads also look nicer and provide a better driving experience. The primary purpose of this monitoring site is to conduct pre- and post- project monitoring and perform source apportionment analyses on runoff samples from WY18 (pre project) and WY19 (post project) to determine what portion of the fine sediment originates from native soil (road shoulder erosion), traction abrasives (road sand), and asphalt plus asphalt binder (the road itself).

Post project data collected at Elks Club in WY19 indicates that repaving a road contributes to improved water quality (less sediment). Improved pavement condition should be recognized as a water quality BMP, not only to garner credits for the Lake Tahoe TMDL Clarity Crediting Program but also to potentially open up water quality improvement funds for road maintenance and vice versa. New roads would be beneficial for public safety, vehicle maintenance costs, aesthetic appeal, driving pleasure, road maintenance and sweeping operations, long term durability, snow removal operations, stormwater quality, and lake clarity. This site has been monitored continuously since WY18 to provide several years of post-project water quality data that could be used to determine the rate at which a road degrades and its effect on water quality over time. A surface seal was completed in August 2024.

2.3 Lakeshore Catchment Description

The Lakeshore monitoring site was established WY17 and is located in the roadside channel on the northern side of Lakeshore Boulevard, near Third Creek, replacing the old Incline Village site. Incline Village is no longer monitored because it rarely receives any flow. Lakeshore is monitored as a catchment outfall at one monitoring station (LS). At 97.8 acres, this is the second largest catchment monitored and includes runoff from Washoe County and NDOT jurisdictions. The catchment drains a relatively steep, highly urbanized area of Incline Village with dominant urban land uses consisting of moderate to high density residential, commercial, and secondary roads. Forty-one percent of the catchment area is impervious and there is a lack of any intervening natural dispersion and infiltration areas due to steep slopes and high-density development. Runoff discharges into Third Creek which discharges into Lake Tahoe.

As part of the Central Incline Village Phase II Water Quality Improvement Project, constructed during the summer of 2015, substantial improvements were made in the catchment upstream of the monitoring site. New infiltration features that reduce roadway runoff in the catchment include: (1) a series of three upstream infiltration basins that receive 1.8 cfs of low flow from the pipe network, (2) two small roadside infiltration pools, and (3) 450 linear feet of roadside infiltration channels. A Jellyfish treatment vault similar to the one installed at SR431 (see section 2.1) was also installed downstream of the new infiltration features. A Vortechnics treatment vault routes low flow through the Jellyfish to be discharged to the lake through a 30-inch corrugated metal pipe (CMP) that passes through the old Incline Village monitoring site. High flows are routed through the roadside channel to the new Lakeshore monitoring site. The drainage area for this outfall is similar to the old Incline Village catchment but receives additional flow from Lakeshore Boulevard east of Village Boulevard as well as some overland flow originating upslope of Lakeshore Boulevard.

2.4 Pasadena Catchment Description

The Pasadena monitoring site was established in WY14 and is located at the northernmost end of Pasadena Avenue in the City of South Lake Tahoe (City). It was monitored as a catchment outfall and BMP effectiveness site beginning WY14. A 36-inch outfall CMP emerging from the side of the steep slope at the end of Pasadena Avenue conveys runoff directly to Lake Tahoe. The pipe is the terminus of a 78.8-acre catchment. The dominant land uses are moderate density single-family residential, multi-family residential and secondary roads. Thirty-nine percent of the catchment is impervious. Several in-situ infiltration BMPs, including upstream permeable and porous road shoulders and perforated storm drain pipes, a pre-treatment Vortechnics storm vault and two Contech Stormfilter cartridge filter vaults were installed in parallel in 2010 at the end of the catchment before discharge to the lake through the 36-inch CMP. Pasadena Inflow (PI) was a monitoring station located at the inflow to the pre-treatment Vortechnics vault and two Stormfilter cartridge filter vaults but below the in-situ BMPs. Pasadena Outflow (PO) is located in the 36-inch outfall CMP.

Beginning WY18 Pasadena was monitored as a catchment outfall only at PO. Inflow monitoring was suspended at PI because it wasn't truly monitoring untreated inflow as it was located downstream of the in-situ infiltration BMPs that provide some pretreatment. Prior to WY14 monitoring, one of the Contech Stormfilters was not receiving any flow due to a missing orifice plate and the filter cartridges were therefore clean. The cartridges in the other Contech Stormfilter were replaced at the same time the missing orifice plate was installed (September 30, 2013). The vaults and filters are inspected every year per the manufacturer's specifications. The pre-treatment Vortechnics vault is evaluated and cleaned as City staff deems necessary. Material accumulation in the Stormfilter vault and on the filters has not yet triggered a need to fully replace the filter cartridges as of WY25. However, maintenance on the first vault is scheduled for the summer of 2026.

2.5 Speedboat Catchment Description

The Speedboat monitoring site, established WY15, is located midway along the western side of Speedboat Avenue just south of Dip Street in Kings Beach, California. The 29.0-acre catchment is monitored as a catchment outfall at a single monitoring station (SB). It receives comingled runoff from Placer County and Caltrans jurisdictions delivered by an 18-inch CMP. The catchment is comprised of thirty percent impervious surfaces and drains a steep area that is characterized predominately by single family residences, vegetation, and secondary road land uses. After passing through a Palmer-Bowlus flume at the monitoring station, low flows flow directly to an infiltration vault. Higher flows flow through a vegetated infiltration channel before entering the infiltration vault. The highest flows flow through an infiltration basin and then to the infiltration vault if the basin overflows. The infiltration vault discharges to Lake Tahoe.

This site was monitored from 2003 to 2012 by the University of California, Davis, Tahoe Environmental Research Center (UCD TERC) and the Desert Research Institute (DRI). Data collected from this site was included in the initial Total Maximum Daily Load (TMDL) study that ultimately populated the Pollutant Load Reduction Model (PLRM) used to estimate pollutant loading from urban catchments.

2.6 Tahoe City Catchment Description

The Tahoe City monitoring station was established WY20 is located at the outflow from a Delaware Sandfilter installed by Caltrans along Highway 28, half a mile to the east of the Tahoe City commercial corridor. The 4.4-acre catchment is the second smallest and is monitored as a catchment outfall at a single monitoring station (TC). During winter months, when snow and ice occasionally block stormwater infrastructure (like drop inlets), this catchment area may increase, though this is difficult to verify. The catchment is 62% impervious and dominant land uses include primary roads, commercial/industrial/communications/utilities (CICU), and single-family residential. Curb and gutter along highway 28 direct flow to the Sandfilter. The outflow from the Sandfilter enters a small, shallow infiltration basin before discharging into Lake Tahoe. The Sandfilter was installed in approximately 2015 to reduce concentrations of fine sediment in stormwater runoff from a section of Highway 28. Monitoring at this site began WY20, not to assess the effectiveness of the Sandfilter, only to track the quality of the stormwater after treatment and before discharge to Lake Tahoe.

2.7 Tahoe Valley Catchment Description

The Tahoe Valley monitoring site was established WY15 and is located on the eastern side of Tahoe Keys Boulevard just north of the intersection with Sky Meadows Court in South Lake Tahoe, near the entrance to the Sky Meadows Condominium Complex. With an area of 338.4 acres, it is the largest catchment monitored. It is a relatively flat, highly urbanized catchment consisting primarily of CICU, single family residences, secondary roads, and vegetation land uses. Thirty-nine percent of the catchment is impervious. This site is monitored as a catchment outfall at a single monitoring site (TV). Runoff to the site is delivered by a 36-inch "squashed" CMP from the City of South Lake Tahoe jurisdiction. After passing by the TV monitoring station, runoff is conveyed through a vegetated swale along the northwest edge of the Sky Meadows Condominium Complex directly to the Upper Truckee River and eventually to Lake Tahoe.

Many water quality improvement projects have been implemented in this catchment in the last 30+ years. The existing Helen Basin and almost 3,200 linear feet of vegetated swales were built as part of the Tahoe Valley Erosion Control Project (ECP) in 1989 to increase stormwater infiltration upstream of the current monitoring site. This area was maintained under a contract with the California Conservation Corps in 2014 and included removing sediment that was blocking pipes, excess vegetation in the basin and swales, drug paraphernalia, empty liquor bottles, and human waste. Caltrans completed the $12 million US Highway 50 water quality improvement project in 2012 which included curb, gutter, rock-lined swales, infiltration chambers and basins along Highways 50 and 89 to address highway runoff in the catchment. To ensure high infiltration rates, the City of South Lake Tahoe removed accumulated sediment, excess vegetation, and trash in the Caltrans swales upstream of Tahoe Keys Boulevard near Council Rock Road and behind the storage units on Eloise in May and June of 2015, also under a contract with the California Conservation Corps. Nearby homeless camps littered with trash, human waste, empty liquor bottles, and used needles were also removed.

As part of the Tahoe Valley Stormwater and Greenbelt Improvement Project, Phase 1, numerous sediment cans were installed around the catchment, a detention basin was constructed on a California Tahoe Conservancy parcel near the D Street and Margaret Avenue intersection, and sections of perforated pipe were installed in F Street, Bonanza Avenue, and D Street to provide infiltration opportunities. These improvements were installed as of the summer of 2024. The construction of the James Eloise swale (wet basin), the lower, middle and upper Greenbelt wet basins behind the crossing at the Y, the north Bonanza wet basin (on the corner of Bonanza and B St), and the south Bonanza dry basin (on Bonanza between D St. and F St.), and road shoulder stabilization throughout the catchment were completed by September 2025. Remaining construction, such as the basin at the corner of Barton Ave and 4th Street and revegetation will be completed by the end of the summer of 2026. It will take a year or two for the basins to be fully revegetated, so benefits of this project may not be seen immediately.

2.8 Tahoma Catchment Description

The Tahoma monitoring site was established WY14 and is located at the bottom of Pine Street right at the lake's edge in Tahoma. It is monitored as a catchment outfall at one monitoring station (TA). The 49.5-acre catchment straddles the Placer County/El Dorado County border and comingles runoff from both jurisdictions, plus waters from the Caltrans maintained Highway 89. The land uses in this catchment are primarily moderate density residential and secondary roads in the Tahoe Cedars subdivision but also include some CICU and primary roads. Thirty percent of the catchment area is impervious. The runoff from this catchment discharges directly into Lake

Tahoe via a 36-inch oval squashed CMP at the bottom of the Water's Edge North condominium complex driveway without infiltration or treatment. Because of the high direct connectivity between the catchment and Lake Tahoe, this storm drain system has great potential to deliver high FSP loads to the lake.

A water quality improvement project completed in the fall of 2014 installed nine sediment traps to decrease flow rates and capture coarse sediment, one new drop inlet to more effectively capture and route flow, and more than 80 feet of perforated infiltration pipe to decrease runoff volumes to the catchment outflow.

The culvert pipe at this site was vactored on June 12, 2023 to remove all accumulated sediment.

2.9 Upper Truckee Catchment Description

The Upper Truckee monitoring site was established WY15 and is located on the eastern bank of the Upper Truckee River at the intersection of Highway 50 and River Drive a short distance upstream of the bridge on Highway 50 that crosses the Upper Truckee River in the City of South Lake Tahoe. The 10.5-acre catchment drains a highly urbanized area which is primarily composed of CICU, primary and secondary roads, and single-family residences. This is the third smallest catchment monitored, but with a high percentage of impervious coverage (72%) it receives relatively high volumes of comingled runoff from the City of South Lake Tahoe and Caltrans jurisdictions. The site is monitored as a catchment outfall site at a single location (UT).

Improvements were made in this catchment by the City of South Lake Tahoe in the summer of 2015 that included an 8,100 cubic foot infiltration gallery, 394 linear feet of perforated pipe and infiltration trenches, seven sediment traps/dry wells, and 3,340 linear feet of stabilized road shoulders. Runoff originating from City streets flows through these treatments, and discharges through a high-density polyethylene (HDPE) pipe to a small rock-lined basin installed by Caltrans in 2019. However, since the majority of runoff in this catchment originates from Highway 50, under Caltrans' jurisdiction, volume and pollutant reductions attributable to the improvements made by the City are hard to detect.

In the summer of 2019 Caltrans completed installation of a large underground concrete vault (dimensions: 54' long x 11'7" wide x 10' deep) that captures and treats Caltrans Highway 50 runoff only. A 6' wall about halfway down the 54' chamber separates it into 2 parts (total volume capacity 3,753 cubic feet). The first half is for settling out the larger particles. Once the water reaches a depth of 6' it spills over the wall into the second half which contains a sand filter to filter out FSP. It then goes over a weir and out the same HDPE pipe used by City runoff described above. The pipe discharges into the small rock-lined basin installed by Caltrans which overflows onto a slope that was armored as of WY24 (it was originally unarmored) and leads directly to the Upper Truckee River and eventually to Lake Tahoe. The vault was designed to be large enough to capture the estimated amount of flow that could enter the vault in any given storm. This site offers the unique opportunity to monitor pre and post project conditions. Rainfall normalized annual FSP loads for WY20, WY21, and WY22 are lower than any previous pre-project year (this is not true for WY23) (see section 8.10). The rainfall normalized annual FSP load for WY24 and WY25 dropped again, but not as low as WY20-22. Though six years of post-project data are not enough to state conclusively that lower loads in WY20-WY22 and WY24-WY25 are due to treatment of Highway 50 runoff in the vault, it is an indication that treatment may be effective.

3. Data Collection Methods, Sampling Protocols, Analytic Methods

Continuous hydrology and stormwater samples are collected using ISCO brand automated samplers (autosamplers) per RSWMP protocols (RSWMP FIG 2015 section 10.2.1, Tahoe RCD et al 2017) at all twelve monitoring stations in WY25 to support seasonal [fall/winter (October 1-February 28), spring (March 1-May 31), and summer (June 1-September 30)] volume and load reporting. Autosamplers were installed and sites maintained according to protocols outlined in the RSWMP FIG sections 10.1.2.2 and 10.2.1.3 respectively. Continuous turbidity was collected at all sites with an FTS DTS-12 turbidimeter. Turbidimeters were installed and maintained as outlined in the RSWMP FIG sections 10.2.2.1 and 10.2.2.2. Equations that relate turbidity to fine sediment particle (FSP) concentration have been developed specifically for the Tahoe Basin and were applied to estimate FSP loads (2NDNATURE et al 2014). Continuous meteorological data is recorded using a Davis Instruments Vantage Pro weather station or weather station equipment sold by Campbell Scientific. The weather stations are installed at eight locations in the vicinity of the nine monitored catchments and maintained following recommendations in the RSWMP FIG sections 10.2.3.1 and 10.2.3.2. All weather stations are maintained by Tahoe RCD, with the exception of Shakori, which is maintained by El Dorado County. Meteorological data is used to calculate seasonal and annual precipitation totals (RSWMP FIG section 10.2.3.5) and to estimate the amount of flow that can be expected in a particular catchment for a particular amount of precipitation to aid with autosampler programming for event-based sampling (RSWMP FIG section 10.2.1.4).

Continuous data (flow, turbidity, and meteorology) are logged at a constant time interval, generally every 5 minutes. Flow and turbidity data are QAQC'd with frequent stage and turbidity field measurements to ensure that no drift has occurred in the readings and sensors are performing optimally (RSWMP FIG sections 10.2.1.7 and 10.2.2.5). Visual observations are used to confirm when a flume or pipe is dry and stage and turbidity should read zero. Visual observations are also used to determine if ice in the flume or pipe is causing stage errors that need to be adjusted to zero. Visual observations and field measurements are made monthly at a minimum but more often during precipitation events. Recalibration of stage measuring equipment is done by adjusting the level measurement on the autosampler. Turbidimeter accuracy was verified on all in-situ turbidimeters with a solution of known turbidity in late September/early October 2016, June 2017, and May/June 2018. Starting in 2019, all turbidimeters are being sent to the manufacturer for annual calibration. Tahoe RCD does not have an extra set of turbidimeters for all sites, so it is not possible to send all turbidimeters in for calibration at the same time. To maintain data continuity, turbidimeters were sent in for calibration in batches of 3-5 at a time in 2019, 2020, 2021, 2022, 2023, 2024, and 2025.

Weather is monitored closely and autosamplers are programmed to sample at the beginning of each runoff event in accordance with RSWMP FIG sections 10.2.1.4 and 10.2.1.5. Individual aliquots from single samples are combined into flow-weighted composites (RSWMP FIG section 10.2.1.10) based on their occurrence in the hydrograph. Full event composites and quality control samples are analyzed for total nitrogen (TN) concentration, total phosphorus (TP) concentration, total suspended solid (TSS) concentration, turbidity, and particle size distribution (PSD) to determine FSP concentration at the UC Davis Tahoe Environmental Research Center Laboratory in Incline Village, NV, the UC Davis Laboratory in Davis, CA, or the High Sierra Water Laboratory, Inc. in Oakland, OR. Table 2 summarizes the sample type acronyms and their meaning. Table 3 summarizes the analytical methods and detection limits for all analyses. Raw analytical data for all samples is presented in Appendix A.

Table 2 Sample types and acronyms.

Sample Acronym	Sample Type
AC	**A**uto-sampler **C**omposite, flow-weighted composite of whole or part of hydrograph
FB	**F**ield **B**lank (QA/QC)
GS	**G**rab **S**ample single (QA/QC)
MS	**M**anually triggered auto-**S**ampler single (QA/QC)

Table 3 Analytical methods and detection limits.

Analyte	Methods	Description	Detection Limit	Target Reporting Limit
Total Suspended Solids	EPA 160.2 or SM 2540-D	Gravimetric	0.4 mg/L	1 mg/L
Turbidity	EPA 180.1 or SM 2130-B	Nephelometric	0.05 NTU	0.1 NTU
Total Kjeldahl Nitrogen	EPA 351.1; or EPA 351.2	Colorimetric, block digestion, phenate	35 µg/L	100 µg/L
Nitrate + Nitrite	TERC Low Level Method	Colorimetric, NO3 + NO2 Hydrazine Method, low level	2 µg/L	10 µg/L
Total Nitrogen as N	N/A	Total Kjeldahl Nitrogen + Nitrate + Nitrite	35 µg/L	100 µg/L
Total Phosphorus as P	TERC Low Level Method	Colorimetric, Total Phosphorus, Persulfate digestion, low level	2 µg/L	10 µg/L
Particle Size Distribution	SM 2560 or RSWMP addendum SOP	Laser backscattering	0.5 mg/L	1 mg/L

Sample handling and processing includes proper labeling of samples in the field, transporting samples to a laboratory immediately after collection in a cooler with ice, compositing individual aliquots from single samples on a flow-weighted basis, taking turbidity measurements with a calibrated instrument, shipping to an analytical laboratory with proper chain-of-custody procedures, and filtering samples within the proper holding time. A minimum of 10% of all samples analyzed were QAQC samples to identify any potential problems related to field sampling and sample processing (RSWMP FIG section 10.2.1.6). Analytical data for all QAQC samples is presented in Appendix B.

4. Data Management Procedure

Level, flow, turbidity, precipitation, and temperature data series and sample dates and times are logged continuously through the RSWMP Data Management System (DMS). The RSWMP DMS is a proprietary two-component online system housed, hosted, and maintained by the Desert Research Institute and Geosyntec. All data are downloaded from the DMS and input into Excel workbooks for storing continuous parameters and sample dates and times and for conducting QAQC. Any other field measurements and observations are recorded in a field notebook or the ArcGIS Survey123 app and transcribed into Excel workbooks. Samples are transported to a processing lab immediately after collection. The DMS automatically calculates the recipe for compositing individual aliquots from single samples into an event composite for each monitoring station. All composite samples are measured for turbidity using a benchtop turbidimeter (Hach 2100N or TL2300) or a portable turbidimeter (Hach 2100P) and values are recorded on standard data sheets in the laboratory and entered into an Excel workbook for storing nutrient and sediment data. All samples are sent to analytical laboratories within appropriate holding times for TSS, TN, TP, and PSD analysis. For a complete description of holding times for sampled parameters, see the RSWMP Quality Assurance Project Plan (QAPP) (DRI et al 2011a). Results from analytical laboratories are entered into the same Excel workbook for storing nutrient and sediment data. All Excel workbooks are housed on one central server (with backup device) and managed by Tahoe RCD staff. All data management procedures described above follow protocols outlined in the RSWMP FIG section 10.2.1.

5. Data Analysis

The raw hydrologic data set includes stage, velocity (at select sites), flow (determined by an equation relating stage in a weir, flume or pipe, or stage and velocity in a pipe to flow), and turbidity recorded every 5 minutes throughout the water year. Data gaps are short and rare. Erroneous readings are corrected and data gaps are filled following QAQC protocols outlined in the RSWMP FIG sections 10.2.1.7 for flow and 10.2.2.5 for turbidity.

Seasonal and annual flow volumes are calculated by the DMS in accordance with RSWMP FIG sections 10.2.1.8 and 10.2.1.9. Results of particle size distribution analysis for the percent of particles less than 16 μm is multiplied by the TSS concentration to obtain FSP concentration from water quality samples. These results and the results of lab analysis for TN and TP concentration in water quality samples are used by the DMS to calculate a flow-weighted event mean concentration (EMC) as outlined in section 10.2.1.10 of the RSWMP FIG. The DMS groups EMCs by season and calculates a seasonal characteristic pollutant concentration for each site; the DMS then applies these concentrations to each hydrologic measurement for that season. The DMS calculates loads by summing concentrations multiplied by runoff volumes over time as outlined in section 10.1.2.11 of the RSWMP FIG. Turbidity is converted to FSP concentration (in both mass per liter and number of particles per liter) using equations relating turbidity to FSP (2NDNATURE et al 2014) and integrated over time to calculate seasonal and annual load estimates in pounds and number of particles (RSWMP FIG sections 10.2.2.6 and 10.2.2.7). Rainfall normalized seasonal and annual trends are calculated for catchments with at least five years of continuous data according to protocols outlined in the RSWMP FIG section 10.4.3.

Raw meteorological data includes a precipitation and a temperature reading every 5 or 10 minutes (depending on the station) throughout the water year. Precipitation occurring as snow is converted to inches of water by a heated tipping bucket at the meteorological station that melts falling snow upon contact with the device. Data is QAQC'd by comparing event, seasonal and annual totals to the closest neighboring meteorological station. Sites are inspected annually to ensure the equipment is working properly. Occasionally precipitation gauges will get clogged with debris (dirt, wasp nests, pine needles etc.) but with weekly review of the continuous data via the online DMS these issues are identified quickly and remedied. Data gaps are rare but are filled with data from a neighboring station when they occur (RSWMP FIG section 10.2.3.4). The DMS calculates seasonal and annual precipitation totals for reporting purposes.

Average annual loads for FSP, TN, and TP presented in section 8, Trends Analysis, are normalized by both catchment size (acres) and inches of precipitation. Normalizing by catchment size only allows for comparison between sites, but this analysis is not highlighted here as the objective of trends analysis is to detect load reductions resulting from improved management activities within each catchment, not between catchments. Normalizing by precipitation allows for comparison between water years in a particular catchment, which addresses the objective. Percent runoff (runoff coefficient) is a function of catchment size, the amount of rainfall received, and the volume measured at the catchment outfall. It represents the fraction of runoff that was measured at the outfall compared to what would theoretically be expected if all the rainfall that fell in the catchment were measured at the outfall as runoff.

Normalized average annual load charts for each site with five or more years of data show whether there is an upward, downward, or neutral trend in average annual loading of FSP, TN, and TP at each site. Also presented for each site with five or more years of data is a table that shows average annual percent runoff and normalized seasonal and average annual loads and trend statistics. The trend statistics (Tau, p-value, and Theil slope) indicate if there has been a statistically significant upward, downward, or neutral trend in pollutant loading in the selected catchments. Tau is a non-parametric measure of the relationship between data when data does not have a normal distribution, similar to the r^2 value in a regression on normally distributed data. Tau is a measure of the correspondence between two rankings, which in this case are water year and pollutant load. Tau is a correlation coefficient that returns a value between -1 and 1 where 0 is no relationship, 1 is a perfect identical relationship and -1 is a perfect opposite relationship with regards to ranked pairs. The water years will always be ranked in order from 2014 through 2025. The pollutant loads are then ranked from least to most as well. The rankings of the pairs are then compared. If pollutant load steadily increases from year to year there will be a perfect identical ranking between the pairs, resulting in a Tau of 1. If pollutant load steadily decreases from year to year there will a perfect opposite ranking of the pairs, resulting in a Tau of -1. The p-value indicates the confidence level in Tau; a p-value less than 0.05 ($p<0.05$) denotes a significant relationship. The Theil slope is similar to the slope for a regression on normalized data but used for data that is not normally distributed. Lastly, charts showing annual sediment and nutrient loads and annual precipitation totals for each site are included to help visualize how precipitation and loads have varied over the period of record for each site.

6. Catchment Outfall Monitoring

6.1 Summary Data for All Monitoring Sites

A meteorological station at the Tahoe City Dam located in the northwest corner of the lake at an elevation of 6,235 feet is maintained under the Truckee River Operating Agreement (TROA). Per RSWMP protocols, this station is used as a reference station to determine if a particular water year is wet, average, or dry (assuming that a wet, average, or dry season in Tahoe City will be the same around the lake). Using an 94-year precipitation record (water years 1932-2025) from this station, WY25, at 30.51 total inches, falls in the third quartile of the dataset and is therefore designated a wet year (Table 4, Figure 2). In WY25 approximately 71% of the precipitation fell during the fall/winter season, approximately 24% fell during the spring season, and approximately 5% fell during the summer season.

Table 4 Annual precipitation statistics from the Tahoe City meteorological reference station, water years 1932-2025.

WY 1932-2025	Annual Precipitation (in)	Designation
1st quartile	8.82 - 22.59	very dry
2nd quartile	22.69 - 29.74	dry
Median	29.84	median
3rd quartile	29.85 - 39.55	wet
4th quartile	39.65 - 69.77	very wet

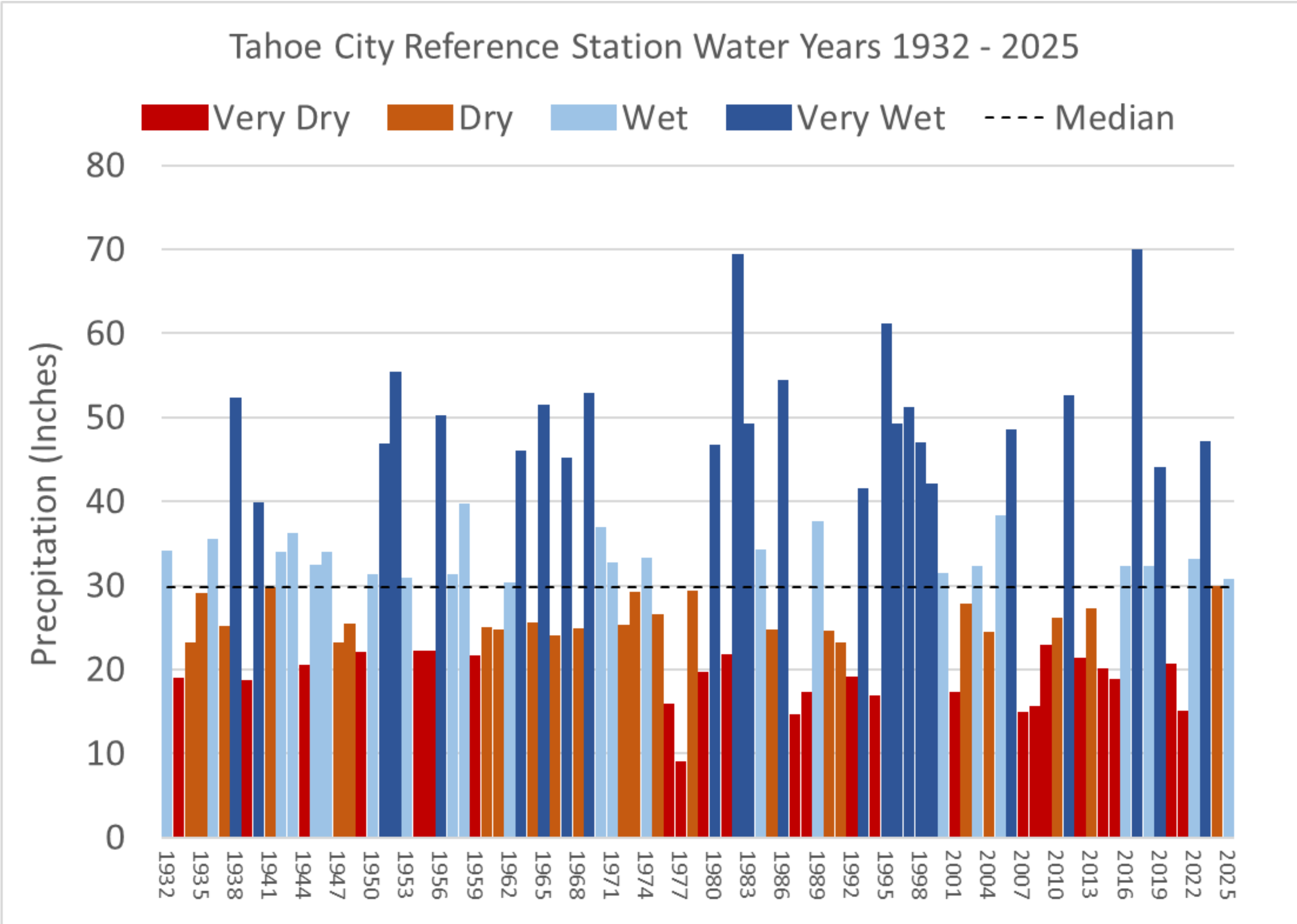

Figure 2 Long-term precipitation record at the Tahoe City meteorological station, water years 1932-2025.

Three primary "seasons" are defined by the NPDES permit: fall/winter (October 1 - February 28), spring (March 1 - May 31), and summer (June 1 - September 30). These are the seasons used by RSWMP and are defined as such to better fit with precipitation patterns and storm event types that occur in the Tahoe Basin. The primary event types in the fall/winter are frontal rainstorms, rain on snow, mixed rain/snow, or event snowmelt. An event snowmelt occurs during and shortly after a snow event when enough snow melts (generally on the roads from the heat generated by automobile traffic) to produce runoff at a given monitoring site. Spring event types include the fall/winter event types plus non-event snowmelts. A non-event snowmelt generally occurs in the spring when temperatures are greater than 50 degrees Fahrenheit and accumulated snowpack melts. Most monitoring sites do not receive sufficient spring non-event snowmelt to sample. Summer events are primarily thunderstorms and frontal rainstorms.

The intention is to sample 6-12 runoff events per year in each catchment, and this target was met in WY25 for all sites, with the exception of Lakeshore. There were only 10 periods of flow measured at Lakeshore all year, eight of which were less than 50 cubic feet. The two periods of flow that were greater than 50 cubic feet were sampled.

Summary data for all sites are presented in Table 5. Figure 3 - Figure 12 illustrate Table 5 in graphical form. Runoff volumes are calculated from instantaneous flow rates (cubic feet per second) taken every 5 minutes by assuming the flow rate was constant for the 5-minute period. FSP loads are calculated from event sampling as well as estimated from continuous turbidity, and TN and TP loads are calculated from event sampling. As not every runoff event was sampled during the year, the seasonal and annual loads represent an average (volume weighted) load calculation for the respective period based on the events that were sampled in that period. FSP loads estimated from continuous turbidity include all periods of flow, not just those that were sampled. Percent FSP denotes the average seasonal and annual percentages of total suspended sediment that is fine sediment particles at each site. In Figure 3 - Figure 12, SR431 is represented by its four sites: Contech MFS Inflow (CI), Contech MFS Outflow (CO), Jellyfish Inflow (JI), and Jellyfish Outflow (JO); Elk's Club is EC, Lakeshore is LS, Pasadena is PO, Speedboat is SB, Tahoe City is TC, Tahoe Valley is TV, Tahoma is TA, and Upper Truckee is UT.

Table 5 Summary statistics for all catchments for WY25. Top table shows seasonal and annual precipitation and runoff volumes; the second table shows seasonal and annual FSP concentrations and loads based on samples and estimated from continuous turbidity; the third table shows seasonal and annual percentages of TSS that is FSP and seasonal and annual estimated FSP loads in number of particles; and the bottom table shows seasonal and annual TN and TP concentrations and loads based on samples.

Water Year 2025 (October 1, 2024 - September 30, 2025)			Seasonal Precipitation (in)			Total Annual Precip (in)	Seasonal Runoff Volumes (cf)			Total Annual Runoff Volumes (cf)
Catchment Name	Station Name	Station Acronym	Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)	
SR431	Contech In	CI	13.46	5.14	3.50	22.10	5,671	2,992	5,890	14,552
	Contech Out	CO	13.46	5.14	3.50	22.10	4,565	1,960	4,326	10,851
	Jellyfish In	JI	13.46	5.14	3.50	22.10	7,198	3,469	6,310	16,977
	Jellyfish Out	JO	13.46	5.14	3.50	22.10	4,981	2,163	5,225	12,369
Elk's Club	Elk's Club	EC	12.54	4.01	1.75	18.30	92,325	159,633	22,352	274,309
Lakeshore	Lakeshore	LS	9.07	2.24	0.89	12.21	549	0	3,773	4,322
Pasadena	Pasadena Out	PO	11.62	3.82	1.88	17.31	41,958	0	5,437	47,395
Speedboat	Speedboat	SB	10.02	2.71	1.15	13.88	65,447	4,639	5,175	75,261
Tahoe City	Tahoe City	TC	16.10	4.48	1.75	22.32	69,658	28,791	3,636	102,085
Tahoe Valley	Tahoe Valley	TV	11.62	3.82	1.88	17.31	1,042,772	295,738	14,845	1,353,355
Tahoma	Tahoma	TA	17.77	5.32	1.69	24.78	105,187	62,209	7,437	174,832
Upper Truckee	Upper Truckee	UT	11.62	3.82	1.88	17.31	91,805	24,193	15,270	131,268

Water Year 2025 (October 1, 2024 - September 30, 2025)			Average Seasonal FSP Concentrations (mg/L)			Average Annual FSP Concen-trations (mg/L)	Seasonal FSP Loads (lbs)			Total Annual FSP Loads (lbs)	Average Estimated Seasonal FSP Concentrations (mg/L)			Average Estimated Annual FSP Concen-trations (mg/L)	Seasonal Estimated FSP Loads (lbs)			Total Annual Estimated FSP Loads (lbs)
Catchment Name	Station Name	Station Acronym	Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)	
SR431	Contech In	CI	328	783	211	374	116	146	78	340	65	319	118	139	23	60	43	126
	Contech Out	CO	277	693	200	322	79	85	54	218	83	48	86	78	24	6	23	53
	Jellyfish In	JI	421	798	192	413	189	173	76	438	91	272	91	128	41	59	36	136
	Jellyfish Out	JO	287	634	183	303	89	86	60	234	51	233	46	81	16	31	15	62
Elk's Club	Elk's Club	EC	29	6	273	36	169	62	381	611	20	1	17	8	113	7	23	143
Lakeshore	Lakeshore	LS	28	na	5,907	5,160	1	na	1,391	1,392	25	na	727	637	1	na	171	172
Pasadena	Pasadena Out	PO	31	na	192	50	82	na	65	147	41	na	223	62	109	na	76	184
Speedboat	Speedboat	SB	145	131	649	179	592	38	210	839	110	105	658	147	447	31	213	691
Tahoe City	Tahoe City	TC	121	50	183	103	527	90	42	658	52	44	127	53	228	78	29	335
Tahoe Valley	Tahoe Valley	TV	31	58	204	39	2,024	1,079	189	3,293	31	50	31	35	1,996	928	28	2,952
Tahoma	Tahoma	TA	31	3	178	27	205	11	83	298	139	15	15	90	910	60	7	978
Upper Truckee	Upper Truckee	UT	78	157	133	99	449	238	127	814	89	240	101	118	508	362	97	967

Water Year 2025 (October 1, 2024 - September 30, 2025)			Average Seasonal % of total sediment as FSP			Average Annual % of total sediment as FSP	Seasonal Estimated FSP Loads (#particles)			Total Annual Estimated FSP Loads (#particles)
Catchment Name	Station Name	Station Acronym	Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)	
SR431	Contech In	CI	70%	70%	36%	56%	2.17E+15	6.83E+15	3.44E+15	1.24E+16
	Contech Out	CO	79%	75%	43%	64%	2.30E+15	5.04E+14	1.73E+15	4.53E+15
	Jellyfish In	JI	72%	69%	36%	58%	3.99E+15	6.64E+15	2.73E+15	1.34E+16
	Jellyfish Out	JO	74%	73%	36%	58%	1.45E+15	3.33E+15	1.08E+15	5.86E+15
Elk's Club	Elk's Club	EC	45%	49%	42%	47%	1.05E+16	4.64E+14	1.73E+15	1.27E+16
Lakeshore	Lakeshore	LS	67%	na	72%	71%	7.83E+13	0.00E+00	1.44E+16	1.45E+16
Pasadena	Pasadena Out	PO	34%	na	34%	34%	9.85E+15	0.00E+00	5.43E+15	1.53E+16
Speedboat	Speedboat	SB	62%	68%	33%	61%	4.52E+16	2.93E+15	1.87E+16	6.69E+16
Tahoe City	Tahoe City	TC	60%	70%	50%	63%	2.12E+16	7.29E+15	2.27E+15	3.08E+16
Tahoe Valley	Tahoe Valley	TV	41%	66%	56%	46%	1.80E+17	8.35E+16	1.62E+15	2.65E+17
Tahoma	Tahoma	TA	40%	37%	24%	38%	1.11E+17	5.48E+15	4.39E+14	1.17E+17
Upper Truckee	Upper Truckee	UT	55%	81%	47%	59%	5.05E+16	3.60E+16	6.67E+15	9.31E+16

Water Year 2025 (October 1, 2024 - September 30, 2025)			Average Seasonal TN Concentrations (ug/L)			Average Annual TN Concen-trations (ug/L)	Seasonal TN Loads (lbs)			Total Annual TN Loads (lbs)	Average Seasonal TP Concentrations (ug/L)			Average Annual TP Concen-trations (ug/L)	Seasonal TP Loads (lbs)			Total Annual TP Loads (lbs)
Catchment Name	Station Name	Station Acronym	Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)	
SR431	Contech In	CI	1,361	3,057	4,513	2,986	0.5	0.6	1.7	3	1,638	3,441	1,511	1,957	0.6	0.6	0.6	1.8
	Contech Out	CO	1,326	3,014	3,694	2,575	0.4	0.4	1.0	2	1,394	3,041	1,350	1,674	0.4	0.4	0.4	1.1
	Jellyfish In	JI	1,563	3,407	4,993	3,215	0.7	0.7	2.0	3	1,929	3,542	1,390	2,058	0.9	0.8	0.5	2.2
	Jellyfish Out	JO	960	2,990	4,568	2,839	0.3	0.4	1.5	2	1,354	2,730	620	1,285	0.4	0.4	0.2	1.0
Elk's Club	Elk's Club	EC	596	210	6,942	888	3.4	2.1	9.7	15	284	30	1,918	269	1.6	0.3	2.7	4.6
Lakeshore	Lakeshore	LS	466	na	19,499	17,080	0.02	na	4.6	5	305	na	26,599	23,257	0.01	na	6.3	6.3
Pasadena	Pasadena Out	PO	2,444	na	11,489	3,482	6.4	na	3.9	10	641	na	2,125	811	1.7	na	0.7	2.4
Speedboat	Speedboat	SB	1,643	1,039	15,913	2,587	6.7	0.3	5.1	12	1,049	934	6,204	1,397	4.3	0.3	2.0	6.6
Tahoe City	Tahoe City	TC	1,041	595	5,127	1,061	4.5	1.1	1.2	7	893	292	1,707	753	3.9	0.5	0.4	4.8
Tahoe Valley	Tahoe Valley	TV	1,107	853	5,098	1,096	72	16	4.7	93	375	400	1,269	391	24	7.4	1.2	33
Tahoma	Tahoma	TA	738	176	7,938	844	4.8	0.7	3.7	9	394	42	2,130	342	2.6	0.2	1.0	3.7
Upper Truckee	Upper Truckee	UT	1,589	1,811	4,011	1,912	9.1	2.7	3.8	16	758	734	965	778	4.3	1.1	0.9	6.4

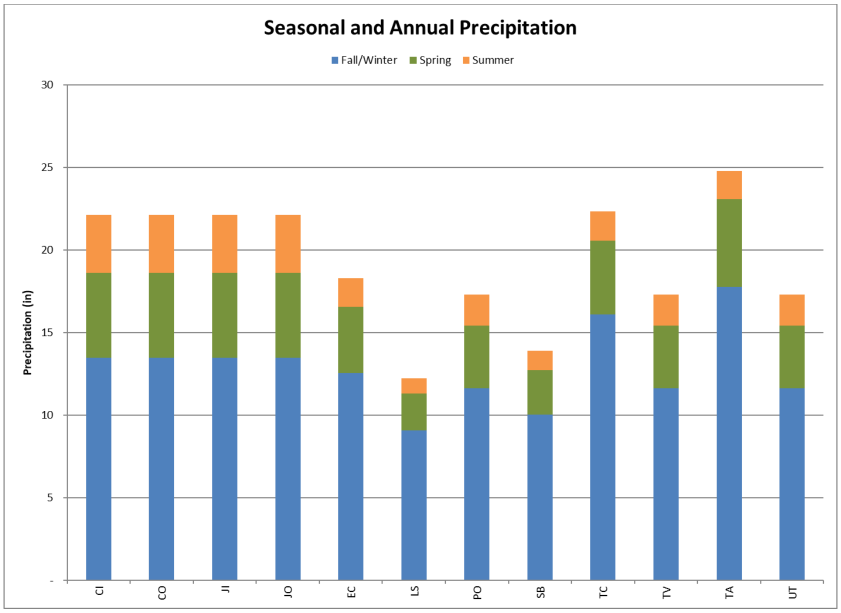

Figure 3 Precipitation totals at each monitoring station, WY25.

Precipitation

- The northwest corner of the lake received the most precipitation (TC and TA). Similar values were also received in the northeast corner of the lake at about 6,800 ft. (CI, CO, JI, JO).
- The northeast corner of the lake at lake level and the south shore received the least amount of precipitation (LS, SB, EC, PO, TV, and UT).
- There are no stations on the east shore.
- All regions of the lake received the greatest amount of precipitation during the fall/winter season and least during the summer.

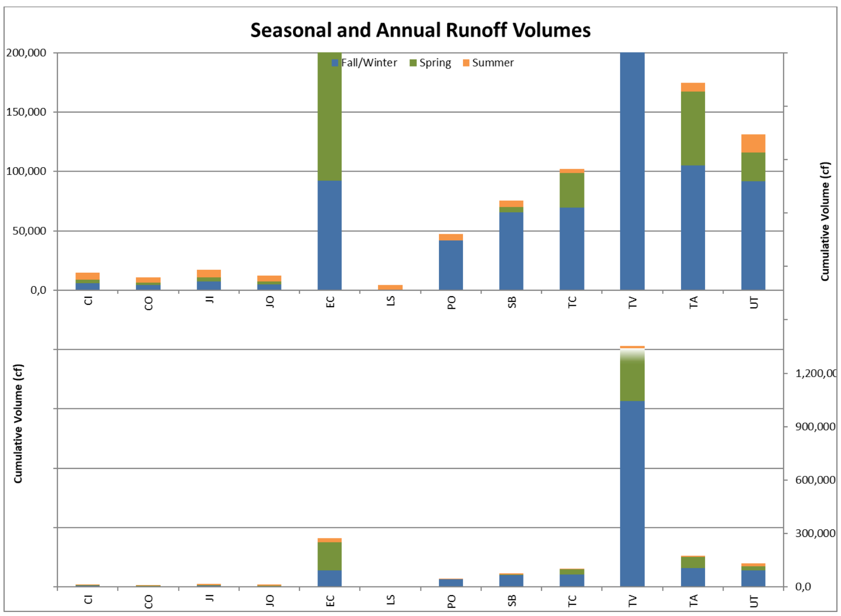

Figure 4 Runoff volumes at each monitoring station, WY25.

Note: Bottom graph shows all sites with complete y-axis, top graph changes y-axis so CI, CO, JI, JO, and LS can be seen.

Runoff Volumes

- Catchment size influences runoff volume. TV, the largest catchment, had the most runoff. SR431 (CI, CO, JI, CO), the smallest catchment, had the least runoff aside from LS.
- Infiltration features influence runoff volume. LS, the second largest catchment, contains numerous infiltration features and measured the least amount of runoff in WY25.
- Impervious area influences runoff volumes. Though the TC catchment area is about one twentieth the size of PO, it had greater runoff volume. TC is 62% impervious and PO is 39% impervious. Additionally, PO has many catchment-wide infiltration features.
- Precipitation totals influence runoff volumes. In most years, most catchments have the most runoff in the fall/winter, mirroring seasonal precipitation totals.

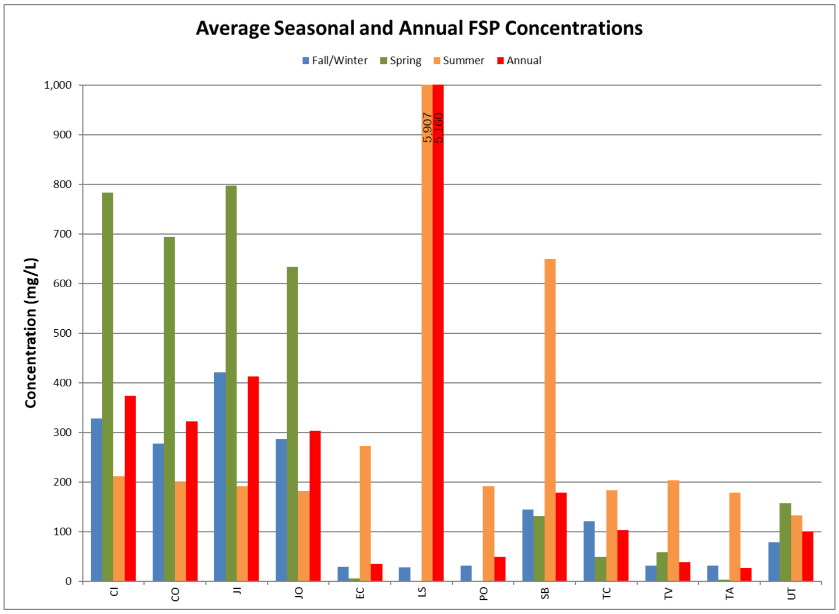

Figure 5 FSP concentrations based on samples at each monitoring station, WY25.

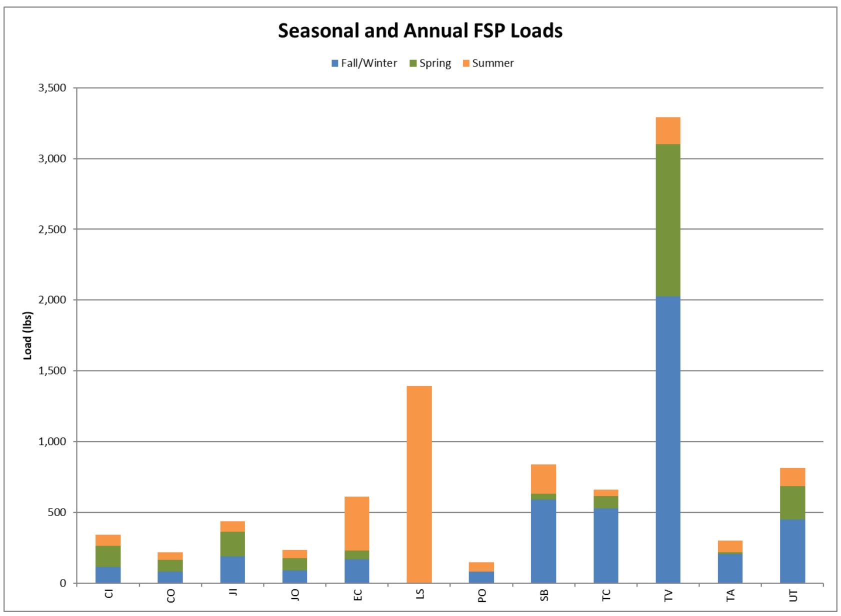

Figure 6 FSP loads based on samples at each monitoring station, WY25.

FSP Concentrations Based on Samples

- Average seasonal FSP concentrations were highest in the spring at SR431 (CI, CO, JI, JO), and UT, and highest in summer at EC, LS, PO, SB, TC, TV, and TA.
- The highest average seasonal FSP concentration was observed in the summer at LS. High concentrations were also seen at SR431 (CI, CO, JI, JO) in the winter and at SB in the summer. These sites are highly influenced by primary roads.
- Average annual FSP concentrations were highest at LS and SR431 (CI, CO, JI, JO).
- Average annual FSP concentrations were lowest at EC, PO, TV, and TA.

FSP Loads Based on Samples

- Runoff volumes influence loads. TV, despite having low FSP concentrations, had the largest load because of high runoff volume. Similarly, SR431 (CI, CO, JI, JO) had high concentrations but small runoff volumes and therefore low loads.
- Concentrations influence loads. LS, with the least runoff volume, had an extremely high concentration event in the summer and a very high summer FSP load. Similarly, EC had very high summer concentrations that lead to a high summer load despite a low summer volume.

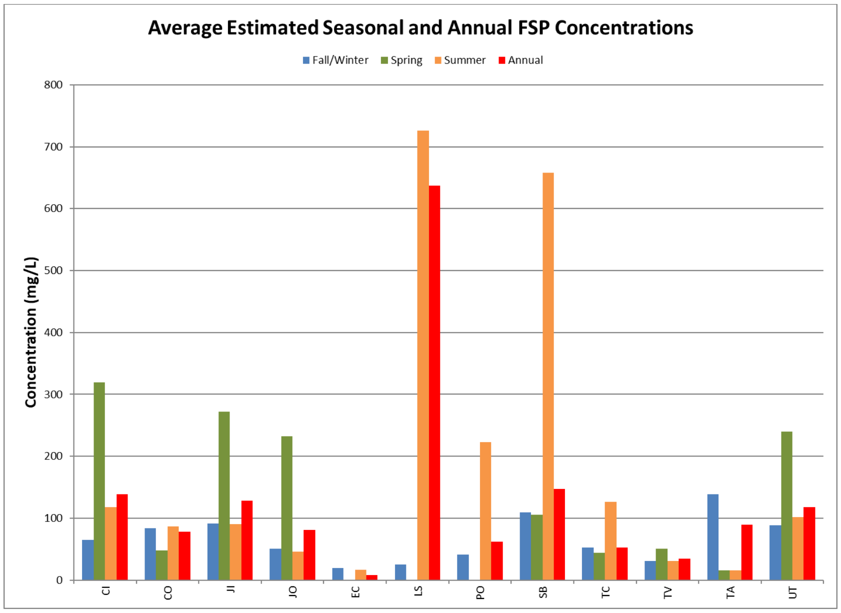

Figure 7 FSP concentrations estimated from turbidity at each monitoring station, WY25.

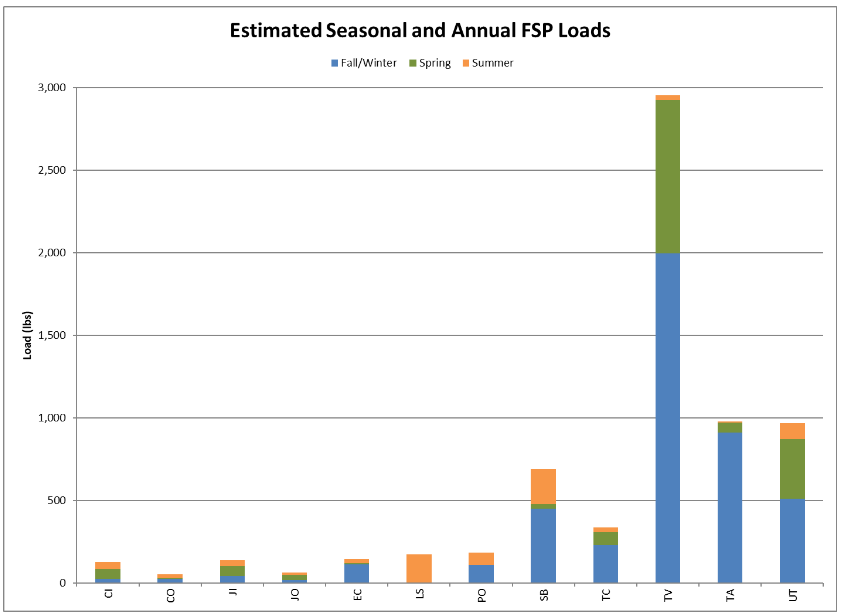

Figure 8 FSP loads estimated from turbidity at each monitoring station, WY25.

FSP Concentrations Estimated from Turbidity

- Average estimated seasonal FSP concentrations were highest in the fall/winter at EC and TA; highest in the spring at SR431 (CI, JI, JO), TV, and UT; and highest in the summer at CO, LS, PO, SB, and TC.
- The highest average estimated seasonal FSP concentrations were observed during the summer at LS and SB.
- Average estimated annual FSP concentrations were highest at LS.
- Average estimated annual FSP concentrations were lowest at EC, TV, and TC.

FSP Loads Estimated from Turbidity

- Runoff volumes influence loads. TV, despite having low estimated FSP concentrations had the largest load because of high runoff volume. Similarly, SR431 (CI, CO, JI, JO) had relatively high concentrations but small runoff volumes and therefore low loads.
- Concentrations influence loads. SB with comparatively low runoff volume but fairly high estimated FSP concentrations had a relatively high estimated FSP load. LS has the lowest runoff volumes and due to extremely high summer concentrations during one event had a substantial summer load.

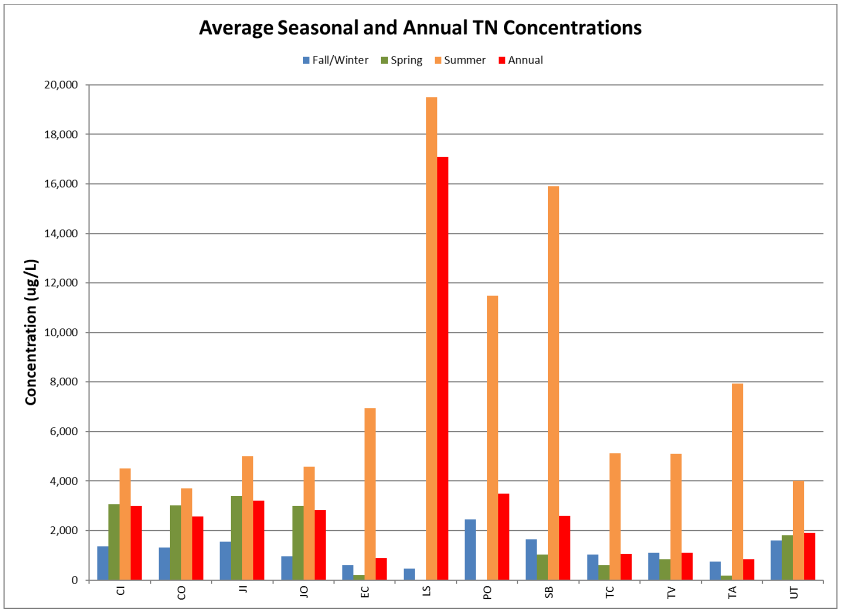

Figure 9 TN concentrations at each monitoring station, WY25.

TN Concentrations

- Average seasonal TN concentrations were highest in the summer at every site.
- The highest average seasonal TN concentrations were observed during the summer at LS, PO, and SB.
- Average annual TN concentrations were highest at LS.
- Average annual TN concentrations were lowest at EC, TC, TV, and TA.

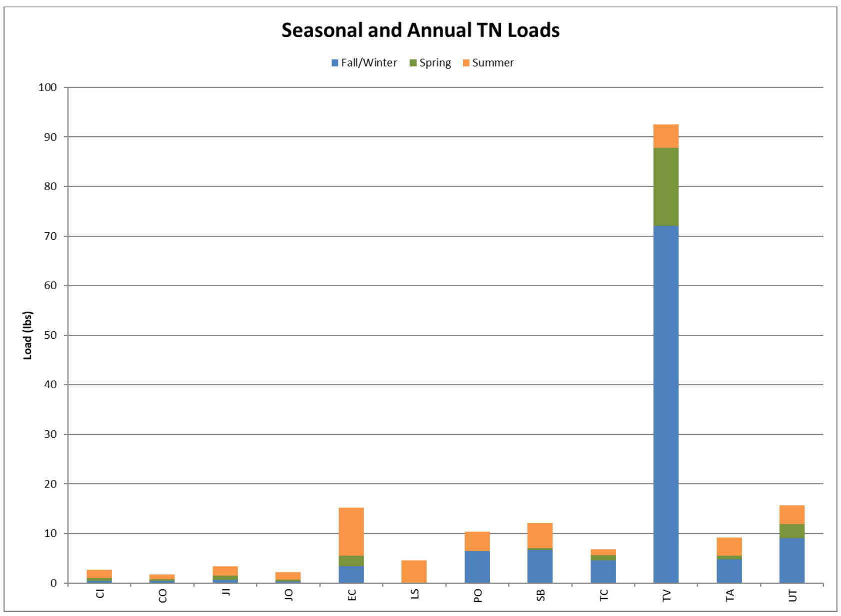

Figure 10 TN loads at each monitoring station, WY25.

TN Loads

- Runoff volumes influence loads. With the largest runoff volume, TV had the largest TN load, despite having a low average annual TN concentration. Similarly, SR431 (CI, CO, JI, JO) had relatively high concentrations but small runoff volumes and therefore low loads.
- Concentrations influence loads. PO and SB had relatively high loads because they had a relatively high annual concentrations despite having fairly low runoff volumes.

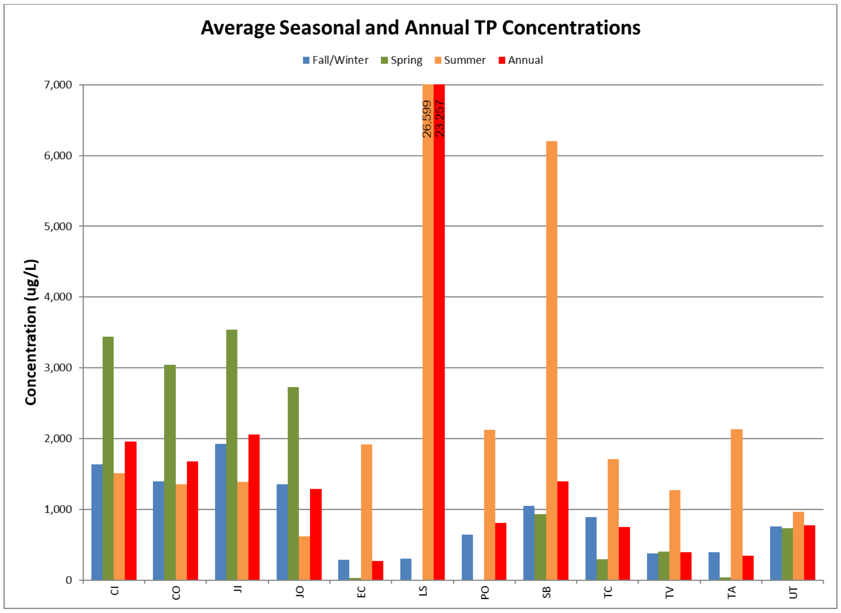

Figure 11 TP concentrations at each monitoring station, WY25.

TP Concentrations

- Average seasonal TP concentrations were highest in the spring at SR431 (CI, CO, JI, JO) and highest in the summer at EC, LS, PO, SB, TC, TV, TA and UT.
- The highest average seasonal TP concentration was observed during the summer at LS and SB.
- Average annual TP concentrations were highest at LS, SB and SR431 (CI, CO, JI, JO).
- Average annual TP concentrations were lowest at EC, TV, and TA.

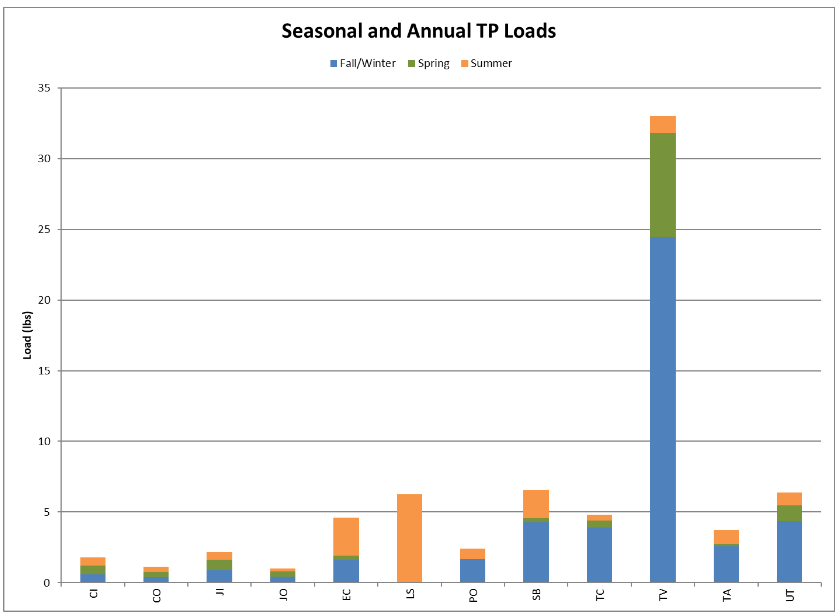

Figure 12 TP loads at each monitoring station, WY25.

TP Loads

- Runoff volumes influence loads. With the largest runoff volume, TV had the largest TP load, despite having a low average annual TP concentration. Similarly, SR431 (CI, CO, JI, JO) had high concentrations but small runoff volumes and therefore low loads.
- Concentrations influence loads. LS had a relatively high summer load because it had an extremely high average summer concentration despite have a very low runoff volume.

6.2 Summary Data for Individual Catchments

6.2.1 SR431

Figure 13 shows the average daily inflow and cumulative precipitation for WY25 at the SR431 treatment vaults. The treatment vaults are not designed to reduce flows so outflows are roughly equal to inflows for the Jellyfish. However, the Contech MFS vault has a capacity of about 3,000 cf. This results in a substantial amount of runoff evaporating or possibly seeping out through cracks in the vault instead of passing through the outflow and accounts for the difference between inflow and outflow volumes in Table 5 (compare CI annual volume to CO annual volume in Table 5).

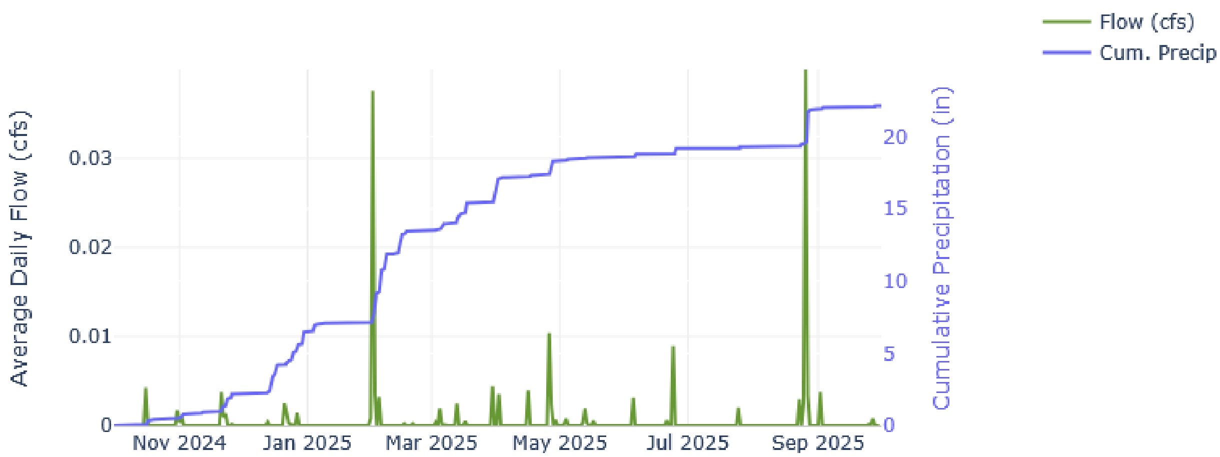

Figure 13 Average daily inflow and cumulative precipitation at the SR431 treatment vaults, WY25.

- Average daily flow in Figure 13 is from CI, but JI is similar, so it is not shown. The occasional difference in inflow volume between CI and JI is attributable to an unequal split of the flow in the splitter chamber when sediment accumulates.
- 22.105 inches of total precipitation (13.460 inches in the fall/winter, 5.141 inches in the spring, and 3.504 inches in the summer) were recorded at the NDOT weather station.
- 51 precipitation events occurred (21 fall/winter events, 14 spring events, 16 summer events).
- The largest storm event produced 2.68 inches of precipitation and occurred during an atmospheric river rain and snow event February 4-7, 2025.
- 75% of storms were less than half an inch.
- The largest runoff volume occurred during the January 31, 2025 – February 2, 2025 atmospheric river rain on snow event (3,627 cf).
- Highest average daily flows occurred on August 26, 2025 during a thunderstorm event.
- 4 days of snowmelt occurred in the spring season, resulting in 389 cf of runoff (3% of the total flow).
- The highest instantaneous peak precipitation was 0.19 inches in 5 minutes during a thunderstorm event on August 26, 2025.
- The highest instantaneous peak flow was 0.63 cfs during the thunderstorm event on August 26, 2025.

Contech MFS

Nine events were sampled at the Contech inflow and Contech outflow in WY25 (two in the fall/winter, three in the spring, and four in the summer). Event summary data is presented in Table 6. Minimum and maximum EMCs and loads for Contech inflow are shown in Table 7 and minimum and maximum EMCs and loads for Contech outflow are shown in Table 8.

Table 6 Event summary data at the Contech MFS treatment vault, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
CI	Fall/Winter	1/31/2025 13:30	2/2/2025 18:10	52:40	3,627	0.22	219	2.11	Rain on Snow	347	78.5	70.5	1,423	0.32	1,723	0.390
CO	Fall/Winter	1/31/2025 13:40	2/2/2025 18:15	52:35	3,241	0.20	264	2.11	Rain on Snow	291	58.8	80.4	1,372	0.28	1,451	0.293
CI	Fall/Winter	2/4/2025 16:45	2/4/2025 19:35	2:50	278	0.07	103	1.38	Rain on Snow	87	1.51	64.6	566	0.01	541	0.009
CO	Fall/Winter	2/4/2025 16:55	2/4/2025 19:40	2:45	236	0.05	127	1.38	Rain on Snow	92	1.36	63.6	712	0.01	629	0.009
CI	Spring	3/30/2025 10:35	3/30/2025 20:00	9:25	381	0.20	1,747	0.22	Rain on Snow	1,371	32.6	82.1	4,062	0.10	5,928	0.141
CO	Spring	3/30/2025 10:45	3/30/2025 13:35	2:50	283	0.09	159	0.22	Rain on Snow	915	16.2	84.6	3,407	0.06	4,131	0.073
CI	Spring	4/16/2025 16:55	4/16/2025 18:10	1:15	342	0.49	1,483	0.16	Thunderstorm	1,910	40.7	65.2	6,342	0.14	7,642	0.163
CO	Spring	4/16/2025 17:00	4/16/2025 18:10	1:10	300	0.32	121	0.16	Thunderstorm	1,472	27.5	68.9	5,464	0.10	5,979	0.112
CI	Spring	4/26/2025 1:35	4/27/2025 15:40	38:05	1,102	0.11	571	0.97	Event Snowmelt	231	15.9	67.4	1,694	0.12	1,282	0.088
CO	Spring	4/26/2025 1:50	4/27/2025 12:40	34:50	623	0.06	52	0.97	Event Snowmelt	219	8.52	74.3	1,661	0.06	1,137	0.044
CI	Summer	6/24/2025 17:10	6/24/2025 19:05	1:55	773	0.52	900	0.38	Thunderstorm	369	17.8	39.6	4,012	0.19	2,338	0.113
CO	Summer	6/24/2025 17:15	6/24/2025 19:10	1:55	707	0.40	655	0.38	Thunderstorm	251	11.1	43.7	3,440	0.15	1,567	0.069
CI	Summer	8/23/2025 13:10	8/23/2025 14:45	1:35	253	0.23	543	0.16	Thunderstorm	128	2.01	37.2	7,067	0.11	1,346	0.021
CO	Summer	8/23/2025 13:50	8/23/2025 14:35	0:45	100	0.10	304	0.16	Thunderstorm	122	0.76	41.9	6,341	0.04	1,359	0.008
CI	Summer	8/25/2025 15:55	8/25/2025 18:15	2:20	217	0.07	159	0.16	Thunderstorm	21	0.29	26.8	5,429	0.07	493	0.007
CO	Summer	8/25/2025 16:10	8/25/2025 17:55	1:45	52	0.02	136	0.16	Thunderstorm	26	0.09	34.0	4,773	0.02	543	0.002
CI	Summer	9/2/2025 17:10	9/2/2025 20:05	2:55	324	0.13	179	0.17	Thunderstorm	26	0.53	35.0	3,115	0.06	350	0.007
CO	Summer	9/2/2025 18:05	9/2/2025 19:45	1:40	115	0.05	113	0.17	Thunderstorm	39	0.28	42.3	2,486	0.02	388	0.003

Table 7 Maximum and minimum EMCs and loads at the Contech Inflow for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	21	0.29	1910	78.49
Runoff Volume (cf)	217	217	342	3,627
Runoff Start/End (Date Time)	8/25/2025 15:55 - 8/25/2025 18:15	8/25/2025 15:55 - 8/25/2025 18:15	4/16/2025 16:55 - 4/16/2025 18:10	1/31/2025 13:30 - 2/2/2025 18:10
Event Type	Thunderstorm	Thunderstorm	Thunderstorm	Rain on Snow

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	566	0.01	7,067	0.32
Runoff Volume (cf)	278	278	253	3,627
Runoff Start/End (Date Time)	2/4/2025 16:45 - 2/4/2025 19:35	2/4/2025 16:45 - 2/4/2025 19:35	8/23/2025 13:10 - 8/23/2025 14:45	1/31/2025 13:30 - 2/2/2025 18:10
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Rain on Snow

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	350	0.007	7,642	0.39
Runoff Volume (cf)	324	217	342	3,627
Runoff Start/End (Date Time)	9/2/2025 17:10 - 9/2/2025 20:05	8/25/2025 15:55 - 8/25/2025 18:15	4/16/2025 16:55 - 4/16/2025 18:10	1/31/2025 13:30 - 2/2/2025 18:10
Event Type	Thunderstorm	Thunderstorm	Thunderstorm	Rain on Snow

Table 8 Maximum and minimum EMCs and loads at the Contech Outflow for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	26	0.09	1472	58.84
Runoff Volume (cf)	52	52	300	3,241
Runoff Start/End (Date Time)	8/25/2025 16:10 - 8/25/2025 17:55	8/25/2025 16:10 - 8/25/2025 17:55	4/16/2025 17:00 - 4/16/2025 18:10	1/31/2025 13:40 - 2/2/2025 18:15
Event Type	Thunderstorm	Thunderstorm	Thunderstorm	Rain on Snow
TN	**Minimum**		**Maximum**	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	712	0.01	6,341	0.28
Runoff Volume (cf)	236	236	100	3,241
Runoff Start/End (Date Time)	2/4/2025 16:55 - 2/4/2025 19:40	2/4/2025 16:55 - 2/4/2025 19:40	8/23/2025 13:50 - 8/23/2025 14:35	1/31/2025 13:40 - 2/2/2025 18:15
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Rain on Snow
TP	**Minimum**		**Maximum**	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	388	0.002	5,979	0.29
Runoff Volume (cf)	115	52	300	3,241
Runoff Start/End (Date Time)	9/2/2025 18:05 - 9/2/2025 19:45	8/25/2025 16:10 - 8/25/2025 17:55	4/16/2025 17:00 - 4/16/2025 18:10	1/31/2025 13:40 - 2/2/2025 18:15
Event Type	Thunderstorm	Thunderstorm	Thunderstorm	Rain on Snow

Daily flow and FSP EMC summaries for the Contech MFS inflow and outflow are presented in Figure 14 and Figure 15, respectively. Table 6 presents EMC data in tabular form.

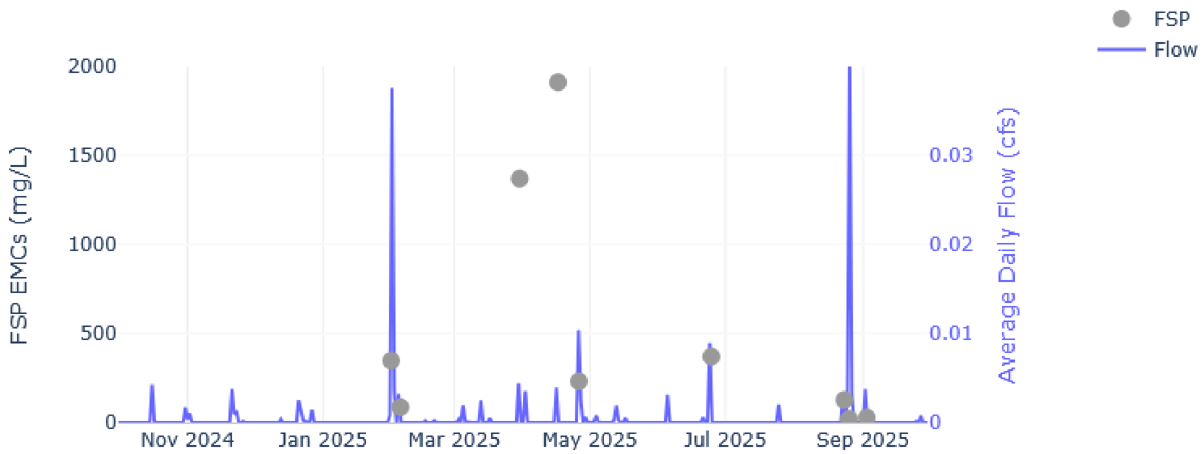

Figure 14 Daily inflow and FSP EMC summary at the Contech MFS, WY25.

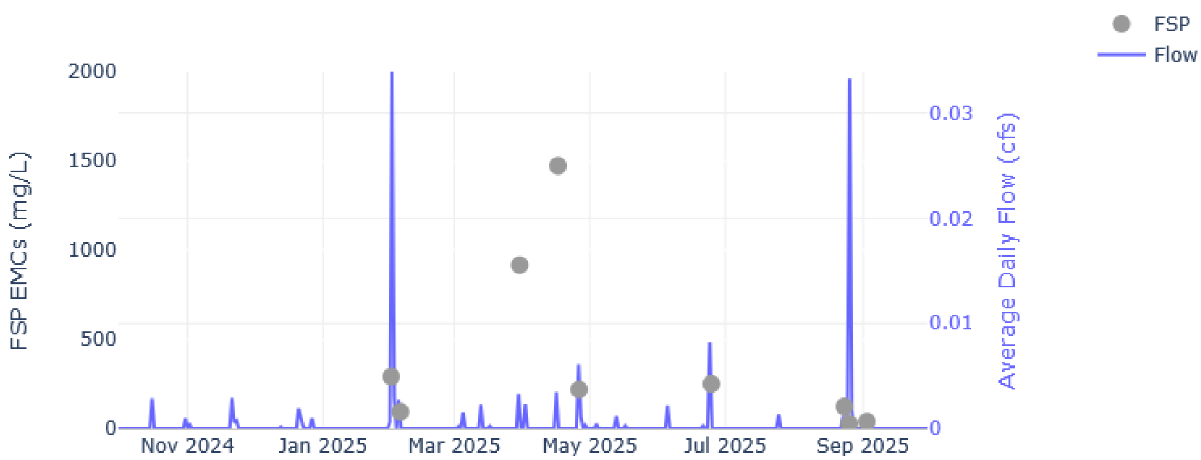

Figure 15 Daily outflow and FSP EMC summary at the Contech MFS, WY25.

Daily flow and TN EMC summaries for the Contech MFS inflow and outflow are presented in Figure 16 and Figure 17, respectively. Table 6 presents EMC data in tabular form.

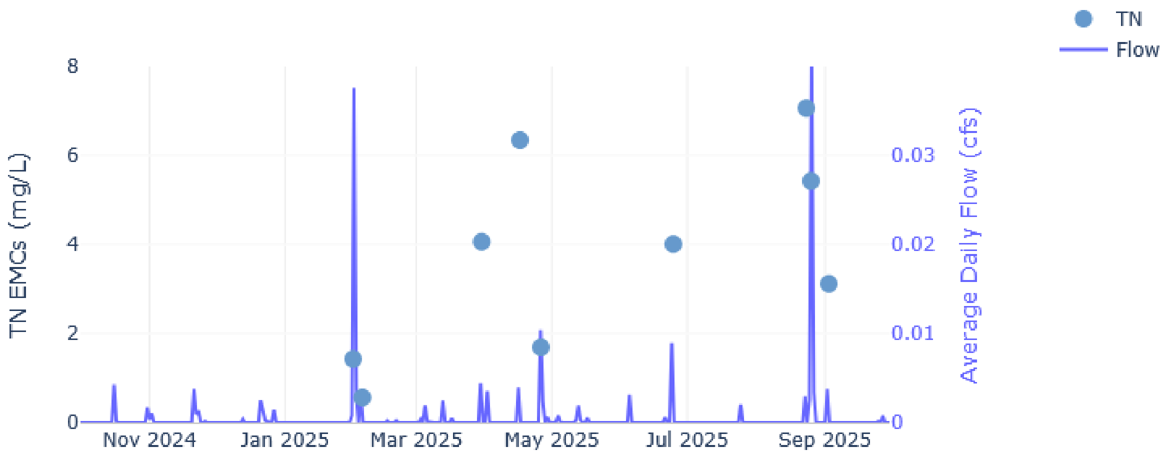

Figure 16 Daily inflow and TN EMC summary at the Contech MFS, WY25.

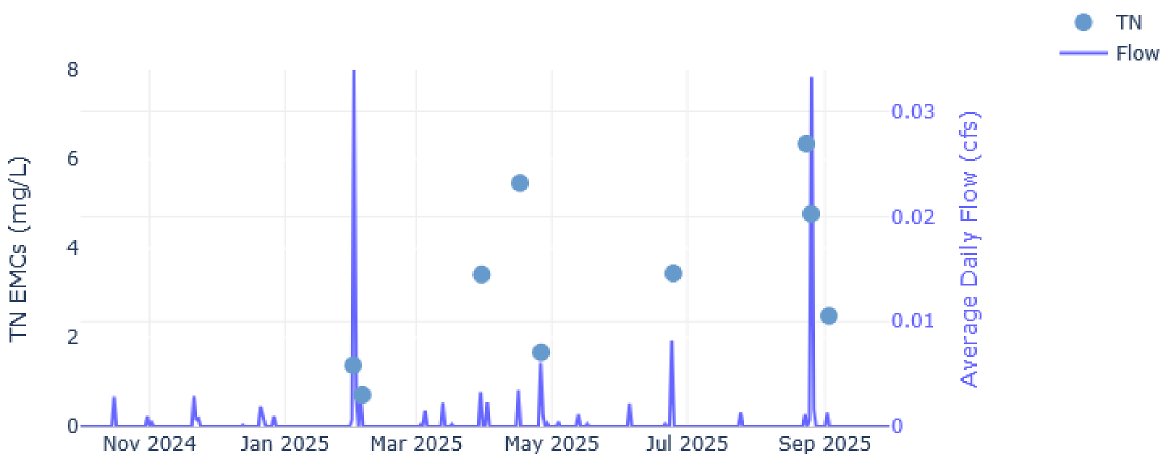

Figure 17 Daily outflow and TN EMC summary at the Contech MFS, WY25.

Daily flow and TP EMC summaries for the Contech MFS inflow and outflow are presented in Figure 18 and Figure 19, respectively. Table 6 presents EMC data in tabular form.

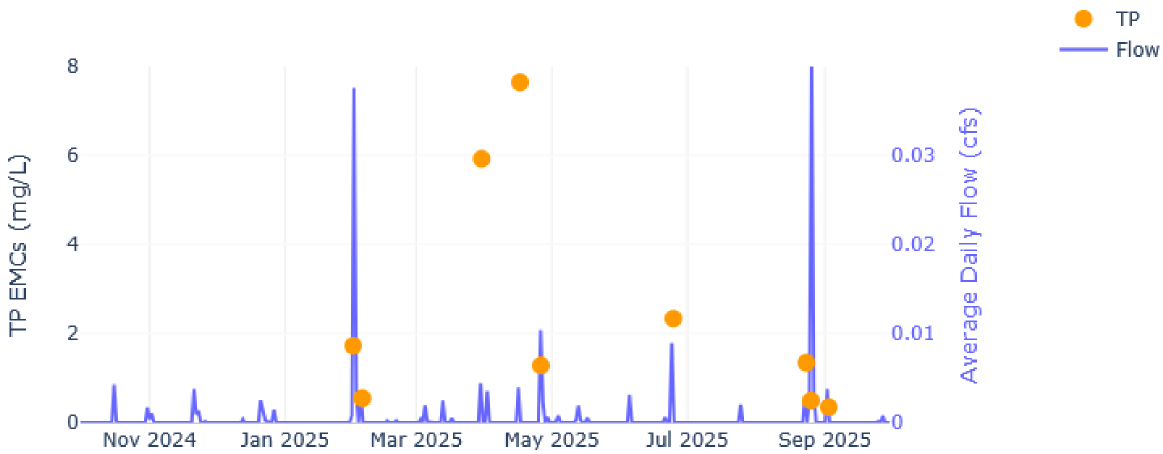

Figure 18 Daily inflow and TP EMC summary at the Contech MFS, WY25.

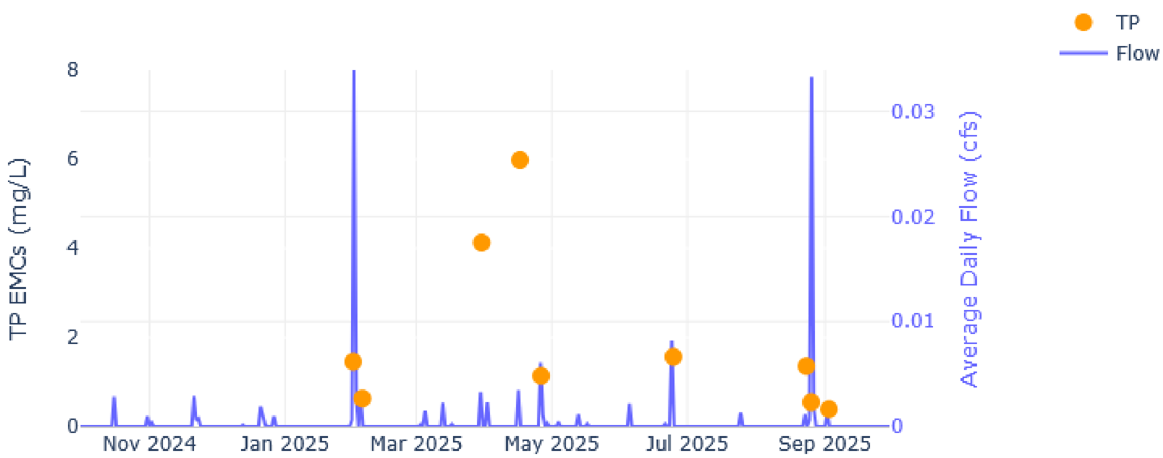

Figure 19 Daily outflow and TP EMC summary at the Contech MFS, WY25.

Seasonal load as a fraction of the water year load for the Contech MFS inflow and outflow are presented in Figure 20 and Figure 21, respectively. Event loads are presented in tabular form in Table 6.

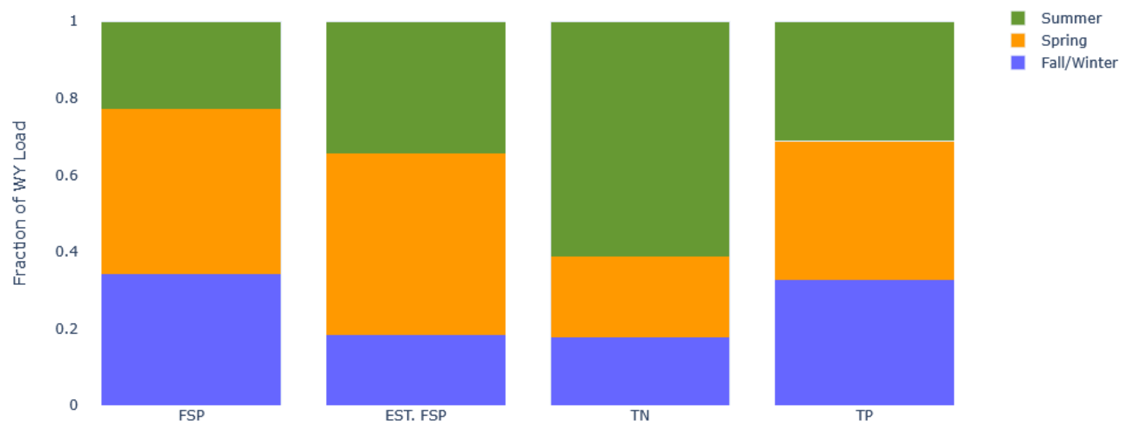

Figure 20 Seasonal load as a fraction of the water year load at the Contech MFS inflow, WY25. The first FSP column represents the FSP load calculated using event mean concentrations and the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

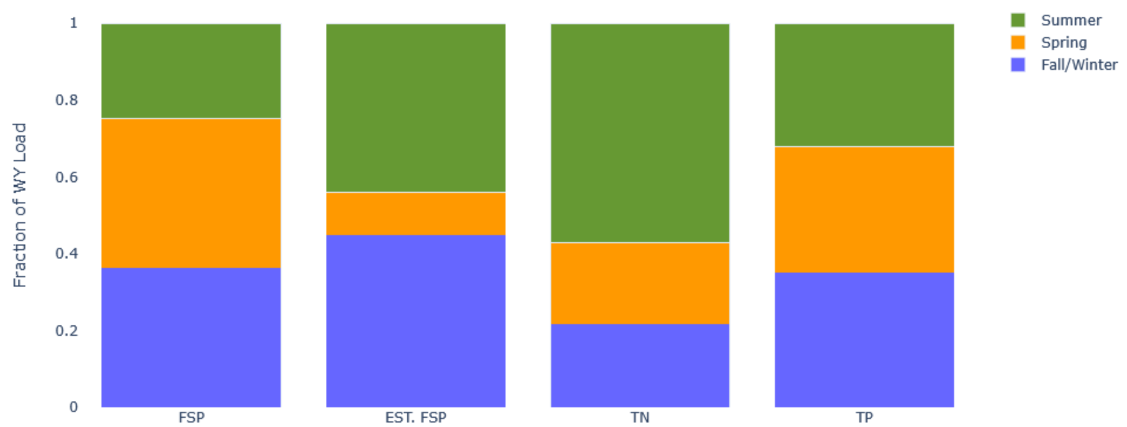

Figure 21 Seasonal load as a fraction of the water year load at the Contech MFS outflow, WY25. The first FSP column represents the FSP load calculated using event mean concentrations and the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads (based on samples) at the inflow was generated in the spring.
- The largest fraction of FSP loads (based on samples) at the outflow was generated in the fall/winter.
- The largest fraction of FSP loads (based on continuous turbidity) at the inflow was generated in the spring.

- The largest fraction of FSP loads (based on continuous turbidity) at the outflow was generated in the fall/winter.
- FSP loads calculated from sample concentrations are lab certified results and therefore reliable, however, not all runoff volume is sampled. Estimated FSP loads calculated from turbidity are less precise, but turbidity measurements are taken continuously on all runoff. This discrepancy accounts for the difference between FSP and estimated FSP results.
- The largest fraction of TN loads at the inflow was generated in the summer.
- The largest fraction of TN loads at the outflow was generated in the summer.
- The largest fraction of TP loads at the inflow was generated in the spring.
- The largest fraction of TP loads at the outflow was generated in the fall/winter.

Jellyfish

Nine events were sampled at Jellyfish inflow and Jellyfish outflow (two in the fall/winter, three in the spring, and four in the summer) in WY25. Event summary data is presented in Table 9. Minimum and maximum EMCs and loads for the Jellyfish inflow are shown in Table 10 and minimum and maximum EMCs and loads for the Jellyfish outflow are shown in Table 11.

Table 9 Event summary data at the Jellyfish treatment vault, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
JI	Fall/Winter	1/31/2025 13:30	2/2/2025 18:25	52:55	4,043	0.23	381	2.11	Rain on Snow	450	113	72.8	1,627	0.41	2,039	0.514
JO	Fall/Winter	1/31/2025 13:35	2/2/2025 18:10	52:35	3,226	0.21	141	2.11	Rain on Snow	303	61	74.7	990	0.20	1,419	0.286
JI	Fall/Winter	2/4/2025 15:15	2/4/2025 22:05	6:50	362	0.08	146	1.38	Rain on Snow	106	2.39	62.6	856	0.02	711	0.016
JO	Fall/Winter	2/4/2025 16:50	2/4/2025 19:35	2:45	238	0.06	88	1.38	Rain on Snow	63	0.93	62.1	559	0.01	490	0.007
JI	Spring	3/30/2025 10:35	3/30/2025 19:55	9:20	382	0.20	1,682	0.22	Rain on Snow	1,546	36.9	76.9	5,067	0.12	6,254	0.149
JO	Spring	3/30/2025 10:40	3/30/2025 13:25	2:45	263	0.16	1,227	0.22	Rain on Snow	681	11.2	81.0	2,409	0.04	2,744	0.045
JI	Spring	4/16/2025 16:55	4/16/2025 18:10	1:15	350	0.50	1,258	0.16	Thunderstorm	1,699	37.1	63.9	6,218	0.14	7,523	0.164
JO	Spring	4/16/2025 17:00	4/16/2025 18:00	1:00	304	0.40	1,256	0.16	Thunderstorm	1,688	32.0	61.1	6,345	0.12	6,962	0.132
JI	Spring	4/26/2025 1:35	4/27/2025 15:30	37:55	1,088	0.11	513	0.97	Event Snowmelt	246	16.7	67.9	1,923	0.13	1,313	0.089
JO	Spring	4/26/2025 1:45	4/27/2025 13:40	35:55	690	0.10	352	0.97	Event Snowmelt	153	6.59	75.4	1,739	0.07	866	0.037
JI	Summer	6/24/2025 17:10	6/24/2025 19:00	1:50	776	0.52	782	0.38	Thunderstorm	348	16.8	39.5	4,855	0.24	2,148	0.104
JO	Summer	6/24/2025 17:10	6/24/2025 19:00	1:50	731	0.49	470	0.38	Thunderstorm	272	12.4	40.0	4,744	0.22	721	0.033
JI	Summer	8/23/2025 13:10	8/23/2025 14:40	1:30	272	0.24	494	0.16	Thunderstorm	118	2.01	36.7	7,198	0.12	1,410	0.024
JO	Summer	8/23/2025 13:55	8/23/2025 14:40	0:45	63	0.09	172	0.16	Thunderstorm	159	0.63	40.7	7,535	0.03	1,582	0.006
JI	Summer	8/25/2025 15:55	8/25/2025 18:15	2:20	244	0.07	163	0.16	Thunderstorm	21	0.32	24.6	5,727	0.09	569	0.009
JO	Summer	8/25/2025 16:00	8/25/2025 18:05	2:05	147	0.05	51	0.16	Thunderstorm	15	0.14	23.1	5,895	0.05	385	0.004
JI	Summer	9/2/2025 17:10	9/2/2025 20:05	2:55	360	0.13	167	0.17	Thunderstorm	28	0.62	37.8	3,140	0.07	300	0.007
JO	Summer	9/2/2025 17:25	9/2/2025 19:45	2:20	229	0.11	104	0.17	Thunderstorm	14	0.20	29.7	2,353	0.03	187	0.003

Table 10 Maximum and minimum EMCs and loads at the Jellyfish Inflow for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	21	0.32	1699	113.49
Runoff Volume (cf)	244	244	350	4,043
Runoff Start/End (Date Time)	8/25/2025 15:55 - 8/25/2025 18:15	8/25/2025 15:55 - 8/25/2025 18:15	4/16/2025 16:55 - 4/16/2025 18:10	1/31/2025 13:30 - 2/2/2025 18:25
Event Type	Thunderstorm	Thunderstorm	Thunderstorm	Rain on Snow

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	856	0.02	7,198	0.41
Runoff Volume (cf)	362	362	272	4,043
Runoff Start/End (Date Time)	2/4/2025 15:15 - 2/4/2025 22:05	2/4/2025 15:15 - 2/4/2025 22:05	8/23/2025 13:10 - 8/23/2025 14:40	1/31/2025 13:30 - 2/2/2025 18:25
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Rain on Snow

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	300	0.007	7,523	0.51
Runoff Volume (cf)	360	360	350	4,043
Runoff Start/End (Date Time)	9/2/2025 17:10 - 9/2/2025 20:05	9/2/2025 17:10 - 9/2/2025 20:05	4/16/2025 16:55 - 4/16/2025 18:10	1/31/2025 13:30 - 2/2/2025 18:25
Event Type	Thunderstorm	Thunderstorm	Thunderstorm	Rain on Snow

Table 11 Maximum and minimum EMCs and loads at the Jellyfish Outflow for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	14	0.14	1688	61.04
Runoff Volume (cf)	229	147	304	3,226
Runoff Start/End (Date Time)	9/2/2025 17:25 - 9/2/2025 19:45	8/25/2025 16:00 - 8/25/2025 18:05	4/16/2025 17:00 - 4/16/2025 18:00	1/31/2025 13:35 - 2/2/2025 18:10
Event Type	Thunderstorm	Thunderstorm	Thunderstorm	Rain on Snow

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	559	0.01	7,535	0.22
Runoff Volume (cf)	238	238	63	731
Runoff Start/End (Date Time)	2/4/2025 16:50 - 2/4/2025 19:35	2/4/2025 16:50 - 2/4/2025 19:35	8/23/2025 13:55 - 8/23/2025 14:40	6/24/2025 17:10 - 6/24/2025 19:00
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Thunderstorm

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	187	0.003	6,962	0.29
Runoff Volume (cf)	229	229	304	3,226
Runoff Start/End (Date Time)	9/2/2025 17:25 - 9/2/2025 19:45	9/2/2025 17:25 - 9/2/2025 19:45	4/16/2025 17:00 - 4/16/2025 18:00	1/31/2025 13:35 - 2/2/2025 18:10
Event Type	Thunderstorm	Thunderstorm	Thunderstorm	Rain on Snow

Daily flow and FSP EMC summaries for the Jellyfish inflow and outflow are presented in Figure 22 and Figure 23, respectively. Table 9 presents EMC data in tabular form.

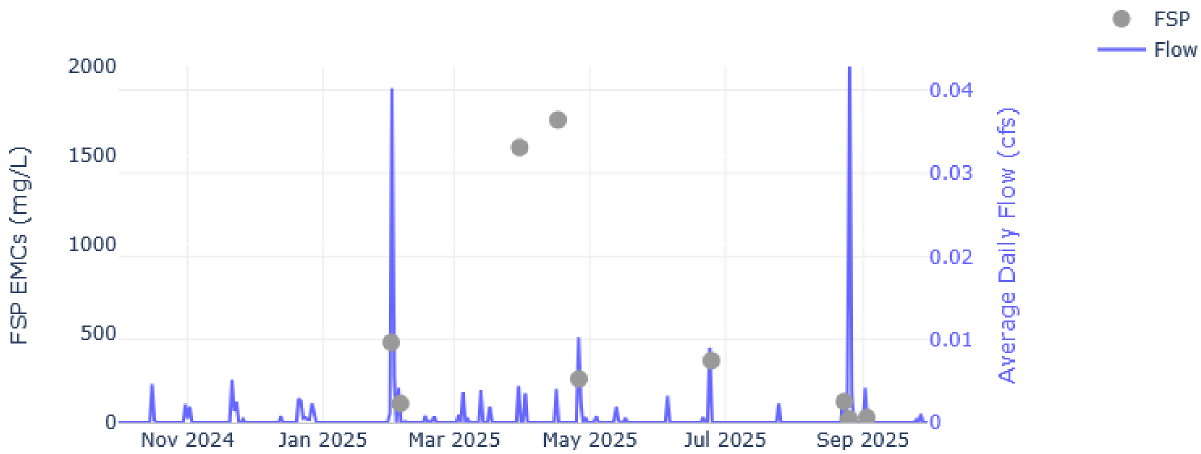

Figure 22 Daily inflow and FSP EMC summary at the Jellyfish inflow, WY25.

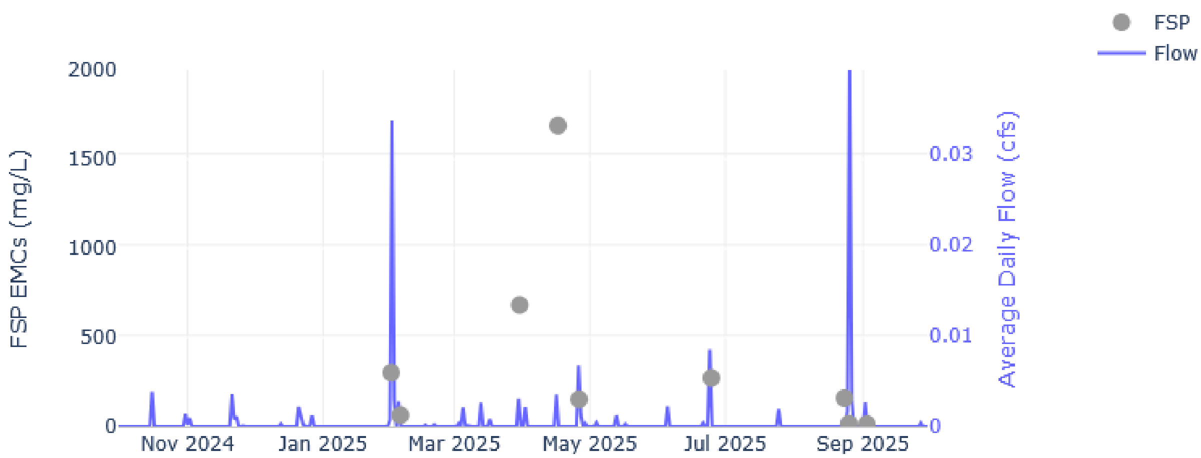

Figure 23 Daily outflow and FSP EMC summary at the Jellyfish outflow, WY25.

Daily flow and TN EMC summaries for the Jellyfish inflow and outflow are presented in Figure 24 and Figure 25, respectively. Table 9 presents EMC data in tabular form.

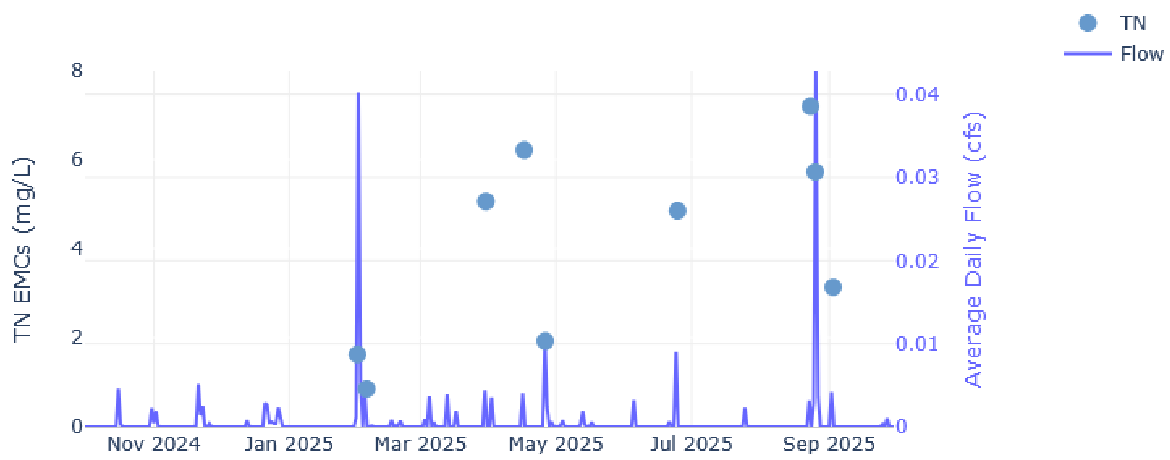

Figure 24 Daily inflow and TN EMC summary at the Jellyfish inflow, WY25.

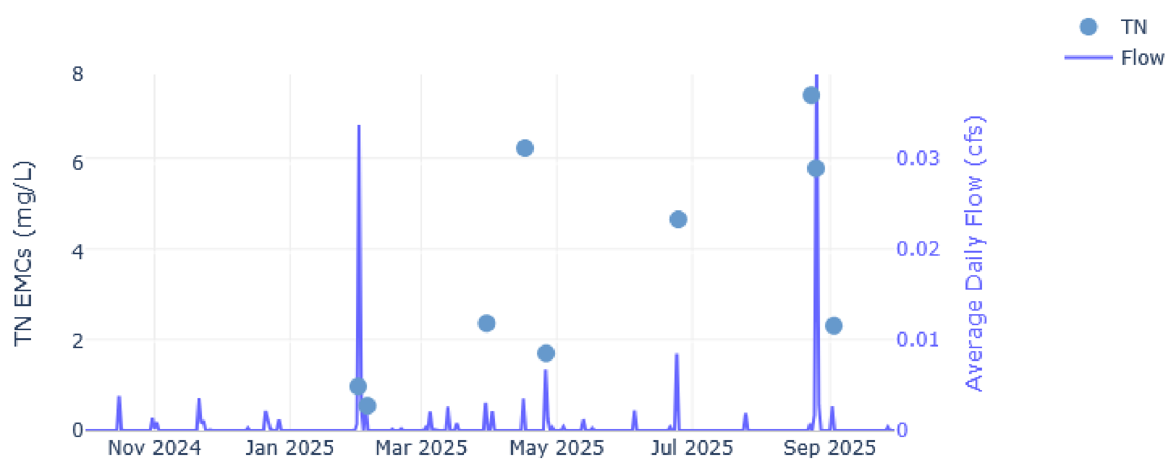

Figure 25 Daily outflow and TN EMC summary at the Jellyfish outflow, WY25.

Daily flow and TP EMC summaries for the Jellyfish inflow and outflow are presented in Figure 26 and Figure 27, respectively. Table 9 presents EMC data in tabular form.

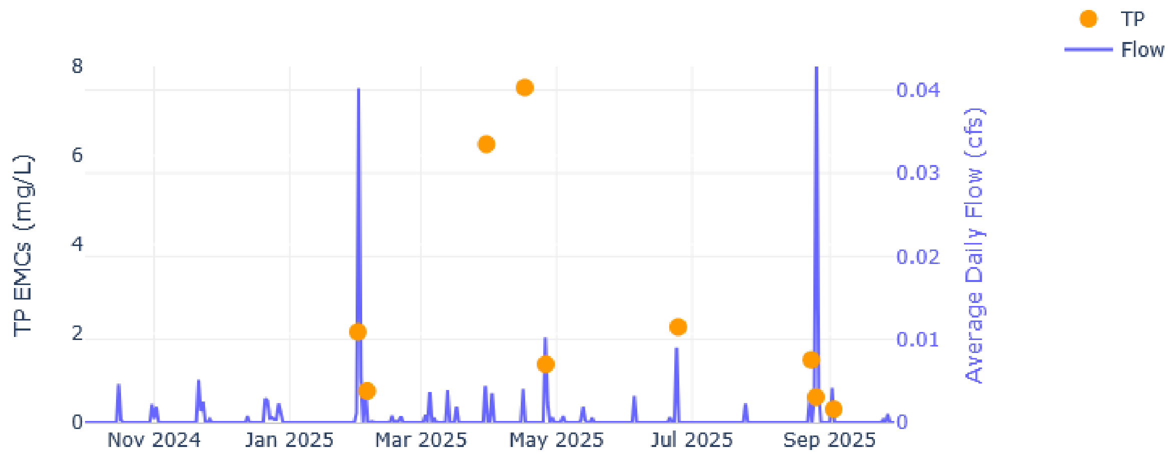

Figure 26 Daily inflow and TP EMC summary at the Jellyfish inflow, WY25.

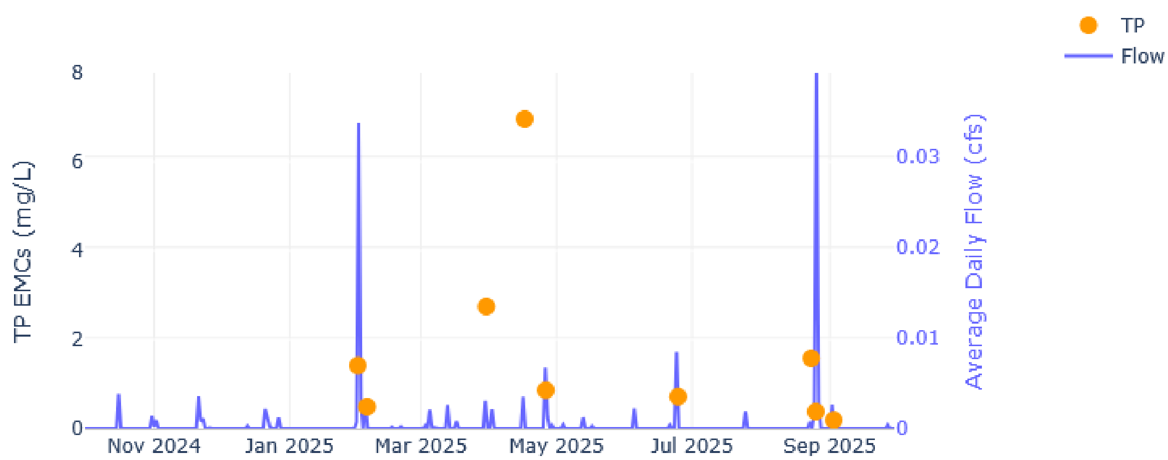

Figure 27 Daily outflow and TP EMC summary at the Jellyfish outflow, WY25.

Seasonal load as a fraction of the water year load for the Jellyfish inflow and outflow are presented in Figure 28 and Figure 29, respectively. Event loads are presented in tabular form in Table 9.

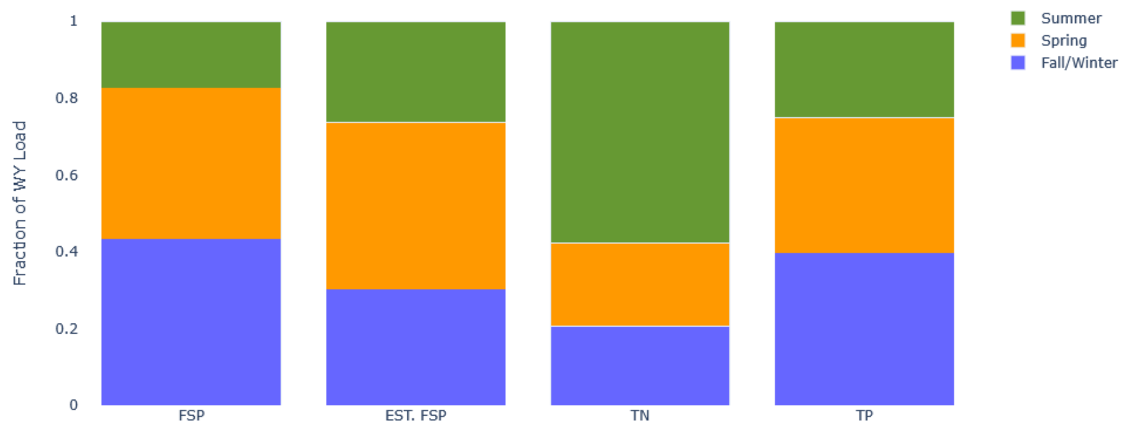

Figure 28 Seasonal load as a fraction of the water year load at the Jellyfish inflow, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

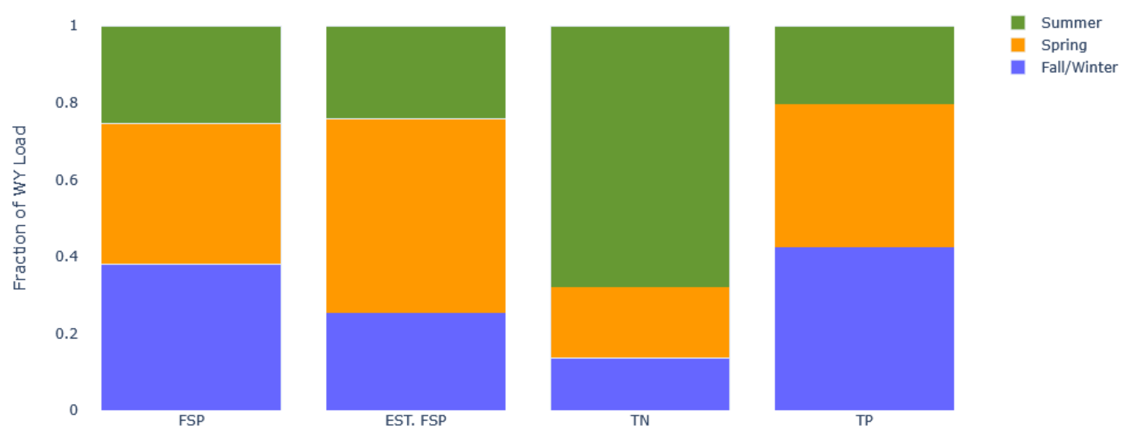

Figure 29 Seasonal load as a fraction of the water year load at the Jellyfish outflow, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads (based on samples) at the inflow was generated in the fall/winter.
- The largest fraction of FSP loads (based on samples) at the outflow was generated in the fall/winter.
- The largest fraction of FSP loads (based on continuous turbidity) at the inflow was generated in the spring.

- The largest fraction of FSP loads (based on continuous turbidity) at the outflow was generated in the spring.
- FSP loads calculated from sample concentrations are lab certified results and therefore reliable, however, not all runoff volume is sampled. Estimated FSP loads calculated from turbidity are less precise, but turbidity measurements are taken continuously on all runoff. This discrepancy accounts for the difference between FSP and estimated FSP results.
- The largest fraction of TN loads at the inflow was generated in the summer.
- The largest fraction of TN loads at the outflow was generated in the summer.
- The largest fraction of TP loads at the inflow was generated in the fall/winter.
- The largest fraction of TP loads at the outflow was generated in fall/winter.

6.2.2 Elks Club

Figure 30 shows the average daily flow and cumulative precipitation for WY25 at the Elks Club catchment outfall.

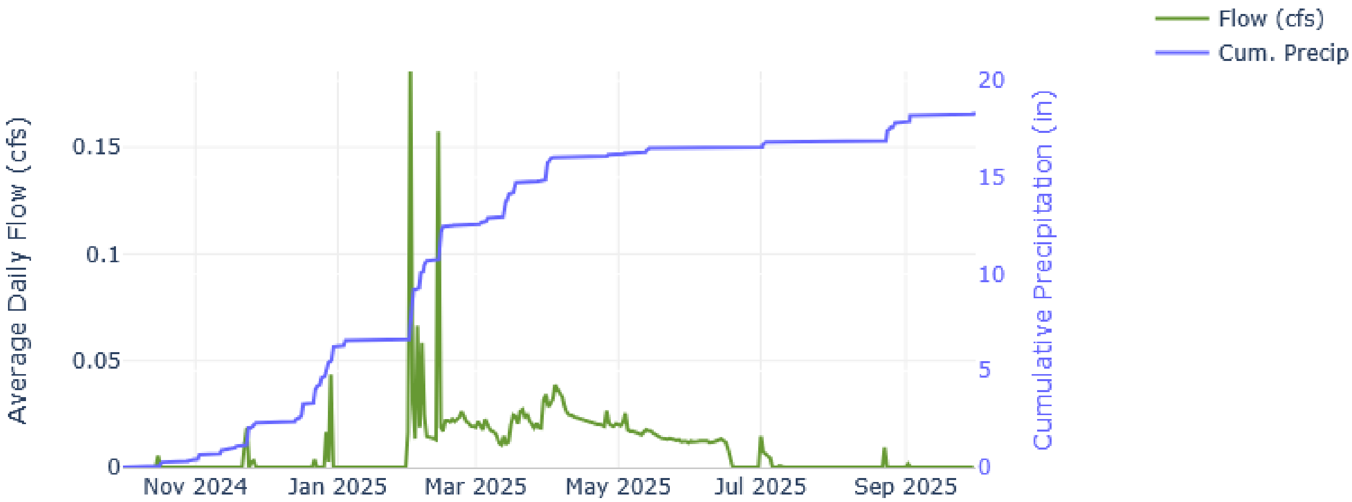

Figure 30 Average daily flow and cumulative precipitation at the Elks Club catchment outfall, WY25.

- 18.30 inches of total precipitation (12.54 inches in the fall/winter, 4.01 inches in the spring, 1.75 inches in the summer) were recorded at the Shakori (SHK) weather station.
- 46 precipitation events occurred (21 fall/winter events, 12 spring events, 13 summer events).
- The largest storm event produced 2.66 inches of precipitation and occurred during an atmospheric river rain on snow event from January 31, 2025 to February 2, 2025.
- 74% of storms were less than half an inch.
- The largest runoff volume was caused by continuous snowmelt April 2-25, 2025 (51,853 cf).
- The largest runoff volume that wasn't snowmelt occurred during the January 31, 2025 to February 2, 2025 atmospheric river rain on snow event (19,892 cf).
- Highest average daily flows occurred on February 1, 2025 during an atmospheric river rain on snow event.
- 125 days of snowmelt occurred in the fall/winter, spring, and summer resulting in 183,653 cf of runoff (67% of the total flow).
- The highest instantaneous peak precipitation was 0.26 inches in 10 minutes during a thunderstorm event on August 23, 2025.
- The highest instantaneous peak flow was 1.17 cfs on February 13, 2025 during a rain on snow event.

Nine events were sampled at Elks Club for FSP, TN, and TP (four in the fall/winter, three in the spring, and two in the summer) in WY25. Event summary data is presented in Table 12. Minimum and maximum EMCs and loads are shown in Table 13.

Table 12 Event summary data at the Elks Club catchment outfall, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
EC	Fall/Winter	11/22/2024 21:50	11/23/2024 7:20	9:30	2,435	0.19	76	0.86	Rain	10	1.55	37.9	300	0.05	179	0.027
EC	Fall/Winter	12/27/2024 2:20	12/27/2024 19:05	16:45	1,427	0.04	24	0.71	Rain on Snow	13	1.19	74.3	208	0.02	74	0.007
EC	Fall/Winter	12/29/2024 8:25	12/29/2024 22:15	13:50	3,760	0.22	123	0.74	Rain on Snow	34	7.94	76.9	425	0.10	222	0.052
EC	Fall/Winter	1/31/2025 12:55	2/2/2025 20:55	56:00	19,892	0.74	334	2.66	Rain on Snow	32	39.7	37.2	693	0.86	324	0.402
EC	Spring	3/16/2025 10:15	3/17/2025 21:45	35:30	3,222	0.05	8	0.58	Event Snowmelt	2	0.41	33.9	223	0.04	25	0.005
EC	Spring	3/22/2025 8:10	3/25/2025 0:50	64:40	5,576	0.05	7	0.00	Non-event Snowmelt	7	2.30	55.0	174	0.06	29	0.010
EC	Spring	3/30/2025 16:45	3/31/2025 6:20	13:35	2,517	0.10	61	0.49	Rain on Snow	11	1.66	55.8	272	0.04	37	0.006
EC	Summer	7/1/2025 14:15	7/1/2025 15:30	1:15	979	0.84	796	0.16	Thunderstorm	312	19.0	39.0	6,951	0.42	2,181	0.133
EC	Summer	8/23/2025 13:15	8/23/2025 19:05	5:50	806	0.75	460	0.52	Thunderstorm	226	11.4	45.7	6,941	0.35	1,602	0.081

Table 13 Maximum and minimum EMCs and loads at the Elks Club catchment outfall for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	2.0	0.41	312	39.70
Runoff Volume (cf)	3,222	3,222	979	19,892
Runoff Start/End (Date Time)	3/16/2025 10:15 - 3/17/2025 21:45	3/16/2025 10:15 - 3/17/2025 21:45	7/1/2025 14:15 - 7/1/2025 15:30	1/31/2025 12:55 - 2/2/2025 20:55
Event Type	Event Snowmelt	Event Snowmelt	Thunderstorm	Rain on Snow

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	174	0.02	6,951	0.86
Runoff Volume (cf)	5,576	1,427	979	19,892
Runoff Start/End (Date Time)	3/22/2025 08:10 - 3/25/2025 0:50	12/27/2024 02:20 - 12/27/2024 19:05	7/1/2025 14:15 - 7/1/2025 15:30	1/31/2025 12:55 - 2/2/2025 20:55
Event Type	Non-event Snowmelt	Rain on Snow	Thunderstorm	Rain on Snow

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	25	0.005	2,181	0.40
Runoff Volume (cf)	3,222	3,222	979	19,892
Runoff Start/End (Date Time)	3/16/2025 10:15 - 3/17/2025 21:45	3/16/2025 10:15 - 3/17/2025 21:45	7/1/2025 14:15 - 7/1/2025 15:30	1/31/2025 12:55 - 2/2/2025 20:55
Event Type	Event Snowmelt	Event Snowmelt	Thunderstorm	Rain on Snow

Daily flow and the EMC summary at Elks Club for FSP, TN, and TP are presented in Figure 31, Figure 32, and Figure 33, respectively. Table 12 presents EMC data in tabular form.

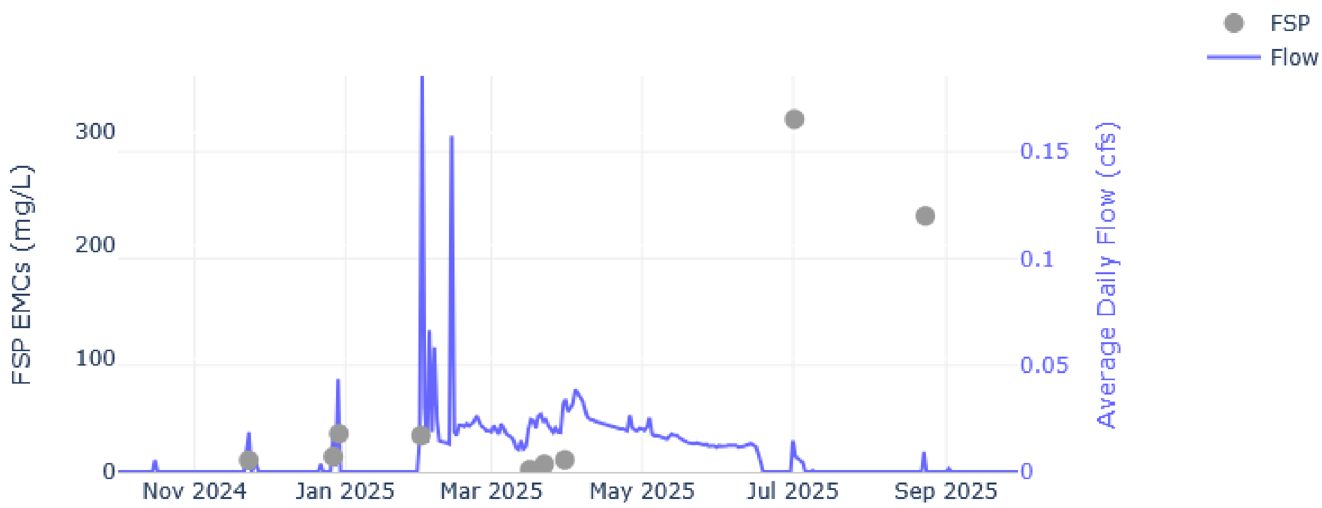

Figure 31 Daily flow and FSP EMC summary at the Elks Club catchment outfall, WY25.

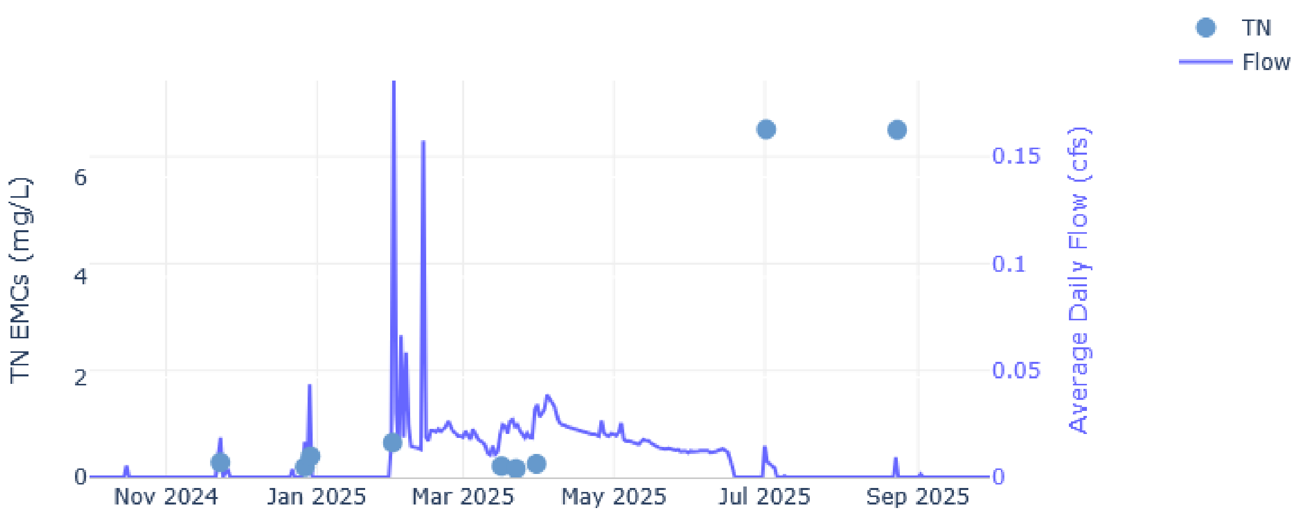

Figure 32 Daily flow and TN EMC summary at the Elks Club catchment outfall, WY25.

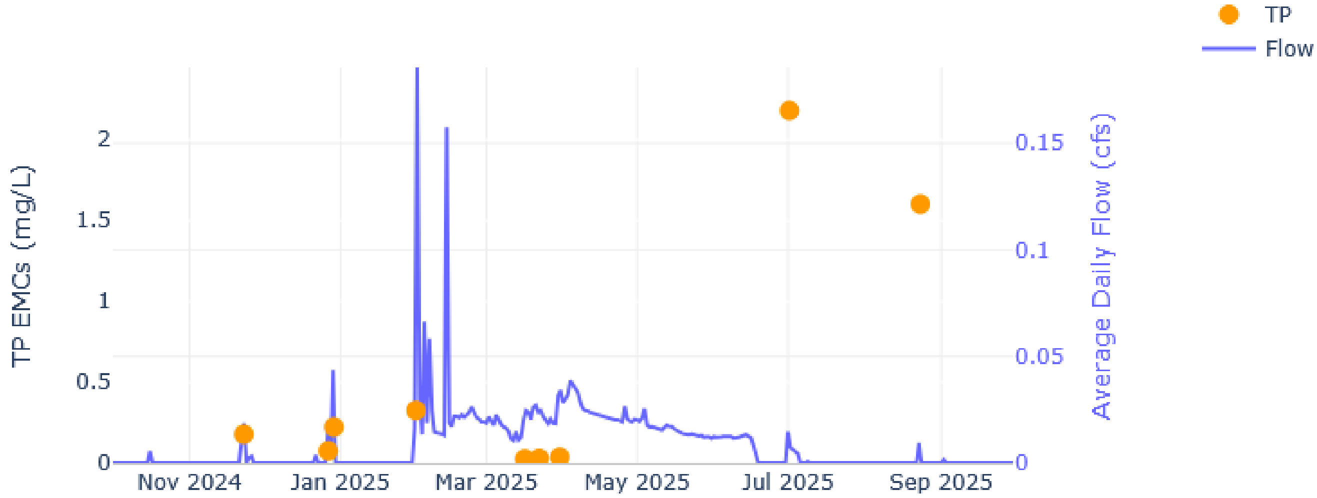

Figure 33 Daily flow and TP EMC summary at the Elks Club catchment outfall, WY25.

Seasonal load as a fraction of the water year load at Elks Club is presented in Figure 34. Event loads are presented in tabular form in Table 12.

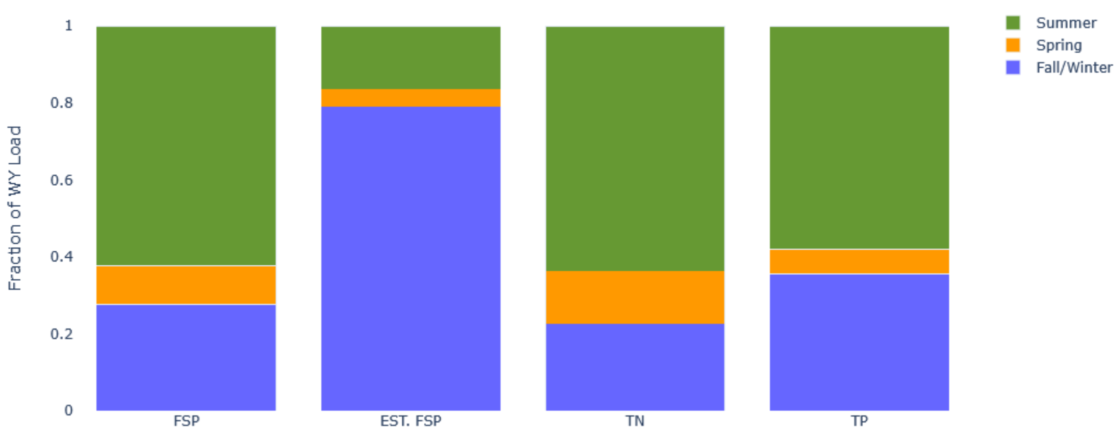

Figure 34 Seasonal load as a fraction of the water year load at the Elks Club catchment outfall, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads from samples was generated in the summer.
- The largest fraction of FSP loads from continuous turbidity was generated in the fall/winter.
- FSP loads calculated from sample concentrations are lab certified results and therefore reliable, however, not all runoff volume is sampled. Estimated FSP loads calculated from turbidity are less precise, but

turbidity measurements are taken continuously on all runoff. This discrepancy accounts for the difference between FSP and estimated FSP results.

- The largest fraction of TN loads was generated in the summer.
- The largest fraction of TP loads was generated in the summer

6.2.3 Lakeshore

Figure 35 shows the average daily flow and cumulative precipitation for WY25 at the Lakeshore catchment outfall.

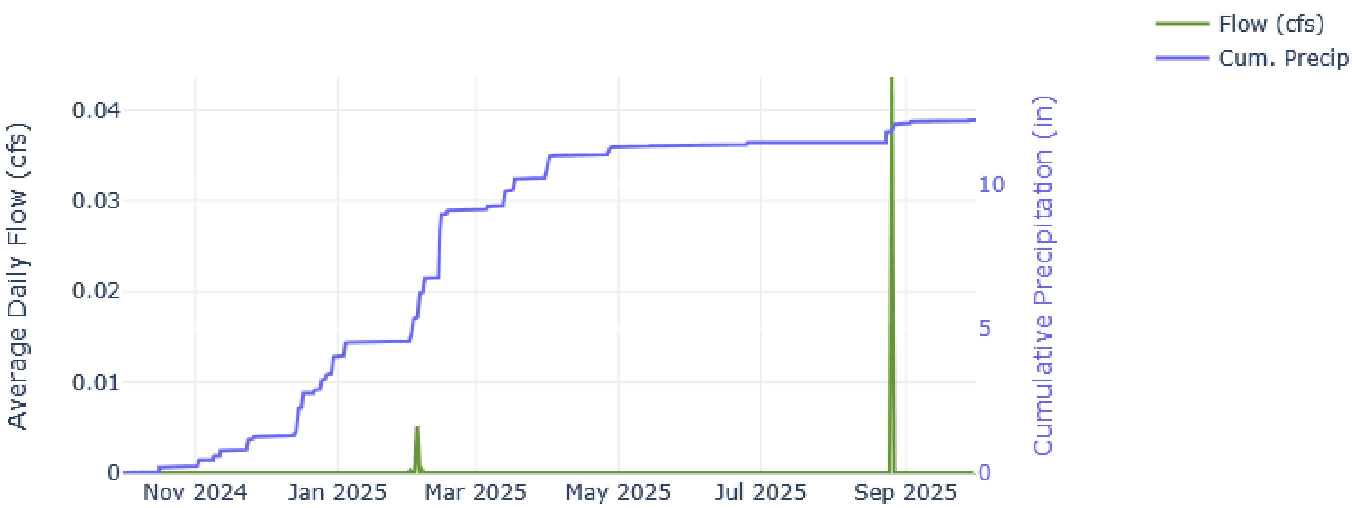

Figure 35 Average daily flow and cumulative precipitation at the Lakeshore catchment outfall, WY25.

- 12.209 inches of total precipitation (9.073 inches in the fall/winter, 2.244 inches in the spring, and 0.892 inches in the summer) were recorded at the TERC weather station.
- 37 precipitation events occurred (20 fall/winter events, 8 spring events, 9 summer events).
- The largest storm event produced 2.19 inches of precipitation and occurred during an atmospheric river rain on snow event from February 13-14, 2025.
- 73% of storms were less than half an inch.
- The largest runoff volume occurred during a thunderstorm event on August 26, 2025 (3,773 cf).
- Highest average daily flows occurred on August 26, 2025 during a thunderstorm event.
- Zero days of snowmelt occurred.
- The highest instantaneous peak precipitation was 0.13 inches in 5 minutes during the thunderstorm event on August 23, 2025.
- The highest instantaneous peak flow was 1.15 cfs on August 26, 2025 during a thunderstorm event.

Two events were sampled at Lakeshore for FSP, TN, and TP in WY25 (one in the fall/winter, zero in the spring, and one in the summer). Event summary data is presented in Table 14. Minimum and maximum EMCs and loads are shown in Table 15.

Table 14 Event summary data at the Lakeshore outfall, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
LS	Fall/Winter	2/4/2025 18:10	2/5/2025 1:10	7:00	446	0.11	118	0.86	Rain on Snow	28	0.788	67.4	466	0.01	305	0.008
LS	Summer	8/26/2025 16:40	8/26/2025 21:00	4:20	3,773	1.15	2,244	0.17	Thunderstorm	5,911	1,391	71.7	19,512	4.59	26,617	6.264

Table 15 Maximum and minimum EMCs and loads at the Lakeshore outfall for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	28	0.79	5911	1391.16
Runoff Volume (cf)	446	446	3,773	3,773
Runoff Start/End (Date Time)	2/4/2025 18:10 - 2/5/2025 1:10	2/4/2025 18:10 - 2/5/2025 1:10	8/26/2025 16:40 - 8/26/2025 21:00	8/26/2025 16:40 - 8/26/2025 21:00
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Thunderstorm

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	466	0.01	19,512	4.59
Runoff Volume (cf)	446	446	3,773	3,773
Runoff Start/End (Date Time)	2/4/2025 18:10 - 2/5/2025 1:10	2/4/2025 18:10 - 2/5/2025 1:10	8/26/2025 16:40 - 8/26/2025 21:00	8/26/2025 16:40 - 8/26/2025 21:00
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Thunderstorm

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	305	0.008	26,617	6.26
Runoff Volume (cf)	446	446	3,773	3,773
Runoff Start/End (Date Time)	2/4/2025 18:10 - 2/5/2025 1:10	2/4/2025 18:10 - 2/5/2025 1:10	8/26/2025 16:40 - 8/26/2025 21:00	8/26/2025 16:40 - 8/26/2025 21:00
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Thunderstorm

Daily flow and FSP EMC summaries at the Lakeshore outfall for FSP, TN, and TP are presented in Figure 36, Figure 37, and Figure 38, respectively. Table 14 presents EMC data in tabular form.

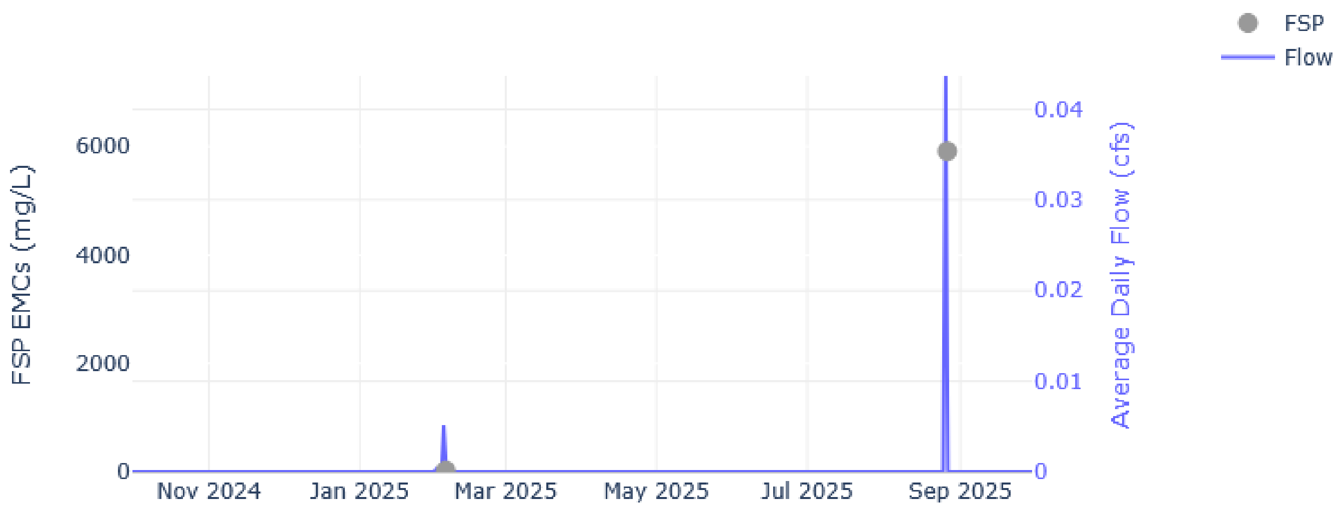

Figure 36 Daily outflow and FSP EMC summary at the Lakeshore outfall, WY25.

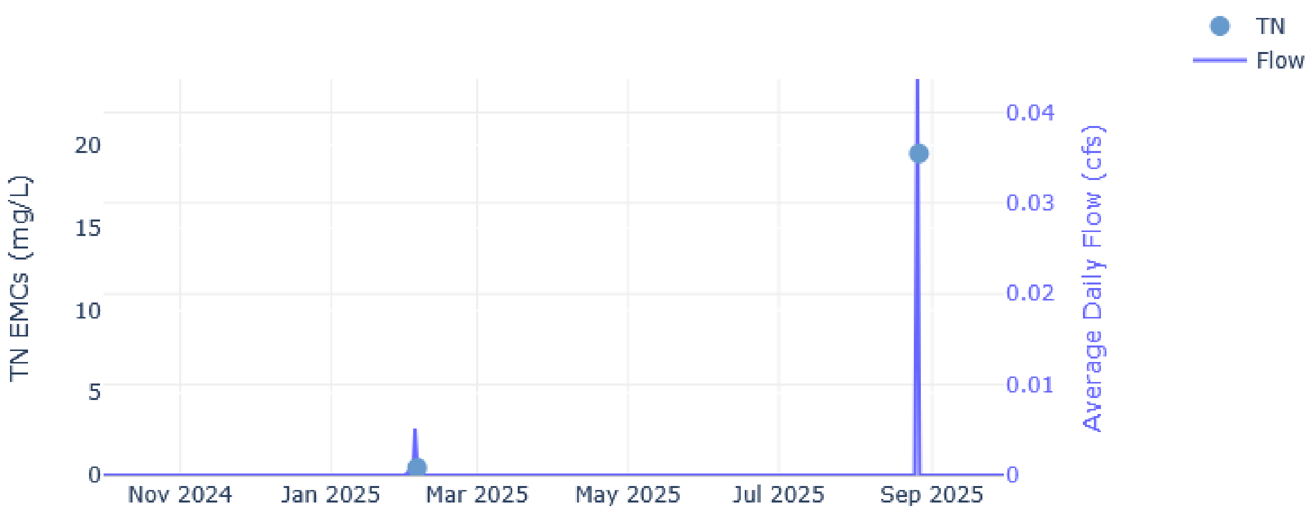

Figure 37 Daily outflow and TN EMC summary at the Lakeshore outfall, WY25.

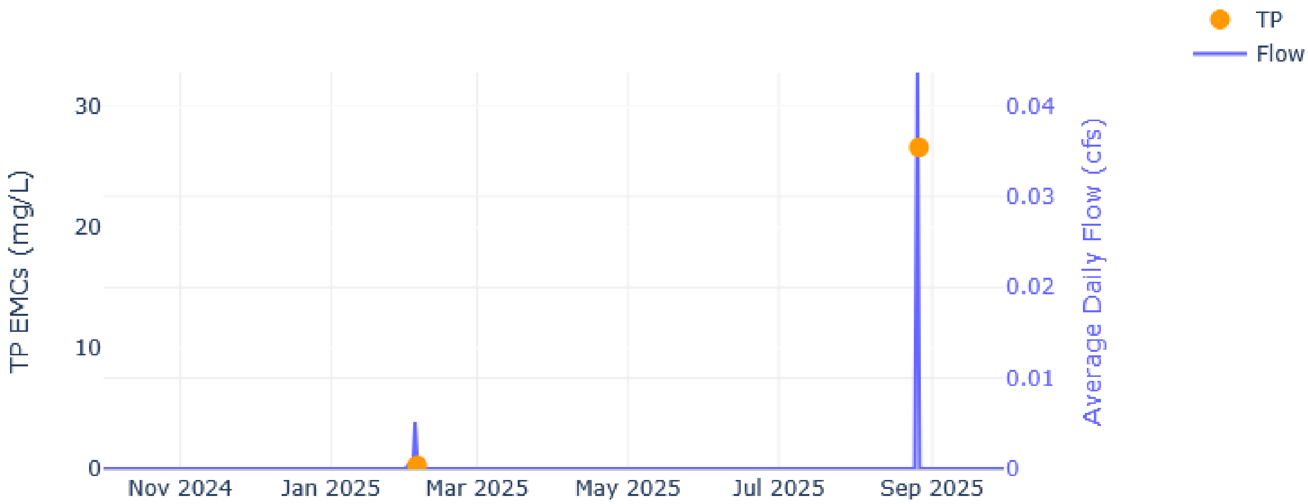

Figure 38 Daily outflow and TP EMC summary at the Lakeshore outfall, WY25.

Seasonal load as a fraction of the water year load at the Lakeshore outflow are presented in Figure 39. Event loads are presented in tabular form in Table 14.

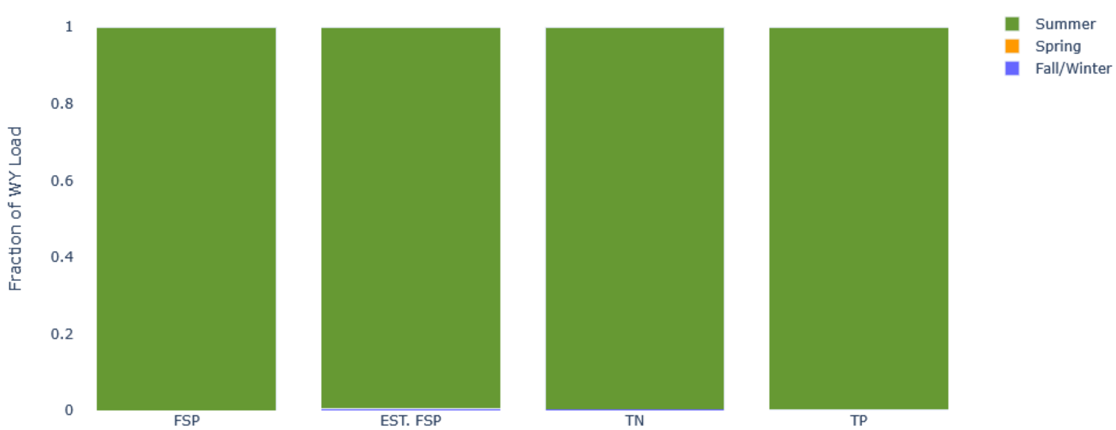

Figure 39 Seasonal load as a fraction of the water year load at the Lakeshore outfall, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads from samples was generated in the summer.
- The largest fraction of FSP loads from continuous turbidity was generated in the summer.
- The largest fraction of TN loads was generated in the summer.
- The largest fraction of TP loads was generated in the summer.

- There was no flow and therefore no samples taken at Lakeshore for the spring season, therefore no load was calculated for FSP, TN, or TP for the spring season.

6.2.4 Pasadena

Figure 40 shows the average daily flow and cumulative precipitation for WY25 at the Pasadena outfall.

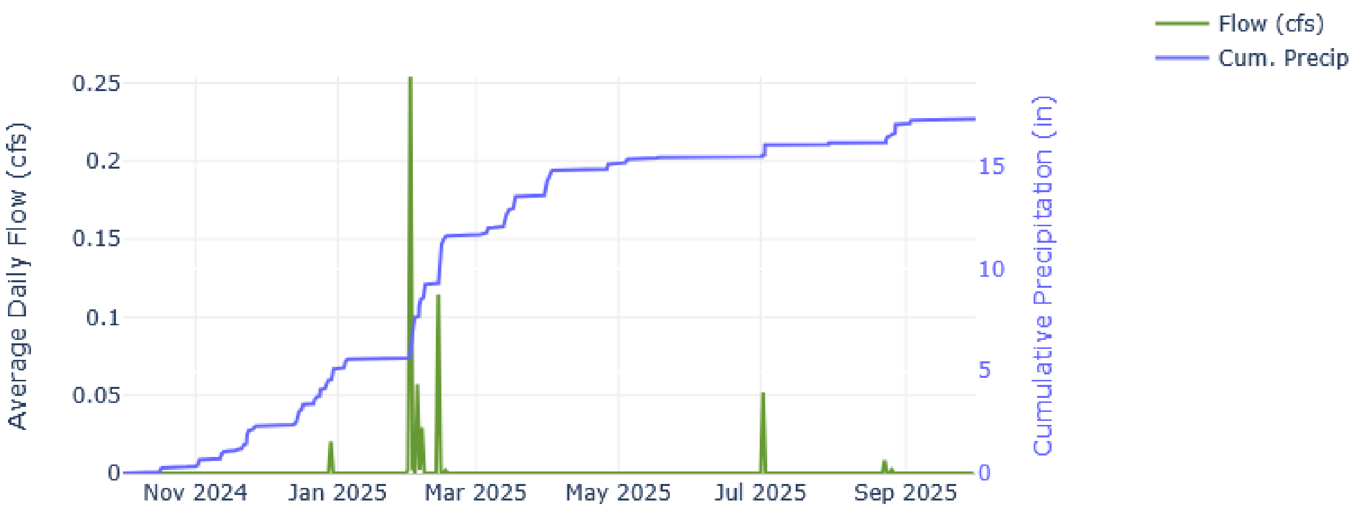

Figure 40 Average daily flow and cumulative precipitation at the Pasadena outfall, WY25.

- 17.313 inches of total precipitation (11.616 inches in the fall/winter, 3.816 inches in the spring, and 1.881 inches in the summer) were recorded at Raph's Shop (RAPH) weather station. Raph's shop weather station was used in lieu of the Bellevue weather station because precipitation totals were erroneously low. Bellevue weather station is located at the edge of a meadow and likely gets high winds during precipitation events and therefore may be subject to undercatch.
- 46 precipitation events occurred (20 fall/winter events, 10 spring events, 16 summer events).
- The largest storm event produced 2.37 inches of precipitation and occurred during a rain and snow atmospheric river event February 12-16, 2025.
- 76% of storms were less than half an inch.
- The largest runoff volume occurred during the January 31, 2025 – February 2, 2025 atmospheric river rain on snow event (22,421 cf).
- Highest average daily flow occurred on February 1, 2025 during an atmospheric river rain on snow event.
- Zero days of snowmelt occurred.
- The highest instantaneous peak precipitation was 0.134 inches in 5 minutes during a thunderstorm event on August 23, 2025.
- The highest instantaneous peak flow was 1.88 cfs on February 1, 2025 during an atmospheric river rain on snow event.

Six events were sampled at Pasadena for FSP, TN, and TP in WY25 (three in the fall/winter, zero in the spring, and three in the summer). Event summary data is presented in Table 16. Minimum and maximum EMCs and loads are shown in Table 17.

Table 16 Event summary data at the Pasadena outfall, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
PO	Fall/Winter	12/29/2024 9:25	12/29/2024 15:40	6:15	1,769	0.25	93	0.54	Rain on Snow	21	2.29	49.5	1,381	0.15	401	0.044
PO	Fall/Winter	1/31/2025 21:20	2/2/2025 19:40	46:20	22,421	1.88	205	2.03	Rain on Snow	32	44.3	31.7	2,756	3.86	679	0.950
PO	Fall/Winter	2/4/2025 18:20	2/5/2025 4:00	9:40	5,136	1.00	188	0.90	Rain on Snow	34	11.0	36.5	1,460	0.47	559	0.179
PO	Summer	7/2/2025 15:05	7/2/2025 23:25	8:20	4,483	1.81	946	0.47	Thunderstorm	202	56.4	31.2	12,134	3.39	2,224	0.622
PO	Summer	8/23/2025 13:55	8/23/2025 17:30	3:35	743	0.64	492	0.27	Thunderstorm	176	8.15	45.7	9,131	0.42	1,848	0.086
PO	Summer	8/26/2025 19:15	8/26/2025 22:10	2:55	193	0.06	36	0.10	Thunderstorm	22	0.26	40.7	5,797	0.07	942	0.011

Table 17 Maximum and minimum EMCs and loads at the Pasadena outfall for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	21	0.26	202	56.36
Runoff Volume (cf)	1,769	193	4,483	4,483
Runoff Start/End (Date Time)	12/29/2024 09:25 - 12/29/2024 15:40	8/26/2025 19:15 - 8/26/2025 22:10	7/2/2025 15:05 - 7/2/2025 23:25	7/2/2025 15:05 - 7/2/2025 23:25
Event Type	Rain on Snow	Thunderstorm	Thunderstorm	Thunderstorm

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	1381	0.07	12,134	3.86
Runoff Volume (cf)	1,769	193	4,483	22,421
Runoff Start/End (Date Time)	12/29/2024 09:25 - 12/29/2024 15:40	8/26/2025 19:15 - 8/26/2025 22:10	7/2/2025 15:05 - 7/2/2025 23:25	1/31/2025 21:20 - 2/2/2025 19:40
Event Type	Rain on Snow	Thunderstorm	Thunderstorm	Rain on Snow

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	401	0.011	2,224	0.95
Runoff Volume (cf)	1,769	193	4,483	22,421
Runoff Start/End (Date Time)	12/29/2024 09:25 - 12/29/2024 15:40	8/26/2025 19:15 - 8/26/2025 22:10	7/2/2025 15:05 - 7/2/2025 23:25	1/31/2025 21:20 - 2/2/2025 19:40
Event Type	Rain on Snow	Thunderstorm	Thunderstorm	Rain on Snow

Daily flow and FSP EMC summaries at the Pasadena outfall for FSP, TN, and TP are presented in Figure 41, Figure 42, and Figure 43, respectively. Table 16 presents EMC data in tabular form.

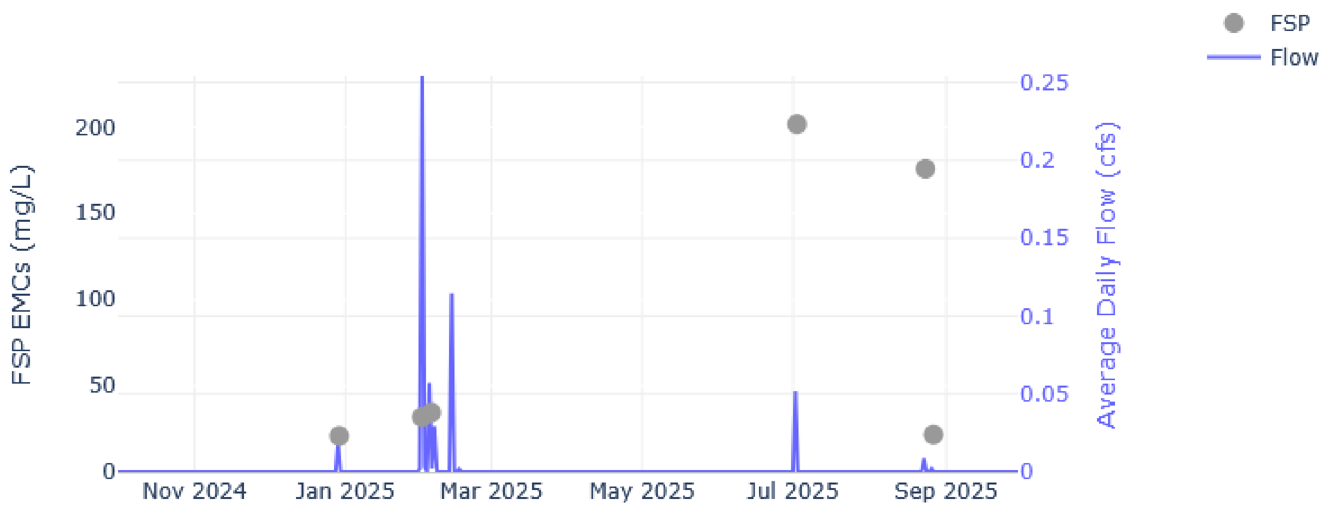

Figure 41 Daily outflow and FSP EMC summary at the Pasadena outfall, WY25.

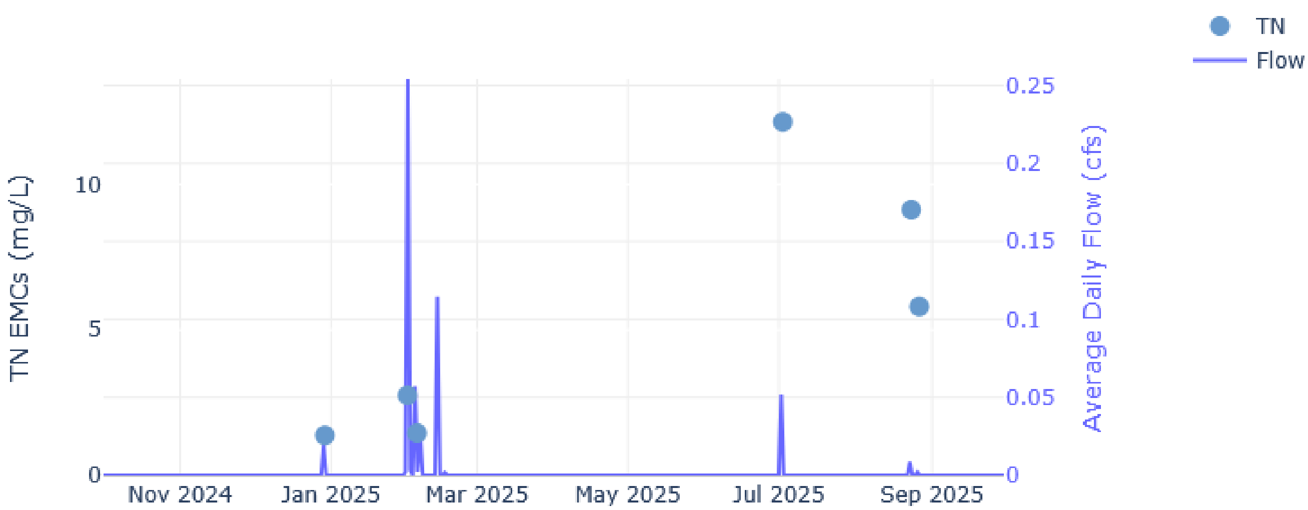

Figure 42 Daily outflow and TN EMC summary at the Pasadena outfall, WY25.

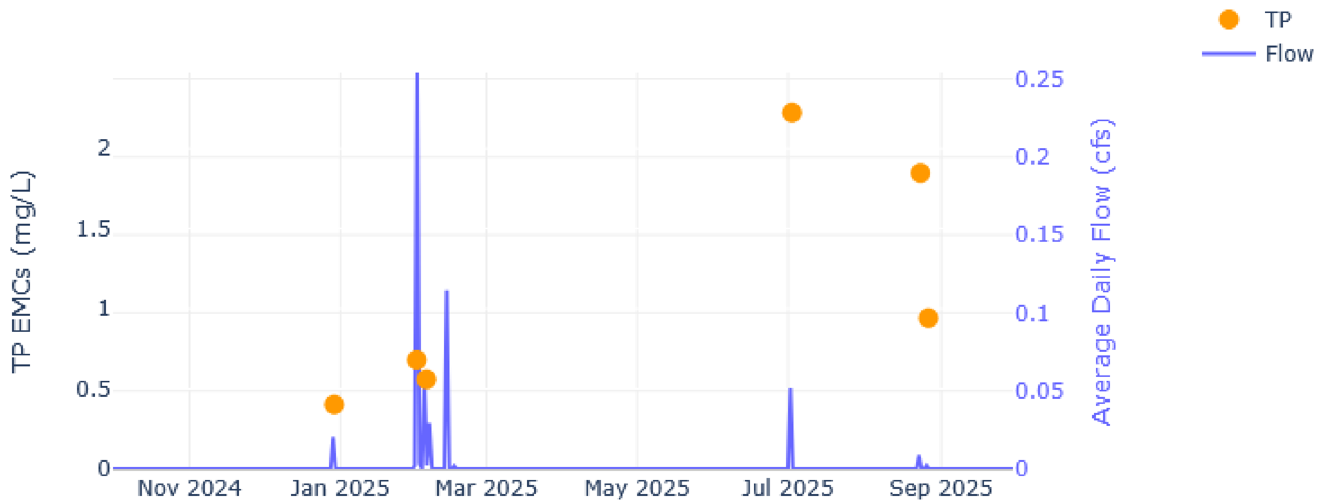

Figure 43 Daily outflow and TP EMC summary at the Pasadena outfall, WY25.

Seasonal load as a fraction of the water year load at the Pasadena outflow are presented in Figure 44. Event loads are presented in tabular form in Table 16.

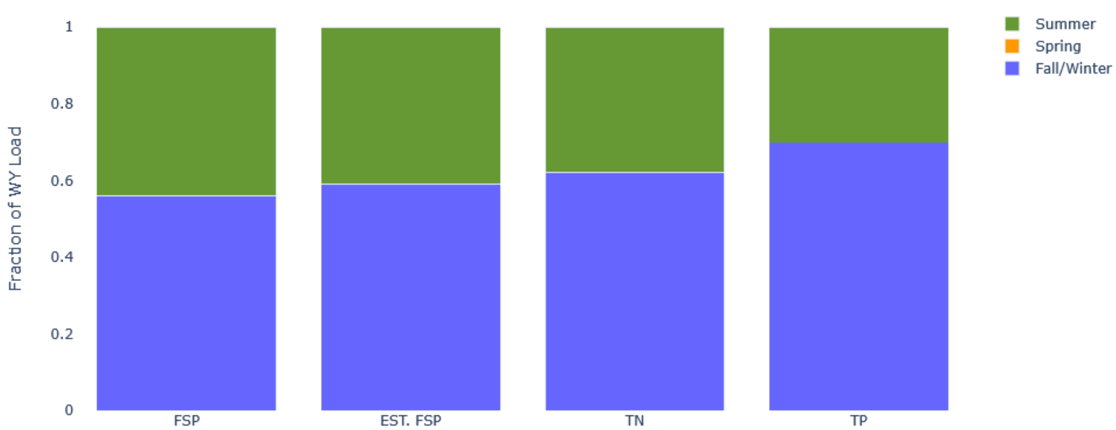

Figure 44 Seasonal load as a fraction of the water year load at the Pasadena outfall, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads from samples was generated in the fall/winter.
- The largest fraction of FSP from continuous turbidity was generated in the fall/winter.
- The largest fraction of TN was generated in the fall/winter.
- The largest fraction of TP load was generated in the fall/winter.

6.2.5 Speedboat

Figure 45 shows the average daily flow and cumulative precipitation for WY25 at the Speedboat catchment outfall.

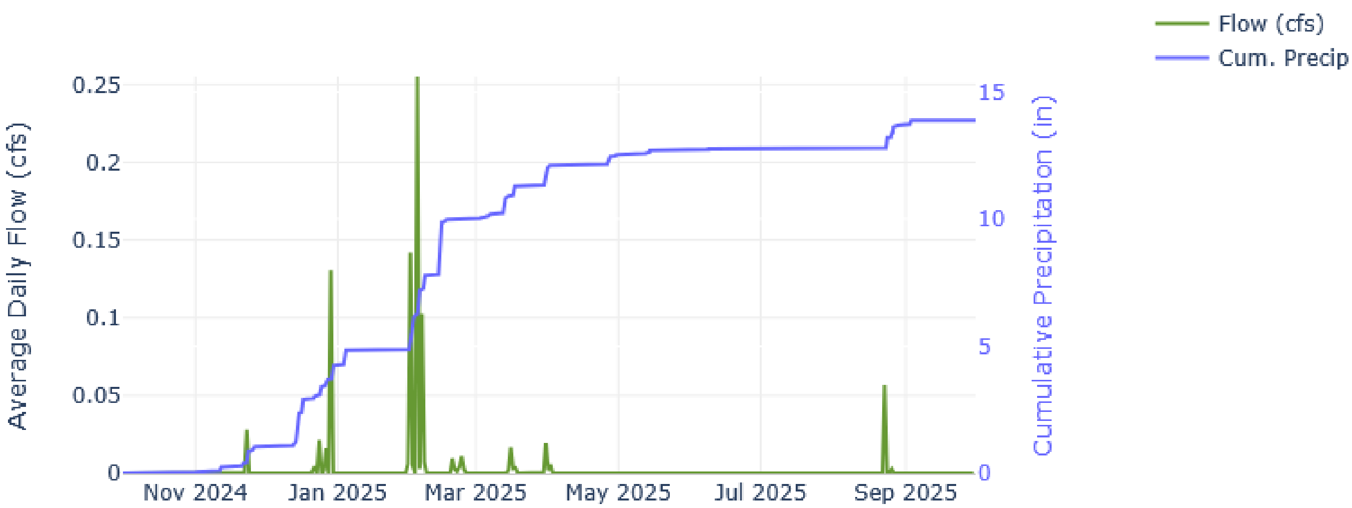

Figure 45 Average daily flow and cumulative precipitation at the Speedboat catchment outfall, WY25.

- 13.88 inches of total precipitation (10.02 inches in the fall/winter, 2.71 inches in the spring, and 1.15 inches in the summer) were recorded at the Nugget (NG) weather station.
- 45 precipitation events occurred (22 fall/winter events, 11 spring events, 12 summer events).
- The largest storm event produced 2.20 inches of precipitation and occurred during an atmospheric river rain and snow event from February 13-16, 2025.
- 80% of storms were less than half an inch.
- The largest runoff volume was caused by a rain and snow event from February 4-5, 2025 (22,294 cf).
- Highest average daily flows occurred on February 4, 2025 during a rain and snow event.
- 11 days of snowmelt occurred in the fall/winter and spring, resulting in 2,901 cf of runoff (4% of the total flow).
- The highest instantaneous peak precipitation was 0.34 inches in 10 minutes during a thunderstorm event on August 23, 2025.
- The highest instantaneous peak flow was 7.04 cfs during a thunderstorm event on August 23, 2025.

Nine events were sampled at Speedboat in WY25 (five in the fall/winter, three in the spring, and one in the summer). Event summary data is presented in Table 18. Minimum and maximum EMCs and loads are shown in Table 19.

Table 18 Event summary data at the Speedboat catchment outfall, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
SB	Fall/Winter	12/21/2024 14:10	12/23/2024 0:15	34:05	484	0.04	475	0.18	Rain on Snow	32	0.96	33.1	969	0.03	544	0.016
SB	Fall/Winter	12/24/2024 7:20	12/24/2024 16:40	9:20	1,837	0.31	535	0.30	Rain on Snow	177	20.3	81.2	1,547	0.18	1,225	0.140
SB	Fall/Winter	12/27/2024 2:35	12/27/2024 14:30	11:55	1,392	0.12	187	0.28	Rain on Snow	59	5.14	84.6	929	0.08	487	0.042
SB	Fall/Winter	12/29/2024 7:35	12/29/2024 18:20	10:45	11,305	1.43	979	0.55	Rain on Snow	176	124	62.8	2,003	1.41	1,244	0.877
SB	Fall/Winter	1/31/2025 14:45	2/2/2025 19:30	52:45	13,233	1.70	2,317	1.38	Rain on Snow	127	105	57.8	1,451	1.20	938	0.774
SB	Spring	3/15/2025 13:35	3/17/2025 16:55	51:20	1,894	0.18	250	0.40	Event Snowmelt	125	14.8	78.4	919	0.11	736	0.087
SB	Spring	3/30/2025 22:30	3/31/2025 17:35	19:05	1,739	0.37	546	0.66	Rain on Snow	168	18.2	60.4	1,352	0.15	1,086	0.118
SB	Spring	4/1/2025 12:45	4/2/2025 18:00	29:15	655	0.07	422	0.00	Non-event Snowmelt	52	2.12	57.5	560	0.02	1,106	0.045
SB	Summer	8/23/2025 13:10	8/23/2025 14:25	1:15	4,902	7.04	1,796	0.40	Thunderstorm	649	199	32.8	15,924	4.87	6,208	1.899

Table 19 Maximum and minimum EMCs and loads at the Speedboat for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	32	0.96	649	198.51
Runoff Volume (cf)	484	484	4,902	4,902
Runoff Start/End (Date Time)	12/21/2024 14:10 - 12/23/2024 0:15	12/21/2024 14:10 - 12/23/2024 0:15	8/23/2025 13:10 - 8/23/2025 14:25	8/23/2025 13:10 - 8/23/2025 14:25
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Thunderstorm

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	560	0.02	15,924	4.87
Runoff Volume (cf)	655	655	4,902	4,902
Runoff Start/End (Date Time)	4/1/2025 12:45 - 4/2/2025 18:00	4/1/2025 12:45 - 4/2/2025 18:00	8/23/2025 13:10 - 8/23/2025 14:25	8/23/2025 13:10 - 8/23/2025 14:25
Event Type	Non-event Snowmelt	Non-event Snowmelt	Thunderstorm	Thunderstorm

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	487	0.02	6,208	1.90
Runoff Volume (cf)	1,392	484	4,902	4,902
Runoff Start/End (Date Time)	12/27/2024 02:35 - 12/27/2024 14:30	12/21/2024 14:10 - 12/23/2024 0:15	8/23/2025 13:10 - 8/23/2025 14:25	8/23/2025 13:10 - 8/23/2025 14:25
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Thunderstorm

Daily flow and the EMC summary at Speedboat for FSP, TN, and TP are presented in Figure 46, Figure 47, and Figure 48, respectively. Table 18 presents EMC data in tabular form.

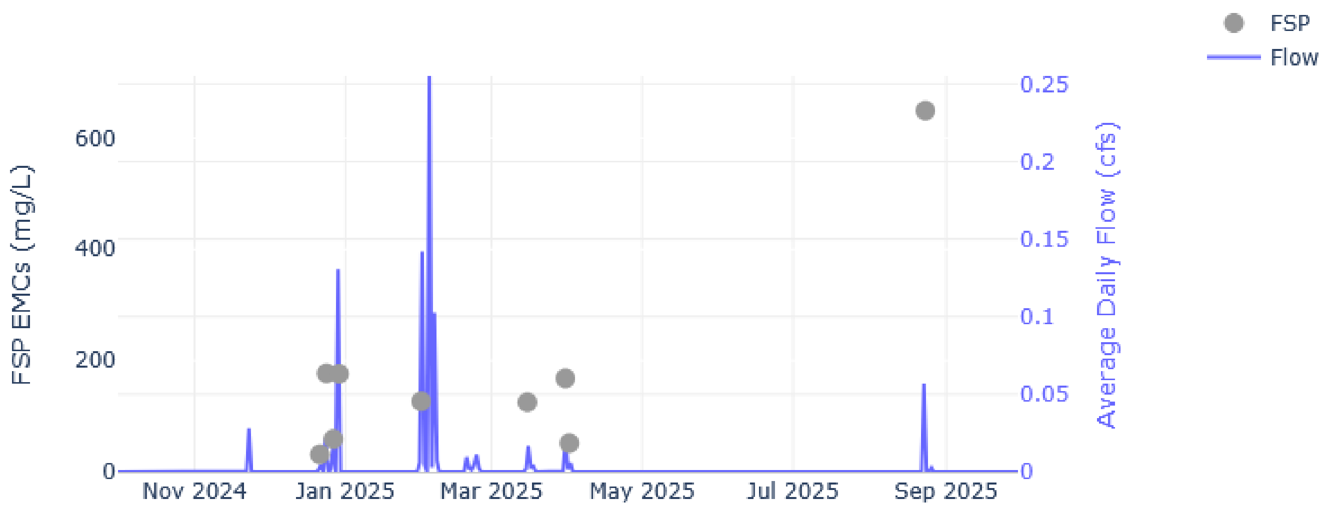

Figure 46 Daily flow and FSP EMC summary at the Speedboat catchment outfall, WY25.

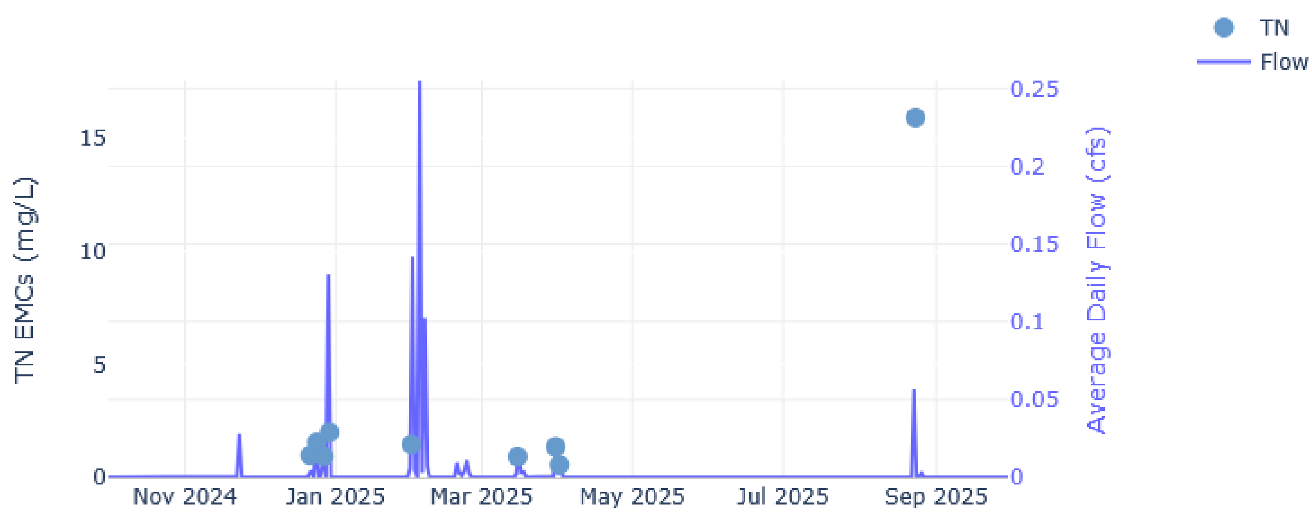

Figure 47 Daily flow and TN EMC summary at the Speedboat catchment outfall, WY25.

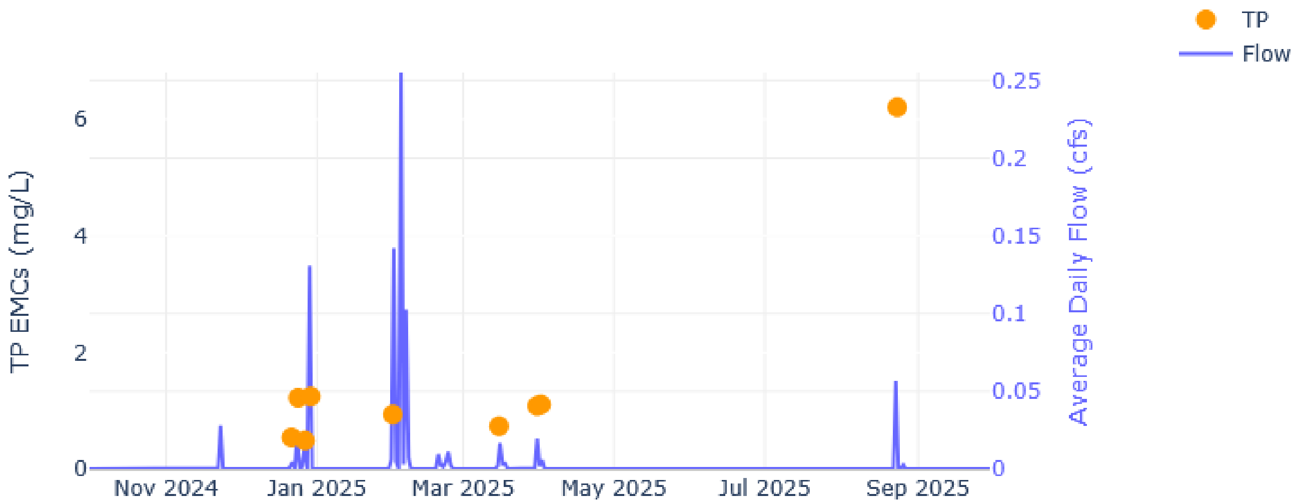

Figure 48 Daily flow and TP EMC summary at the Speedboat catchment outfall, WY25.

Seasonal load as a fraction of the water year load at Speedboat is presented in Figure 49. Event loads are presented in tabular form in Table 18.

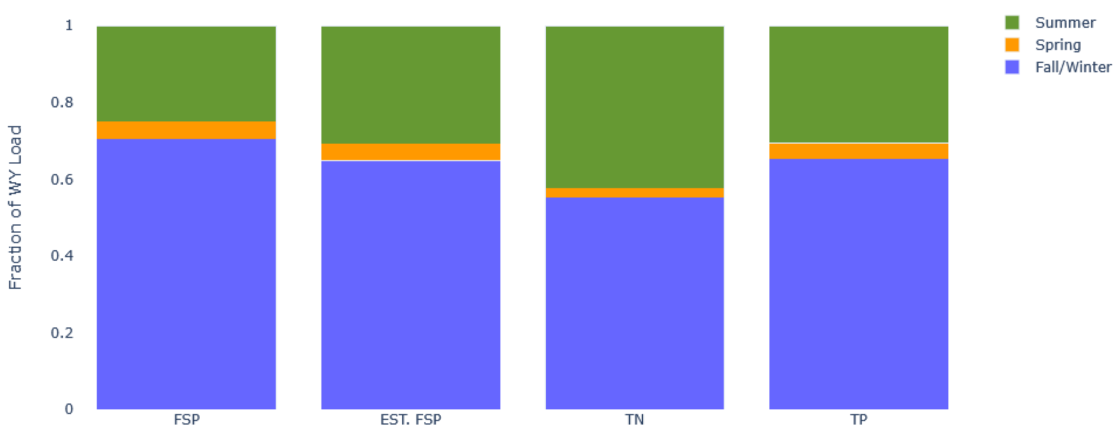

Figure 49 Seasonal load as a fraction of the water year load at the Speedboat catchment outfall, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads from samples was generated in the fall/winter.
- The largest fraction of FSP loads from continuous turbidity was generated in the fall/winter.
- FSP loads calculated from sample concentrations are lab certified results and therefore reliable, however, not all runoff volume is sampled. Estimated FSP loads calculated from turbidity are less precise, but

turbidity measurements are taken continuously on all runoff. This discrepancy accounts for the difference between FSP and estimated FSP results.

- The largest fraction of TN loads was generated in the fall/winter.
- The largest fraction of TP loads was generated in the fall/winter.

6.2.6 Tahoe City

Figure 50 shows the average daily flow and cumulative precipitation for WY25 at the Tahoe City catchment outfall.

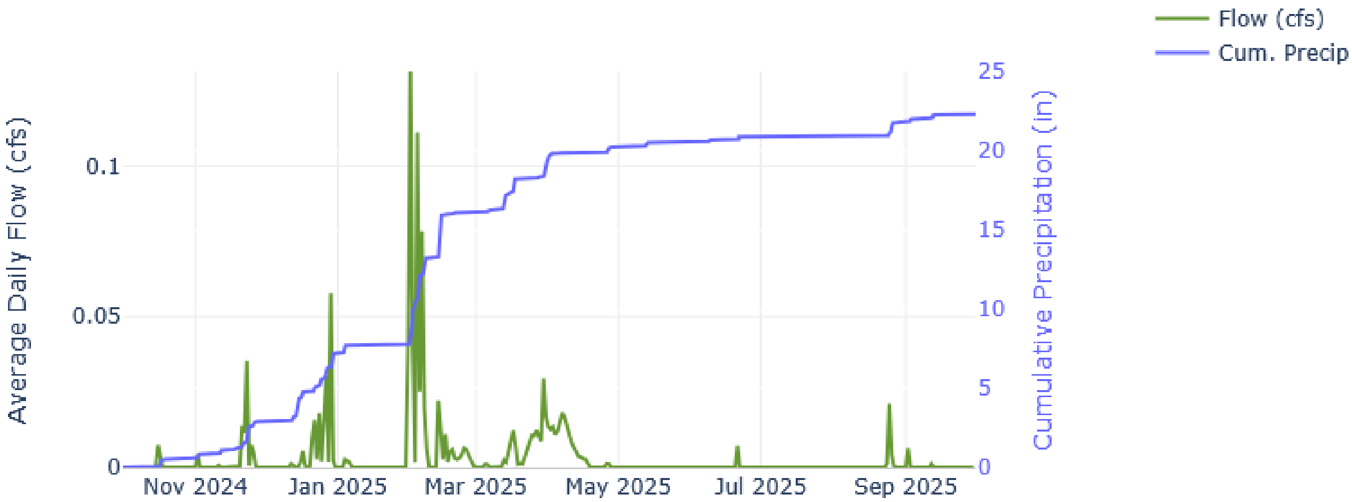

Figure 50 Average daily flow and cumulative precipitation at the Tahoe City catchment outfall, WY25.

- 22.324 inches of total precipitation (16.100 inches in the fall/winter, 4.475 inches in the spring, and 1.749 inches in the summer) were recorded at the Hatchery (HATCH) weather station.
- 51 precipitation events occurred (22 fall/winter events, 13 spring events, 16 summer events).
- The largest storm event produced 2.78 inches of precipitation and occurred during an atmospheric river rain and snow event February 4-9, 2025.
- 75% of storms were less than half an inch.
- The largest runoff volume was caused by an atmospheric river rain on snow event February 4-9, 2025 (20,802 cf).
- Highest average daily flows occurred on February 1, 2025 during an atmospheric river rain on snow event.
- 38 days of snowmelt occurred in the fall/winter and spring resulting in 19,653 cf of runoff (19% of the total flow).
- The highest instantaneous peak precipitation was 0.071 inches in 5 minutes during a thunderstorm event on August 25, 2025.
- The highest instantaneous peak flow was 0.65 cfs during a thunderstorm event on August 25, 2025.

Ten events were sampled at Tahoe City in WY25 (four in the fall/winter, three in the spring, and three in the summer). Event summary data is presented in Table 20. Minimum and maximum EMCs and loads are shown in Table 21.

Table 20 Event summary data at the Tahoe City catchment outfall, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
TC	Fall/Winter	11/22/2024 21:25	11/23/2024 22:15	24:50	4,029	0.23	214	1.02	Rain	15	3.87	28.0	799	0.20	432	0.109
TC	Fall/Winter	12/21/2024 14:25	12/22/2024 11:15	20:50	1,810	0.31	1,162	0.29	Rain on Snow	199	22.5	83.7	1,719	0.19	1,628	0.184
TC	Fall/Winter	12/24/2024 7:40	12/25/2024 0:15	16:35	1,552	0.24	481	0.42	Rain on Snow	186	18.0	82.4	1,207	0.12	1,388	0.134
TC	Fall/Winter	1/31/2025 13:40	2/3/2025 7:35	65:55	18,336	0.50	404	2.66	Rain on Snow	131	150	63.2	1,014	1.16	881	1.008
TC	Spring	3/13/2025 14:05	3/18/2025 8:45	114:40	2,712	0.16	409	1.36	Event Snowmelt	131	22.2	93.1	1,058	0.18	736	0.125
TC	Spring	3/23/2025 10:50	3/26/2025 9:50	71:00	2,432	0.01	37	0.00	Non-event Snowmelt	16	2.45	70.2	544	0.08	106	0.016
TC	Spring	4/8/2025 7:25	4/11/2025 7:25	72:00	3,264	0.02	6	0.00	Non-event Snowmelt	7	1.48	51.9	248	0.05	62	0.013
TC	Summer	6/21/2025 13:25	6/21/2025 21:30	8:05	620	0.20	811	0.21	Thunderstorm	116	4.49	59.5	7,279	0.28	2,224	0.086
TC	Summer	8/25/2025 15:30	8/25/2025 21:55	6:25	1,805	0.65	595	0.56	Thunderstorm	252	28.4	48.2	4,929	0.56	1,853	0.209
TC	Summer	9/2/2025 17:50	9/3/2025 3:25	9:35	565	0.21	45	0.19	Thunderstorm	38	1.34	46.5	3,414	0.12	678	0.024

Table 21 Maximum and minimum EMCs and loads at the Tahoe City catchment outfall for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	7	1.34	252	150.38
Runoff Volume (cf)	3,264	565	1,805	18,336
Runoff Start/End (Date Time)	4/8/2025 07:25 - 4/11/2025 7:25	9/2/2025 17:50 - 9/3/2025 3:25	8/25/2025 15:30 - 8/25/2025 21:55	1/31/2025 13:40 - 2/3/2025 7:35
Event Type	Non-event Snowmelt	Thunderstorm	Thunderstorm	Rain on Snow

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	248	0.05	7,279	1.16
Runoff Volume (cf)	3,264	3,264	620	18,336
Runoff Start/End (Date Time)	4/8/2025 07:25 - 4/11/2025 7:25	4/8/2025 07:25 - 4/11/2025 7:25	6/21/2025 13:25 - 6/21/2025 21:30	1/31/2025 13:40 - 2/3/2025 7:35
Event Type	Non-event Snowmelt	Non-event Snowmelt	Thunderstorm	Rain on Snow

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	62	0.01	2,224	1.01
Runoff Volume (cf)	3,264	3,264	620	18,336
Runoff Start/End (Date Time)	4/8/2025 07:25 - 4/11/2025 7:25	4/8/2025 07:25 - 4/11/2025 7:25	6/21/2025 13:25 - 6/21/2025 21:30	1/31/2025 13:40 - 2/3/2025 7:35
Event Type	Non-event Snowmelt	Non-event Snowmelt	Thunderstorm	Rain on Snow

Daily flow and the FSP EMC summary at Tahoe City for FSP, TN, and TP are presented in Figure 51, Figure 52, and Figure 53. Table 20 presents EMC data in tabular form.

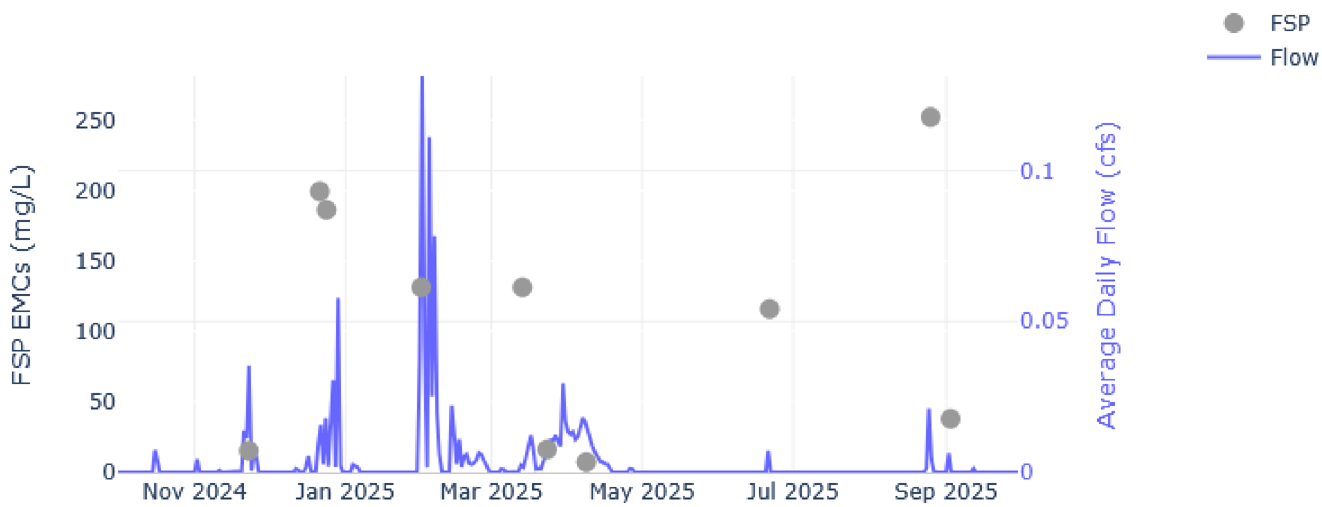

Figure 51 Daily flow and FSP EMC summary at the Tahoe City catchment outfall, WY25.

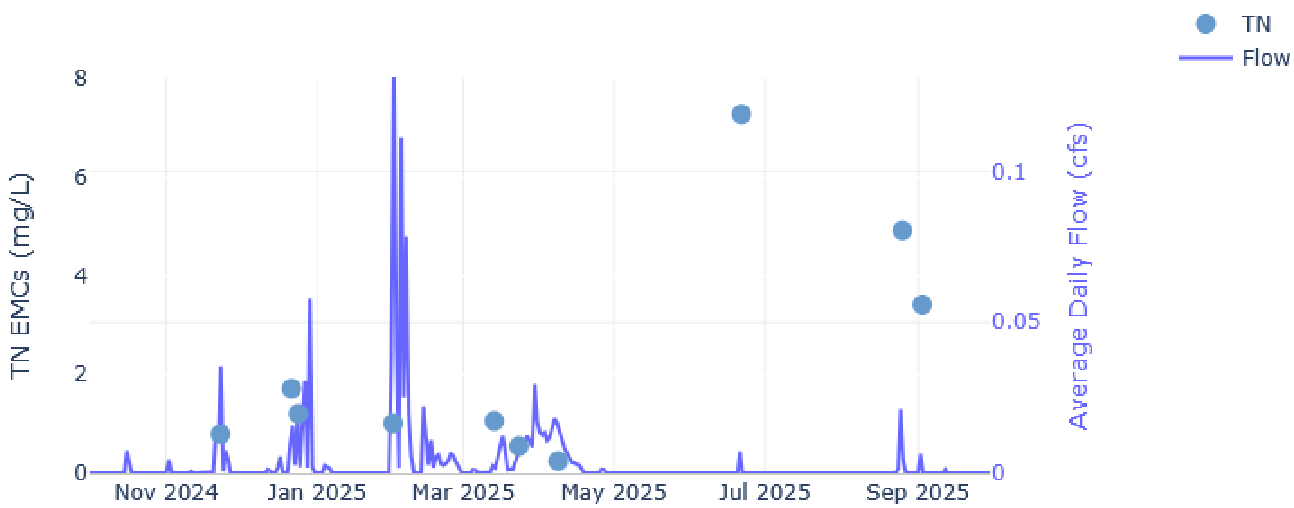

Figure 52 Daily flow and TN EMC summary at the Tahoe City catchment outfall, WY25.

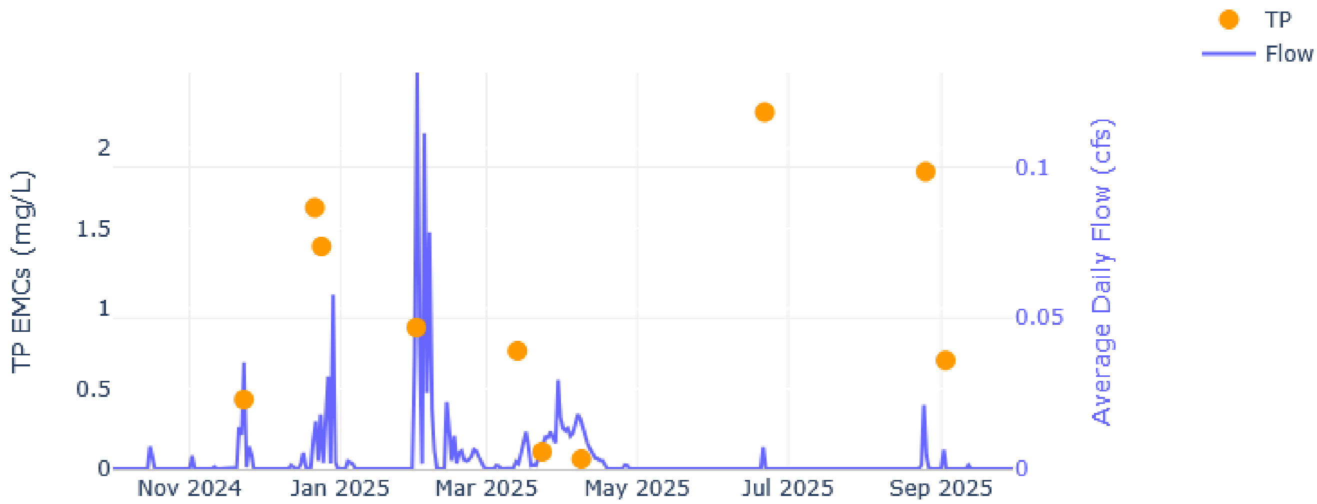

Figure 53 Daily flow and TP EMC summary at the Tahoe City catchment outfall, WY25.

Seasonal load as a fraction of the water year load at Tahoe City is presented in Figure 54. Event loads are presented in tabular form in Table 20.

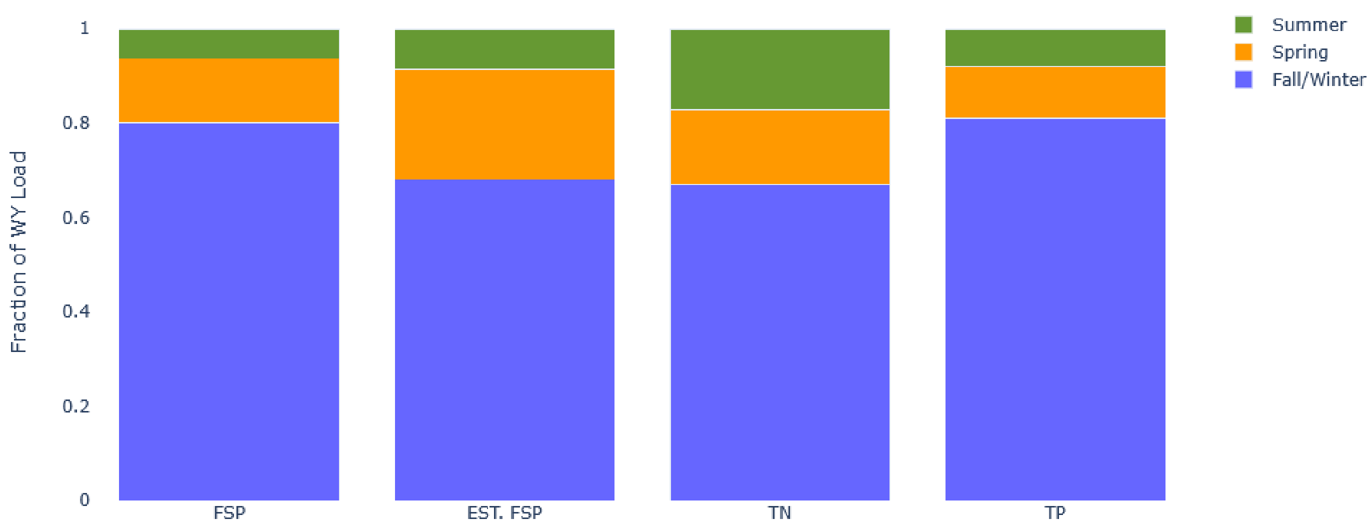

Figure 54 Seasonal load as a fraction of the water year load at the Tahoe City catchment outfall, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads (based on samples) was generated in the fall/winter.

- The largest fraction of FSP loads (based on continuous turbidity) was generated in fall/winter.
- FSP loads calculated from sample concentrations are lab certified results and therefore reliable, however, not all runoff volume is sampled. Estimated FSP loads calculated from turbidity are less precise, but turbidity measurements are taken continuously on all runoff. This discrepancy accounts for the difference between FSP and estimated FSP results.
- The largest fraction of TN loads was generated in the fall/winter.
- The largest fraction of TP loads was generated in the fall/winter.

Tahoe City bypass flow is shown in Figure 55. When bypass occurs, untreated flow comingles with treated flow in the outflow from the Delaware Sandfilter, resulting in reduced overall treatment efficiency.

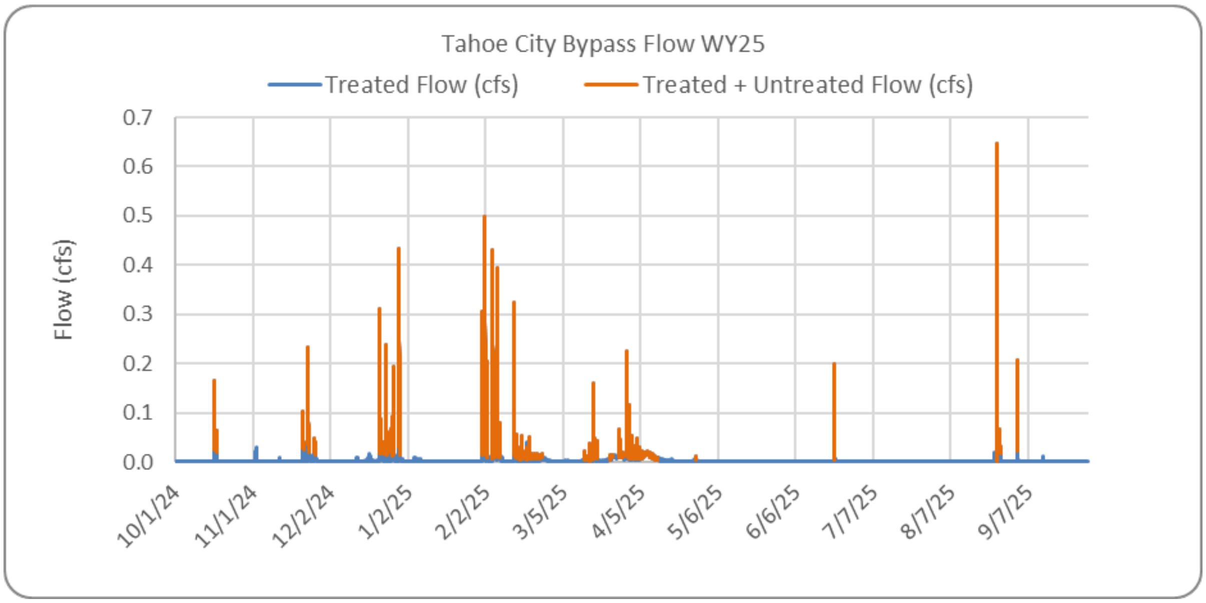

Figure 55 Bypass data for Tahoe City WY25. The orange line indicates bypass occurred.

- In WY25, the Delaware Sandfilter was in bypass mode 29% of the time there was flow at the TC site, which represents up to 76% of the total annual flow volume (77,815 cf of bypass flow out of 102,085 cf total flow). During bypass mode treated flow is comingled with untreated (bypass) flow, so the exact amount of untreated flow is difficult to determine.
- Bypass occurred during 20 runoff events (Table 22) and 10 out of 10 sampled events had untreated (bypass) flow.

Table 22 Bypassed event summary at the Tahoe City catchment outfall, WY25.

Bypass Event Date(s)	Event Type	Sampled?	Runoff Volume (cf)	Precipitation (in)
10/16/2024 - 10/17/2024	Rain	no	862	0.50
11/21/2024 - 11/23/2024	Event Snowmelt Rain	no yes	5,253	1.26
11/25/2024 - 11/26/2024	Rain on Snow	no	1,101	0.42
12/21/2024 - 12/22/2024	Rain on Snow	yes	1,810	0.39
12/24/2024	Rain on Snow	yes	1,552	0.42
12/26/2024 - 12/27/2024	Rain on Snow	no	4,076	0.71
12/29/2024	Rain on Snow	no	5,191	0.90
1/31/2025 - 2/2/2025	Rain on Snow	yes	18,336	2.66
2/4/2025 - 2/7/2025	Rain on Snow	no	20,802	2.78
2/13/2025 - 2/16/2025	Event Snowmelt Non-Event Snowmelt	no no	4,062	2.81
2/18/2025 - 2/24/2025	Non-Event Snowmelt Rain on Snow	no no	2,465	0.05
3/13/2025 - 3/18/2025	Event Snowmelt	yes	2,712	1.96
3/23/2025 - 3/24/2025	Non-Event Snowmelt	yes	2,432	0.00
3/27/2025 - 3/28/2025	Rain Event Snowmelt	no no	1,277	0.14
3/30/2025 - 4/11/2025	Rain on Snow Non-Event Snowmelt	no yes	15,755	1.47
4/27/2025	Event Snowmelt	no	207	0.37
6/21/2025	Thunderstorm	yes	620	0.21
8/25/2025	Thunderstorm	yes	1,869	0.56
8/26/2025	Thunderstorm	no	357	0.11
9/2/2025	Thunderstorm	yes	565	0.19

6.2.7 Tahoe Valley

Figure 56 shows the average daily flow and cumulative precipitation for WY25 at the Tahoe Valley catchment outfall.

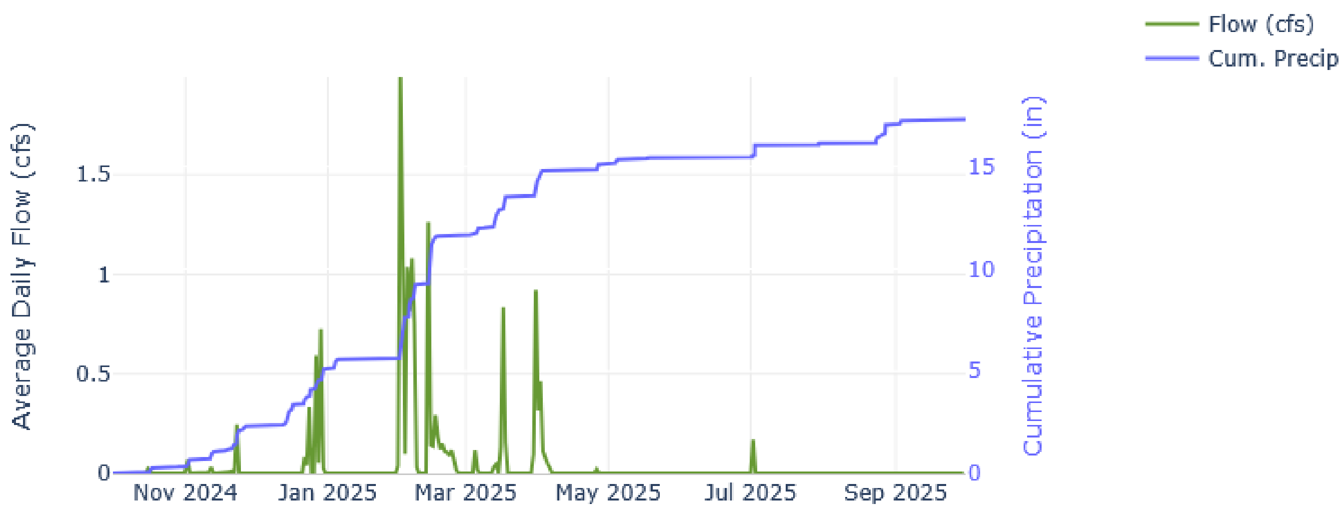

Figure 56 Average daily flow and cumulative precipitation at the Tahoe Valley catchment outfall, WY25.

- 17.313 inches of total precipitation (11.616 inches in the fall/winter, 3.816 inches in the spring, and 1.881 inches in the summer) were recorded at Raph's Shop (RAPH) weather station.
- 46 precipitation events occurred (20 fall/winter events, 10 spring events, 16 summer events).
- The largest storm event produced 2.37 inches of precipitation and occurred during a rain and snow atmospheric river event February 12-16, 2025.
- 76% of storms were less than half an inch.
- The largest runoff volume was caused by an atmospheric river rain on snow event January 31, 2025 – February 3, 2025 (281,601 cf).
- Highest average daily flows occurred on February 1, 2025 during an atmospheric river rain on snow event.
- 13 days of snowmelt occurred in the fall/winter and spring resulting in 61,562 cf of runoff (5% of the total flow).
- The highest instantaneous peak precipitation was 0.134 inches in 5 minutes during a thunderstorm event on August 23, 2025.
- The highest instantaneous peak flow (6.41 cfs) occurred during a rain and snow event on February 4, 2025.

Nine events were sampled at Tahoe Valley in WY25 (five in the fall/winter, three in the spring, and one in the summer). Event summary data is presented in Table 23. Minimum and maximum EMCs and loads are shown in Table 24.

Table 23 Event summary data at the Tahoe Valley catchment outfall, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
TV	Fall/Winter	11/22/2024 21:45	11/23/2024 12:20	14:35	21,543	1.10	3,345	0.69	Rain	21	28.1	43.6	1,032	1.39	344	0.462
TV	Fall/Winter	12/22/2024 0:30	12/22/2024 21:20	20:50	6,639	0.39	1,494	0.34	Rain on Snow	19	7.90	48.9	864	0.36	336	0.139
TV	Fall/Winter	12/26/2024 22:35	12/27/2024 11:20	12:45	42,482	2.76	354	0.44	Rain on Snow	63	166	68.0	1,393	3.69	363	0.962
TV	Fall/Winter	12/29/2024 7:55	12/29/2024 18:55	11:00	57,301	4.13	431	0.56	Rain on Snow	69	246	52.1	1,471	5.26	620	2.216
TV	Fall/Winter	1/31/2025 21:45	2/3/2025 7:30	57:45	281,601	5.55	192	2.03	Rain on Snow	20	347	34.1	1,003	17.62	331	5.815
TV	Spring	3/16/2025 14:20	3/18/2025 20:05	53:45	97,213	1.95	919	0.66	Event Snowmelt	84	512	86.2	964	5.85	490	2.972
TV	Spring	3/30/2025 20:50	3/31/2025 11:00	14:10	35,685	1.79	218	0.59	Rain on Snow	36	80.8	62.6	804	1.79	235	0.523
TV	Spring	3/31/2025 11:00	4/1/2025 2:15	15:15	56,080	2.20	358	0.24	Event Snowmelt	28	96.6	32.1	692	2.42	351	1.228
TV	Summer	7/2/2025 14:30	7/2/2025 19:40	5:10	14,552	2.57	166	0.47	Thunderstorm	204	185	55.9	5,101	4.63	1,270	1.153

Table 24 Maximum and minimum EMCs and loads at the Tahoe Valley catchment outfall for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	19	7.90	204	512.33
Runoff Volume (cf)	6,639	6,639	14,552	97,213
Runoff Start/End (Date Time)	12/22/2024 00:30 - 12/22/2024 21:20	12/22/2024 00:30 - 12/22/2024 21:20	7/2/2025 14:30 - 7/2/2025 19:40	3/16/2025 14:20 - 3/18/2025 20:05
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Event Snowmelt

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	692	0.36	5,101	17.62
Runoff Volume (cf)	56,080	6,639	14,552	281,601
Runoff Start/End (Date Time)	3/31/2025 11:00 - 4/1/2025 2:15	12/22/2024 00:30 - 12/22/2024 21:20	7/2/2025 14:30 - 7/2/2025 19:40	1/31/2025 21:45 - 2/3/2025 7:30
Event Type	Event Snowmelt	Rain on Snow	Thunderstorm	Rain on Snow

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	235	0.14	1,270	5.82
Runoff Volume (cf)	35,685	6,639	14,552	281,601
Runoff Start/End (Date Time)	3/30/2025 20:50 - 3/31/2025 11:00	12/22/2024 00:30 - 12/22/2024 21:20	7/2/2025 14:30 - 7/2/2025 19:40	1/31/2025 21:45 - 2/3/2025 7:30
Event Type	Rain on Snow	Rain on Snow	Thunderstorm	Rain on Snow

Daily flow and the FSP EMC summary at Tahoe Valley for FSP, TN, and TP are presented in Figure 57, Figure 58, and Figure 59, respectively. Table 23 presents EMC data in tabular form.

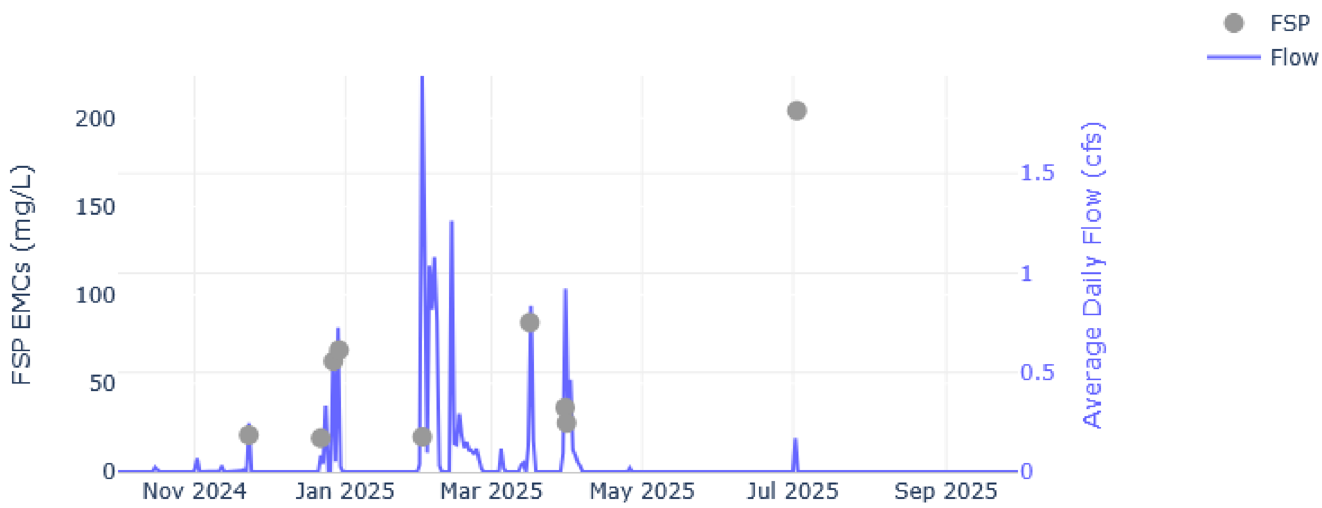

Figure 57 Daily flow and FSP EMC summary at the Tahoe Valley catchment outfall, WY25.

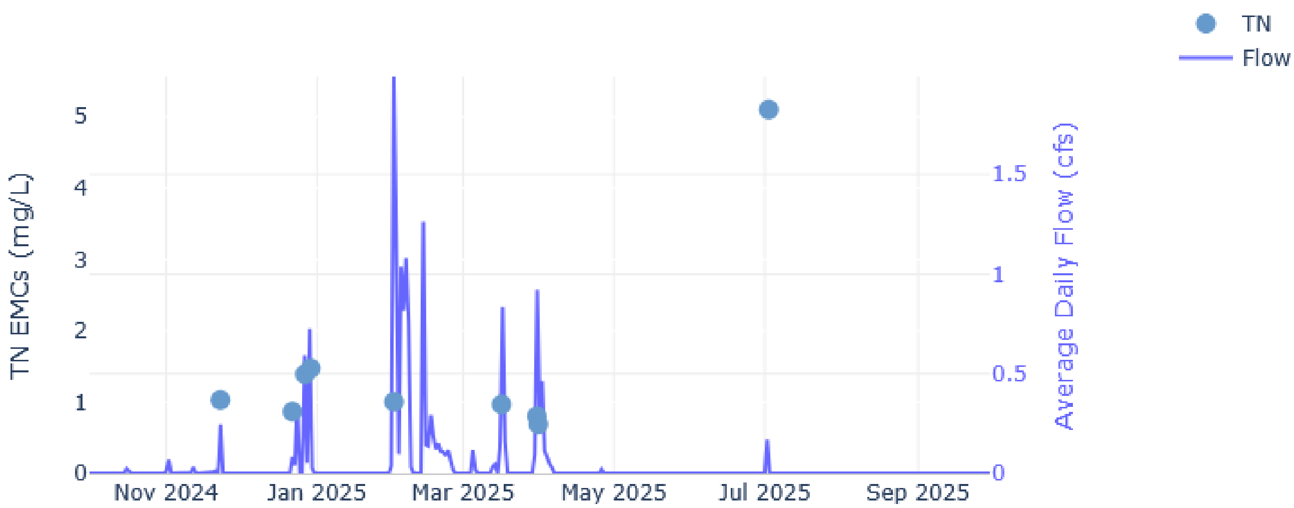

Figure 58 Daily flow and TN EMC summary at the Tahoe Valley catchment outfall, WY25.

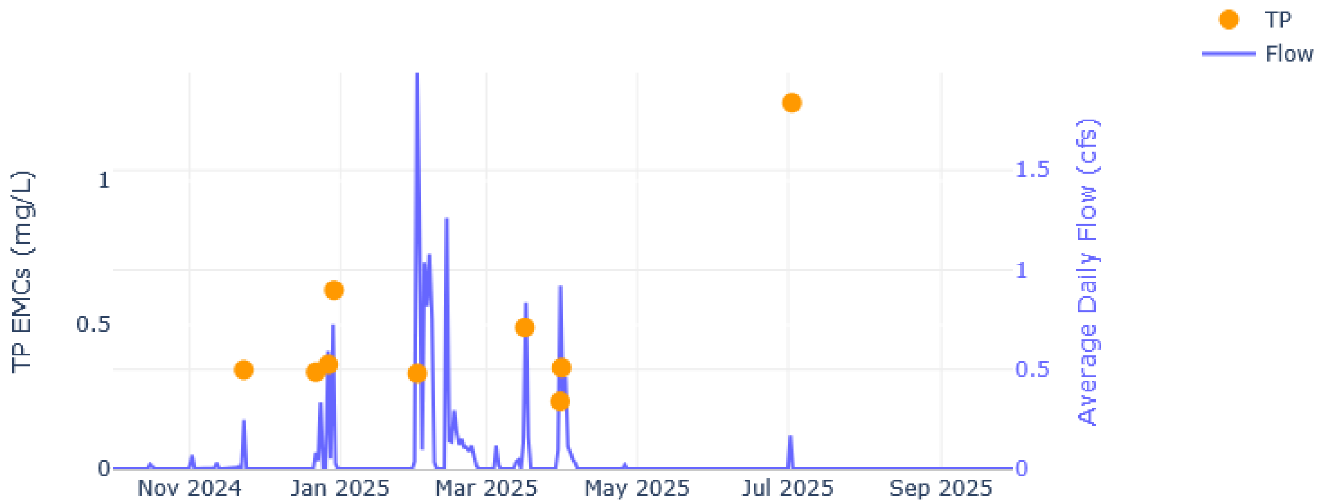

Figure 59 Daily flow and TP EMC summary at the Tahoe Valley catchment outfall, WY25.

Seasonal load as a fraction of the water year load at Tahoe Valley is presented in Figure 60. Event loads are presented in tabular form in Table 23.

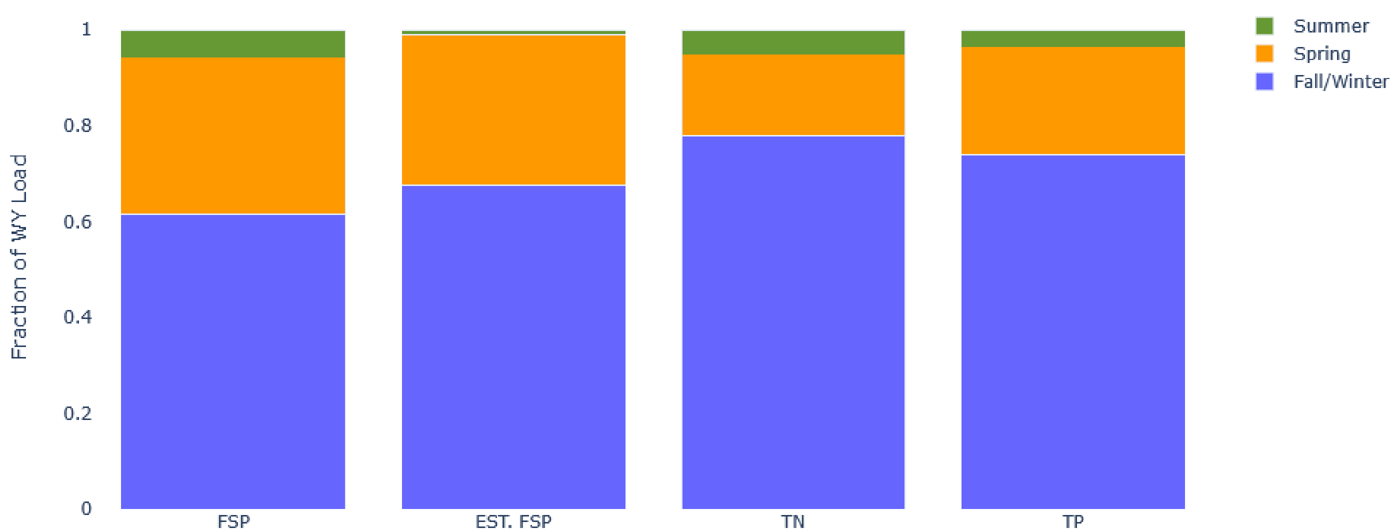

Figure 60 Seasonal load as a fraction of the water year load at the Tahoe Valley catchment outfall, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads (based on samples) was generated in the fall/winter.

- The largest fraction of FSP loads (based on continuous turbidity) was generated in the fall/winter.
- FSP loads calculated from sample concentrations are lab certified results and therefore reliable, however, not all runoff volume is sampled. Estimated FSP loads calculated from turbidity are less precise, but turbidity measurements are taken continuously on all runoff. This discrepancy accounts for the difference between FSP and estimated FSP results.
- The largest fraction of TN loads was generated in the fall/winter.
- The largest fraction of TP loads was generated in the fall/winter.

6.2.8 Tahoma

Figure 61 shows the average daily flow and cumulative precipitation for WY25 at the Tahoma catchment outfall.

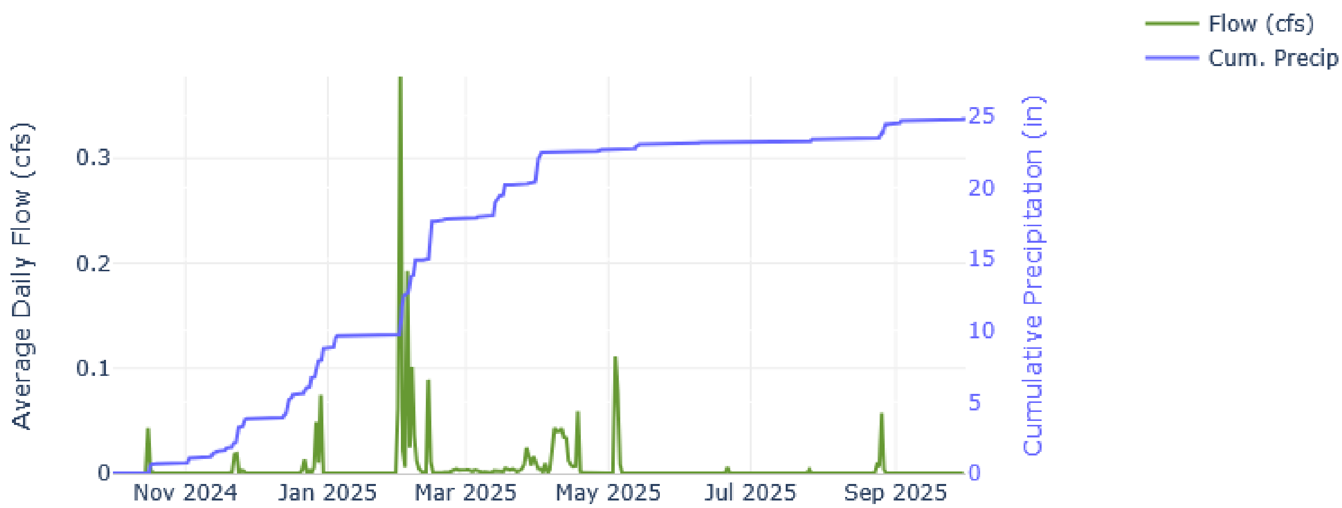

Figure 61 Average daily flow and cumulative precipitation at the Tahoma catchment outfall, WY25.

- 24.78 inches of total precipitation (17.77 inches in the fall/winter, 5.32 inches in the spring, 1.69 inches in the summer) were recorded at the El Dorado County Yard (EDCY) weather station.
- 46 precipitation events occurred (19 fall/winter events, 11 spring events, 16 summer events).
- The largest storm event produced 2.89 inches of precipitation and occurred during an atmospheric river rain on snow event from January 31, 2025 – February 1, 2025.
- 67% of storms were less than half an inch.
- The largest runoff volume occurred during an atmospheric river rain on snow event from January 31, 2025 – February 3, 2025 (40,137 cf).
- Highest average daily flows occurred on February 1, 2025 during an atmospheric river rain on snow event.
- 84 days of snowmelt occurred in the fall/winter and spring, resulting in 61,375 cf of runoff (35% of the total flow).
- The highest instantaneous peak precipitation was 0.14 inches in 5 minutes during a thunderstorm event on August 26, 2025.
- The highest instantaneous peak flow was 3.39 cfs on August 26, 2025 during a thunderstorm event.

Eleven events were sampled at Tahoma in WY25 (four in the fall/winter, three in the spring, and four in the summer). Event summary data is presented in Table 25. Minimum and maximum EMCs and loads are shown in Table 26.

Table 25 Event summary data at the Tahoma catchment outfall, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
TA	Fall/Winter	11/22/2024 15:30	11/23/2024 16:55	25:25	3,179	0.33	668	1.14	Rain	13	2.50	27.4	797	0.16	394	0.078
TA	Fall/Winter	12/21/2024 14:10	12/22/2024 8:05	17:55	1,285	0.36	2,159	0.43	Rain on Snow	48	3.81	55.3	826	0.07	620	0.050
TA	Fall/Winter	12/27/2024 2:50	12/27/2024 19:40	16:50	4,229	0.32	3,013	0.58	Rain on Snow	27	7.22	50.7	465	0.12	269	0.071
TA	Fall/Winter	1/31/2025 13:20	2/3/2025 7:30	66:10	40,137	1.80	3,183	2.89	Rain on Snow	33	81.5	39.7	760	1.90	400	1.002
TA	Spring	3/13/2025 12:00	3/13/2025 19:05	7:05	91	0.01	0	0.15	Event Snowmelt	23	0.128	42.8	347	0.00	424	0.002
TA	Spring	3/23/2025 8:25	3/24/2025 20:55	36:30	385	0.02	0	0.00	Non-event Snowmelt	6	0.145	43.3	286	0.01	66	0.002
TA	Spring	4/8/2025 6:00	4/11/2025 6:00	72:00	11,047	0.10	1,303	0.00	Non-event Snowmelt	3	1.75	36.3	171	0.12	38	0.026
TA	Summer	7/26/2025 13:00	7/26/2025 15:30	2:30	310	0.16	230	0.13	Thunderstorm	193	3.75	33.4	9,216	0.18	2,118	0.041
TA	Summer	8/24/2025 18:05	8/25/2025 3:40	9:35	713	0.48	122	0.25	Thunderstorm	244	10.8	40.1	7,934	0.35	2,048	0.091
TA	Summer	8/26/2025 17:00	8/26/2025 19:10	2:10	4,971	3.39	49	0.44	Thunderstorm	170	52.8	21.1	7,959	2.47	2,172	0.674
TA	Summer	9/2/2025 16:25	9/2/2025 19:05	2:40	88	0.07	36	0.22	Thunderstorm	42	0.233	38.9	2,644	0.01	539	0.003

Table 26 Maximum and minimum EMCs and loads at the Tahoma catchment outfall for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	3	0.13	244	81.52
Runoff Volume (cf)	11,047	91	713	40,137
Runoff Start/End (Date Time)	4/8/2025 06:00 - 4/11/2025 6:00	3/13/2025 12:00 - 3/13/2025 19:05	8/24/2025 18:05 - 8/25/2025 3:40	1/31/2025 13:20 - 2/3/2025 7:30
Event Type	Non-event Snowmelt	Event Snowmelt	Thunderstorm	Rain on Snow

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	171	0.00	9,216	2.47
Runoff Volume (cf)	11,047	91	310	4,971
Runoff Start/End (Date Time)	4/8/2025 06:00 - 4/11/2025 6:00	3/13/2025 12:00 - 3/13/2025 19:05	7/26/2025 13:00 - 7/26/2025 15:30	8/26/2025 17:00 - 8/26/2025 19:10
Event Type	Non-event Snowmelt	Event Snowmelt	Thunderstorm	Thunderstorm

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	38	0.00	2,172	1.00
Runoff Volume (cf)	11,047	385	4,971	40,137
Runoff Start/End (Date Time)	4/8/2025 06:00 - 4/11/2025 6:00	3/23/2025 08:25 - 3/24/2025 20:55	8/26/2025 17:00 - 8/26/2025 19:10	1/31/2025 13:20 - 2/3/2025 7:30
Event Type	Non-event Snowmelt	Non-event Snowmelt	Thunderstorm	Rain on Snow

Daily flow and the FSP EMC summary at Tahoma for FSP, TN, and TP are presented in Figure 62, Figure 63, and Figure 64, respectively. Table 25 presents EMC data in tabular form.

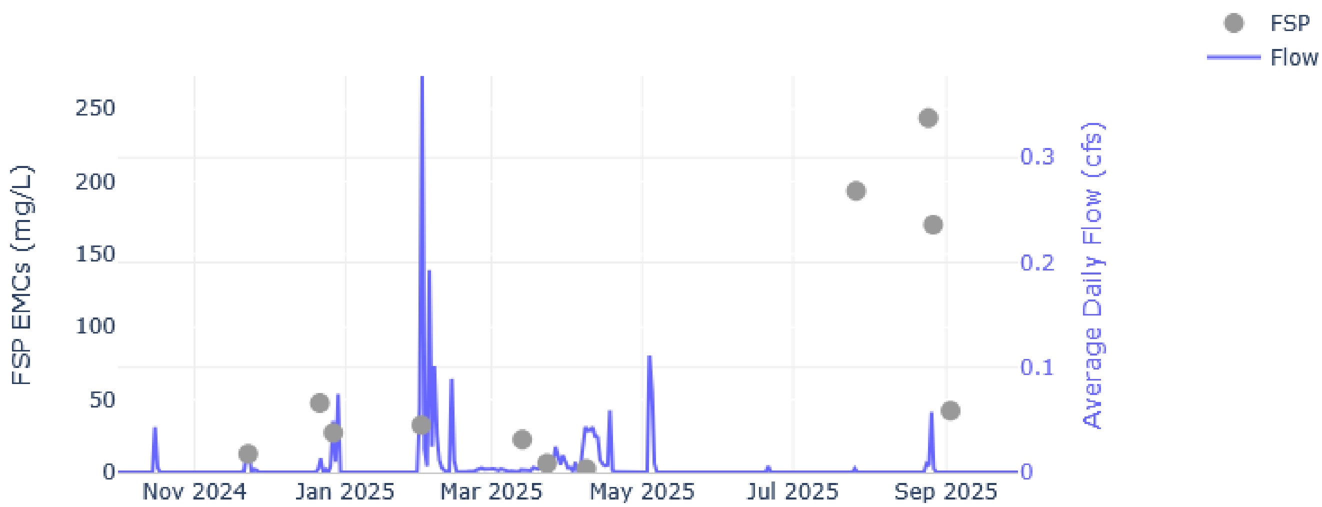

Figure 62 Daily flow and FSP EMC summary at the Tahoma catchment outfall, WY25.

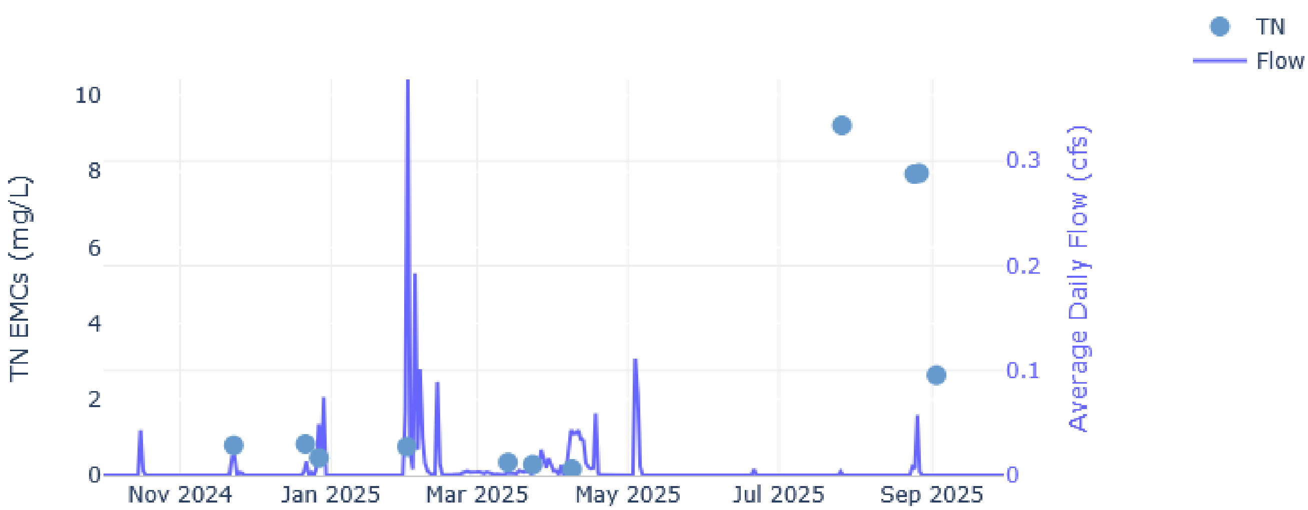

Figure 63 Daily flow and TN EMC summary at the Tahoma catchment outfall, WY25.

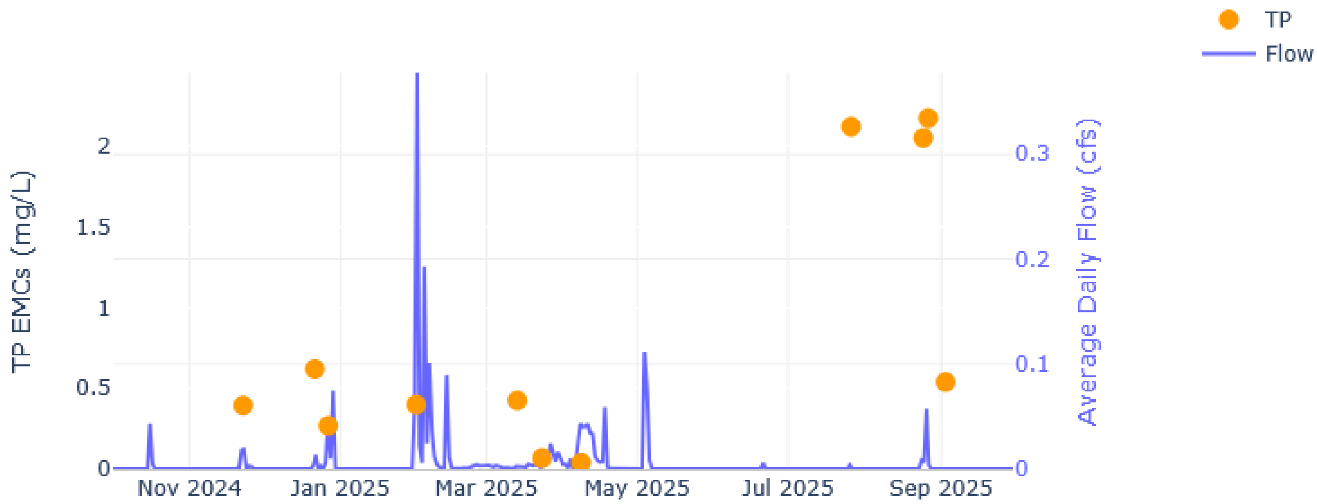

Figure 64 Daily flow and TP EMC summary at the Tahoma catchment outfall, WY25.

Seasonal load as a fraction of the water year load at Tahoma is presented in Figure 65. Event loads are presented in tabular form in Table 25.

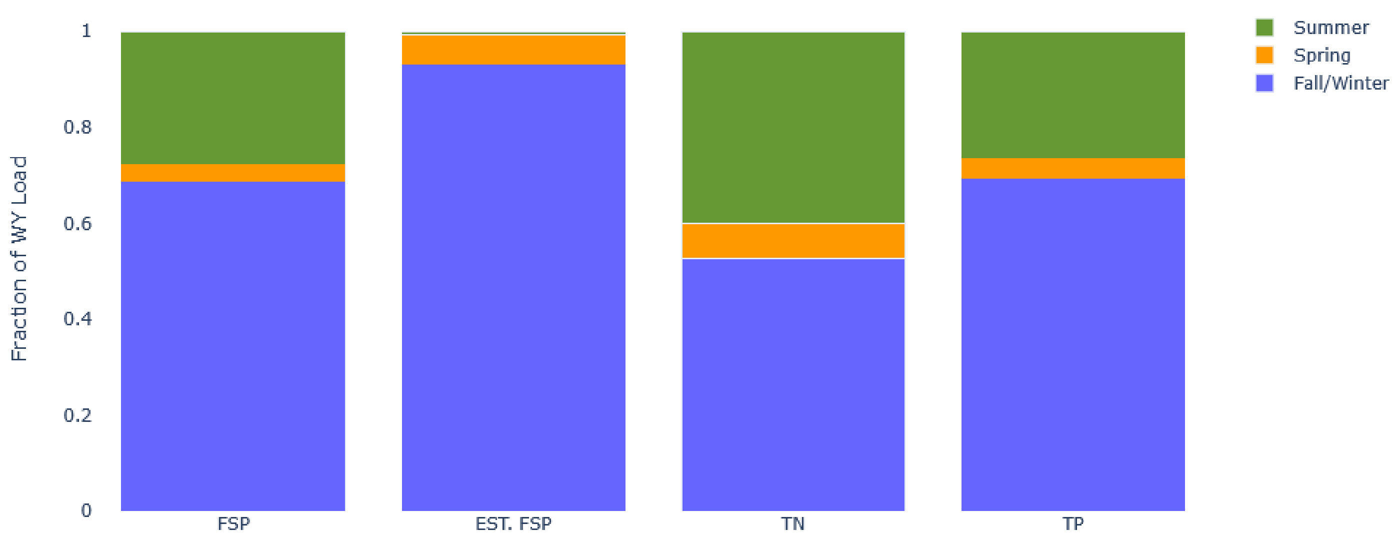

Figure 65 Seasonal load as a fraction of the water year load at the Tahoma catchment outfall, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction of FSP loads (based on samples) was generated in the fall/winter.

- The largest fraction of FSP loads (based on continuous turbidity) was generated in the fall/winter.
- FSP loads calculated from sample concentrations are lab certified results and therefore reliable, however, not all runoff volume is sampled. Estimated FSP loads calculated from turbidity are less precise, but turbidity measurements are taken continuously on all runoff. This discrepancy accounts for the difference between FSP and estimated FSP results.
- The largest fraction of TN loads was generated in the fall/winter.
- The largest fraction of TP loads was generated in the fall/winter.

6.2.9 Upper Truckee

Figure 66 shows the average daily flow and cumulative precipitation for WY25 at the Upper Truckee catchment outfall.

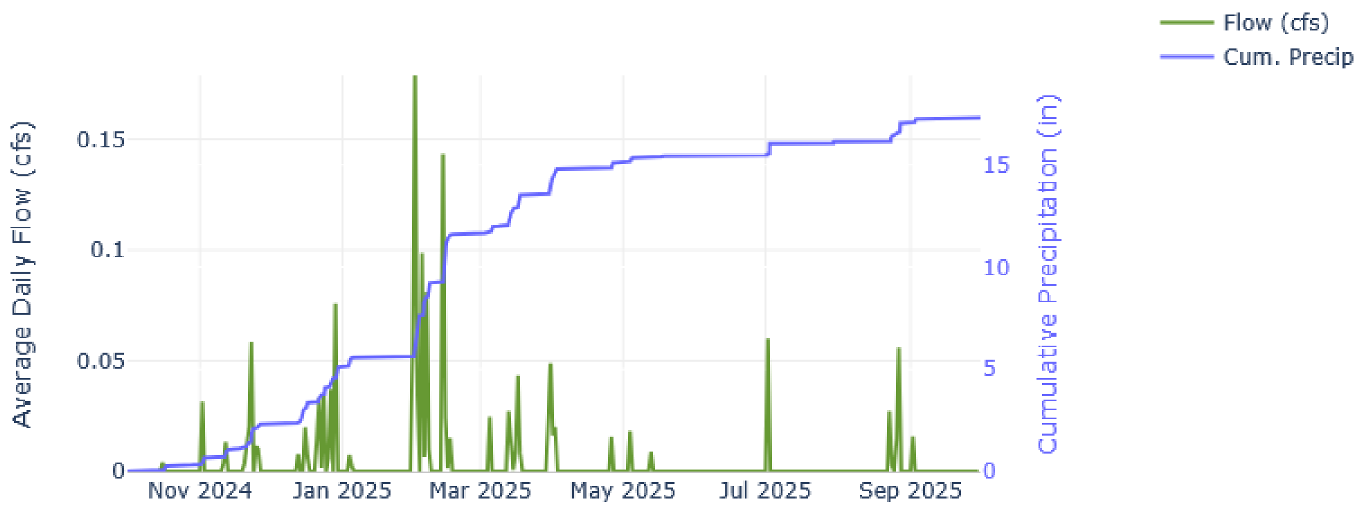

Figure 66 Average daily flow and cumulative precipitation at the Upper Truckee catchment outfall, WY25.

- 17.313 inches of total precipitation (11.616 inches in the fall/winter, 3.816 inches in the spring, and 1.881 inches in the summer) were recorded at Raph's Shop (RAPH) weather station.
- 46 precipitation events occurred (20 fall/winter events, 10 spring events, 16 summer events).
- The largest storm event produced 2.37 inches of precipitation and occurred during a rain and snow atmospheric river event February 12-16, 2025.
- 76% of storms were less than half an inch.
- The largest runoff volume occurred during an atmospheric river rain on snow event from January 31, 2025 to February 2, 2025 (23,103 cf).
- Highest average daily flows occurred on February 1, 2025 during an atmospheric river rain on snow event.
- 10 days of snowmelt occurred in the fall/winter and spring resulting in 4,265 cf of runoff (3% of the total flow).
- The highest instantaneous peak precipitation was 0.134 inches in 5 minutes during a thunderstorm event on August 23, 2025.
- The highest instantaneous peak flow (3.08 cfs) occurred during a thunderstorm event on August 27, 2025.

Eight events were sampled at Upper Truckee in WY25 (five in the fall/winter, three in the spring, and three in the summer). Event summary data is presented in Table 27. Minimum and maximum EMCs and loads are shown in Table 28.

Table 27 Event summary data at the Upper Truckee catchment outfall, WY25.

Station Acronym	Season	Runoff Start (Date Time)	Runoff End (Date Time)	Runoff Duration (hh:mm)	Runoff Volume (cf)	Peak Flow (cfs)	Peak Turb (NTU)	Storm Total (in)	Event Type	FSP EMC (mg/L)	FSP event load (lbs)	%FSP	TN EMC (ug/L)	TN event load (lbs)	TP EMC (ug/L)	TP event load (lbs)
UT	Fall/Winter	11/2/2024 1:10	11/2/2024 13:10	12:00	2,722	0.19	53	0.33	Event Snowmelt	12	2.07	42.0	2,211	0.38	264	0.045
UT	Fall/Winter	11/22/2024 20:15	11/23/2024 11:25	15:10	6,783	0.41	89	0.69	Rain	61	25.6	63.7	1,749	0.74	489	0.207
UT	Fall/Winter	12/21/2024 13:20	12/22/2024 8:30	19:10	4,009	0.48	198	0.34	Rain on Snow	255	63.7	92.3	2,293	0.57	1,338	0.335
UT	Fall/Winter	12/24/2024 8:05	12/24/2024 14:50	6:45	3,027	0.54	320	0.32	Rain on Snow	58	10.9	90.5	2,022	0.38	1,269	0.240
UT	Fall/Winter	1/31/2025 15:00	2/2/2025 19:00	52:00	23,103	0.74	1,467	2.03	Rain on Snow	64	91.7	43.0	1,292	1.86	729	1.051
UT	Spring	3/13/2025 10:15	3/13/2025 17:30	7:15	2,330	0.25	707	0.58	Event Snowmelt	270	39.2	94.6	2,223	0.32	1,145	0.166
UT	Spring	3/30/2025 18:55	3/31/2025 5:00	10:05	2,678	0.26	947	0.35	Rain on Snow	132	22.0	81.4	1,359	0.23	588	0.098
UT	Spring	5/4/2025 1:00	5/4/2025 10:15	9:15	1,569	0.20	473	0.23	Thunderstorm	34	3.34	58.9	1,976	0.19	376	0.037
UT	Summer	7/2/2025 14:45	7/2/2025 17:15	2:30	5,179	2.93	376	0.47	Thunderstorm	179	57.9	38.8	4,610	1.49	1,384	0.447
UT	Summer	8/26/2025 18:35	8/26/2025 22:00	3:25	1,279	0.38	214	0.10	Thunderstorm	40	3.22	67.3	3,954	0.32	457	0.036
UT	Summer	8/27/2025 12:05	8/27/2025 14:45	2:40	4,833	3.08	198	0.42	Thunderstorm	108	32.6	51.3	3,391	1.02	652	0.197

Table 28 Maximum and minimum EMCs and loads at the Upper Truckee catchment outfall for FSP, TN, and TP, WY25.

FSP	Minimum		Maximum	
	EMC (mg/L)	Load (lbs)	EMC (mg/L)	Load (lbs)
EMC or Load Value	12	2.07	270	91.72
Runoff Volume (cf)	2,722	2,722	2,330	23,103
Runoff Start/End (Date Time)	11/2/2024 01:10 - 11/2/2024 13:10	11/2/2024 01:10 - 11/2/2024 13:10	3/13/2025 10:15 - 3/13/2025 17:30	1/31/2025 15:00 - 2/2/2025 19:00
Event Type	Event Snowmelt	Event Snowmelt	Event Snowmelt	Rain on Snow

TN	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	1292	0.19	4,610	1.86
Runoff Volume (cf)	23,103	1,569	5,179	23,103
Runoff Start/End (Date Time)	1/31/2025 15:00 - 2/2/2025 19:00	5/4/2025 01:00 - 5/4/2025 10:15	7/2/2025 14:45 - 7/2/2025 17:15	1/31/2025 15:00 - 2/2/2025 19:00
Event Type	Rain on Snow	Thunderstorm	Thunderstorm	Rain on Snow

TP	Minimum		Maximum	
	EMC (ug/L)	Load (lbs)	EMC (ug/L)	Load (lbs)
EMC or Load Value	264	0.036	1,384	1.05
Runoff Volume (cf)	2,722	1,279	5,179	23,103
Runoff Start/End (Date Time)	11/2/2024 01:10 - 11/2/2024 13:10	8/26/2025 18:35 - 8/26/2025 22:00	7/2/2025 14:45 - 7/2/2025 17:15	1/31/2025 15:00 - 2/2/2025 19:00
Event Type	Event Snowmelt	Thunderstorm	Thunderstorm	Rain on Snow

Daily flow and the FSP EMC summary at Upper Truckee for FSP, TN, and TP are presented in Figure 67, Figure 68, and Figure 69, respectively. Table 27 presents EMC data in tabular form.

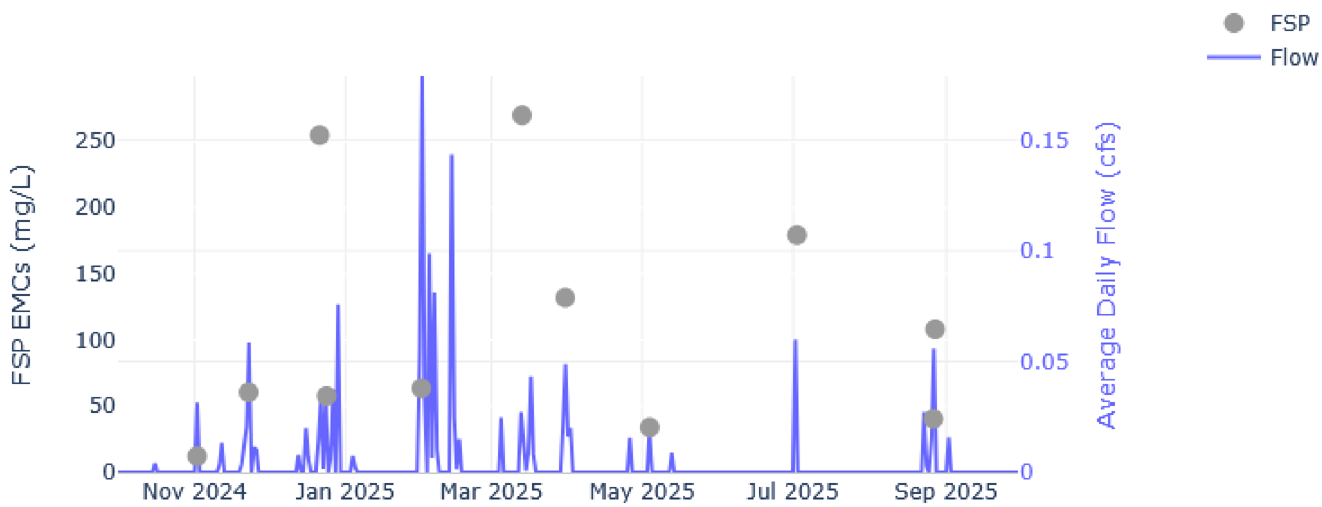

Figure 67 Daily flow and FSP EMC summary at the Upper Truckee catchment outfall, WY25.

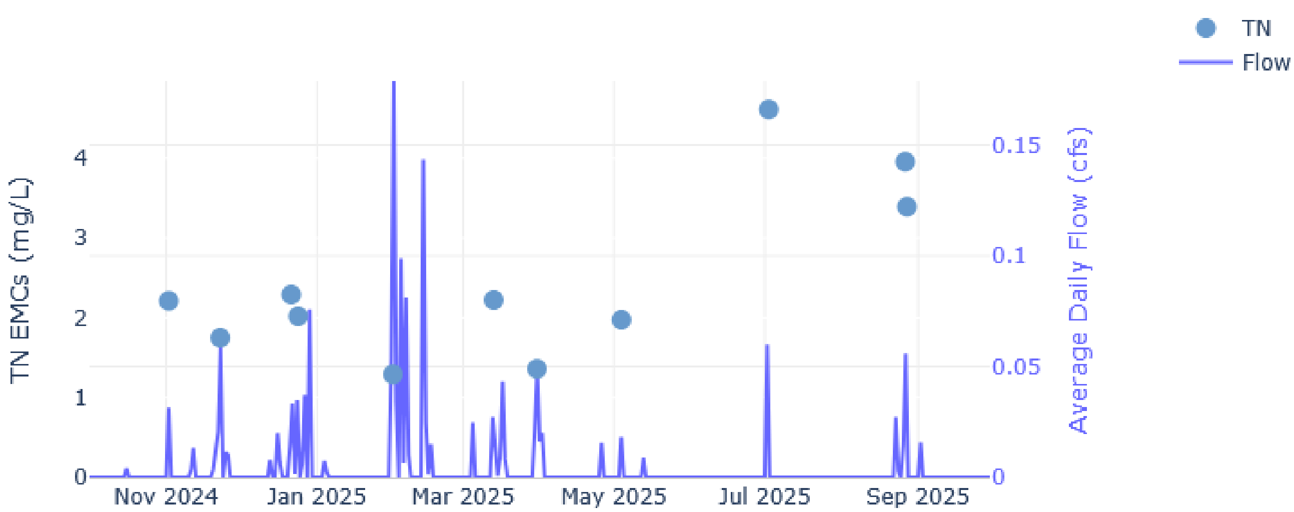

Figure 68 Daily flow and TN EMC summary at the Upper Truckee catchment outfall, WY25.

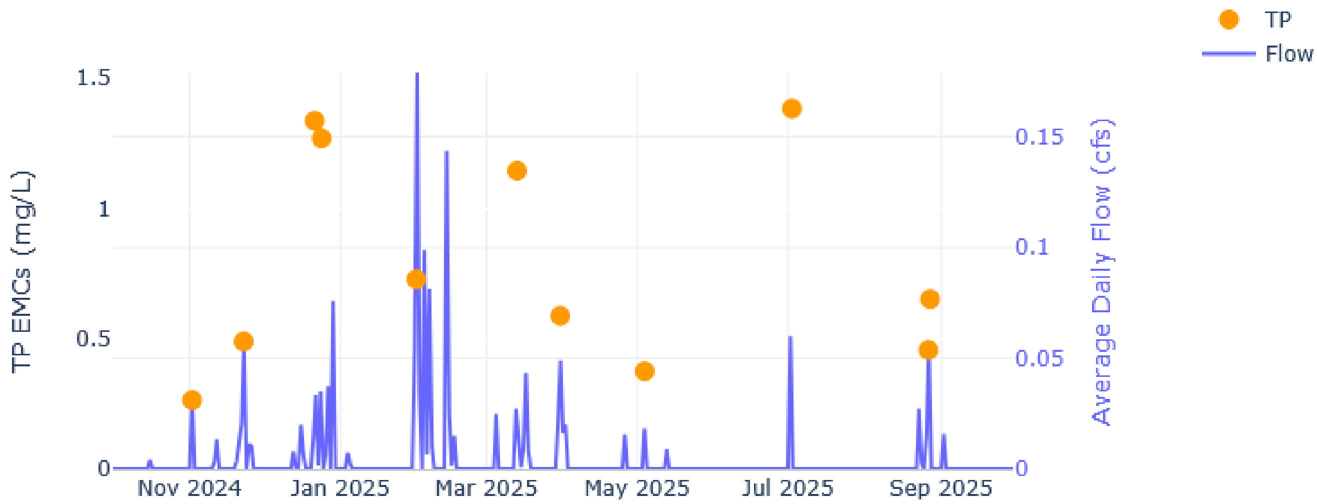

Figure 69	Daily flow and TP EMC summary at the Upper Truckee catchment outfall, WY25.

Seasonal load as a fraction of the water year load at Upper Truckee is presented in Figure 70. Event loads are presented in tabular form in Table 27.

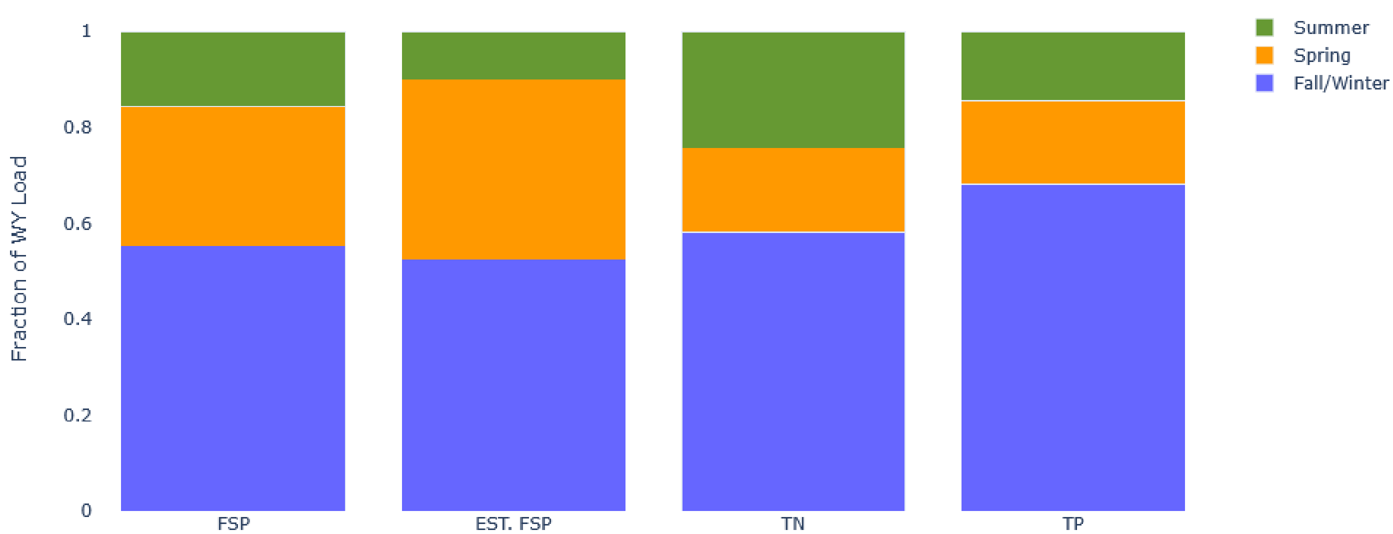

Figure 70	Seasonal load as a fraction of the water year load at the Upper Truckee catchment outfall, WY25. The first FSP column represents the FSP load calculated using event mean concentrations, while the second FSP column (EST. FSP) represents the FSP load estimated using continuous turbidity data.

- The largest fraction FSP loads (based on samples) was generated in the fall/winter.

- The largest fraction of FSP loads (based on turbidity) was generated in the fall/winter.
- The largest fraction of TN loads was generated in the fall/winter.
- The largest fraction of TP loads was generated in the fall/winter.

7. BMP Effectiveness Monitoring

7.1 SR431

Data collected from matched inflow and outflow sampling at the Contech MFS stormwater treatment vault and at the Jellyfish stormwater treatment vault at SR431 have historically shown variable removal efficiencies for sediment and nutrients. The variability is due, in large part, to system maintenance or lack thereof. Below is a summary of the maintenance that occurred during WY25.

- On March 26, 2025 sediment was cleared from the Jellyfish inflow and outflow flumes.
- On June 10, 2025 sediment was cleared from all stilling wells, flumes, and inflow pipes.
- On August 14, 2025 NDOT's contracted maintenance team performed maintenance, including spraying down the Contech MFS cartridges and Jellyfish tentacles and vactoring out the hydrodynamic separator, splitter chamber, and Contech MFS and Jellyfish vaults. The flumes and inflow pipes were not cleaned.

Table 29 presents the seasonal and annual summary data on load removal efficiency for each treatment vault at SR431 in WY25 based on samples taken during sampled events (FSP, TN, TP) and continuous turbidity (estimated FSP).

Table 29 Seasonal and annual efficiency data from the Contech MFS and Jellyfish vaults at SR431, WY25.

Water Year 2025 (October 1, 2024 - September 30, 2025)			Seasonal FSP Loads (lbs)			Total Annual FSP Loads (lbs)	Estimated Seasonal FSP Loads (lbs)			Estimated Total Annual FSP Loads (lbs)	Seasonal TN Loads (lbs)			Total Annual TN Loads (lbs)	Seasonal TP Loads (lbs)			Total Annual TP Loads (lbs)
Catchment Name	Station Name	Station Acronym	Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)		Fall/Winter (Oct1-Feb28)	Spring (Mar1-May31)	Summer (Jun1-Sep30)	
SR431	Contech In	CI	116.2	146.3	77.6	340.1	23.0	59.6	43.4	126.0	0.48	0.57	1.66	2.71	0.58	0.64	0.56	1.78
	Contech Out	CO	79.0	84.8	54.1	218.0	23.8	5.9	23.3	52.9	0.38	0.37	1.00	1.74	0.40	0.37	0.36	1.13
	Load Reduction		37.1	61.4	23.5	122.1	-0.8	53.8	20.1	73.1	0.10	0.20	0.66	0.97	0.18	0.27	0.19	0.64
	% Change		-32%	-42%	-30%	-36%	3%	-90%	-46%	-58%	-22%	-35%	-40%	-36%	-31%	-42%	-34%	-36%
SR431	Jellyfish In	JI	189.3	172.8	75.5	437.7	41.0	59.0	35.8	135.8	0.70	0.74	1.97	3.41	0.87	0.77	0.55	2.18
	Jellyfish Out	JO	89.1	85.6	59.6	234.3	15.8	31.4	15.1	62.3	0.30	0.40	1.49	2.19	0.42	0.37	0.20	0.99
	Load Reduction		100.3	87.2	16.0	203.4	25.2	27.6	20.7	73.5	0.40	0.33	0.48	1.21	0.45	0.40	0.35	1.19
	% Change		-53%	-50%	-21%	-46%	-61%	-47%	-58%	-54%	-58%	-45%	-24%	-36%	-51%	-52%	-63%	-55%

Contech MFS

- The Contech MFS reduced annual FSP loads by 36% and 58% based on samples and estimated from continuous turbidity respectively.
- The greatest FSP reduction efficiency occurred in the spring at 42% based on samples and in the spring at 90% estimated from continuous turbidity.
- The poorest FSP reduction efficiency occurred in the summer at 30% based on samples and in the fall/winter at 3% estimated from continuous turbidity. A value this low for continuous turbidity could indicate poor turbidity sensor maintenance.
- The Contech MFS reduced annual TN loads by 36%.
- The greatest TN reduction efficiency occurred in the summer at 40%.
- The poorest TN reduction efficiency occurred in the fall/winter at 22%.
- The Contech MFS reduced annual TP loads by 36%.
- The greatest TP reduction efficiency occurred in the spring at 42%.
- The poorest TP reduction efficiency occurred in the fall/winter at 31%.

Jellyfish

- The Jellyfish reduced annual FSP loads by 46% and 54% based on samples and estimated from continuous turbidity respectively.
- The greatest FSP reduction efficiency occurred in the fall/winter at 53% based on samples and in the fall/winter at 61% based on continuous turbidity.
- The poorest FSP reduction efficiency occurred in the summer at 21% based on samples and in the spring at 47% based on continuous turbidity.
- The Jellyfish reduced annual TN loads by 36%.
- The greatest TN reduction efficiency occurred in the fall/winter at 58%.
- The poorest TN reduction efficiency occurred in the summer at 24%.
- The Jellyfish reduced annual TP loads by 55%.
- The greatest TP reduction efficiency occurred in the summer at 63%.
- The poorest TP reduction efficiency occurred in the fall/winter at 51%.

Table 30 presents the efficiency of the Contech MFS at reducing concentrations and loads of all three pollutants for the individual events sampled in WY25.

Table 30 Event efficiency data from the Contech MFS vault at SR431, WY25.

Event Start Date	Event Volume as a % of Total Annual Volume (cf)	FSP Concentration (mg/L)			FSP Load (lbs)			TN Concentration (ug/L)			TN Load (lbs)			TP Concentration (ug/L)			TP Load (lbs)		
		in-flow	out-flow	% change	in-flow	out-flow	% change	in-flow	out-flow	% change	in-flow	out-flow	% change	in-flow	out-flow	% change	in-flow	out-flow	% change
1/31/2025	24.9%	347	291	-16%	78	59	-25%	1,423	1,372	-4%	0.32	0.28	-14%	1,723	1,451	-16%	0.39	0.29	-25%
2/4/2025	1.9%	87	92	6%	2	1	-10%	566	712	26%	0.01	0.01	7%	541	629	16%	0.01	0.01	-1%
3/30/2025	2.6%	1,371	915	-33%	33	16	-50%	4,062	3,407	-16%	0.10	0.06	-38%	5,928	4,131	-30%	0.14	0.07	-48%
4/16/2025	2.3%	1,910	1,472	-23%	41	28	-32%	6,342	5,464	-14%	0.14	0.10	-24%	7,642	5,979	-22%	0.16	0.11	-31%
4/26/2025	7.6%	231	219	-5%	16	9	-46%	1,694	1,661	-2%	0.12	0.06	-45%	1,282	1,137	-11%	0.09	0.04	-50%
6/24/2025	5.3%	369	251	-32%	18	11	-38%	4,012	3,440	-14%	0.19	0.15	-22%	2,338	1,567	-33%	0.11	0.07	-39%
8/23/2025	1.7%	128	122	-4%	2	1	-62%	7,067	6,341	-10%	0.11	0.04	-65%	1,346	1,359	1%	0.02	0.01	-60%
8/25/2025	1.5%	21	26	22%	0.3	0.1	-70%	5,429	4,773	-12%	0.07	0.02	-79%	493	543	10%	0.01	0.002	-73%
9/2/2025	2.2%	26	39	50%	1	0.3	-47%	3,115	2,486	-20%	0.06	0.02	-72%	350	388	11%	0.01	0.003	-61%

- The majority of events show a reduction in both concentration and load for all pollutants.
- FSP, TN, and TP concentrations were all higher at the outflow than the inflow for the February 4, 2025 event, however, loads were still reduced for FSP and TP because of the comparatively low outflow volume.
- TP concentration was higher at the outflow than the inflow for the August 23, 2025 event, however, load was still reduced because of the comparatively low outflow volume.
- FSP and TP concentrations were higher at the outflow than the inflow for the August 25, 2025 and September 2, 2025 events, however, loads were still reduced because of the comparatively low outflow volume.

Contech MFS vault water level and bypass flow are presented in Figure 71. When bypass occurs, untreated flow comingles with treated flow in the outflow from the Contech MFS vault, resulting in reduced overall treatment efficiency.

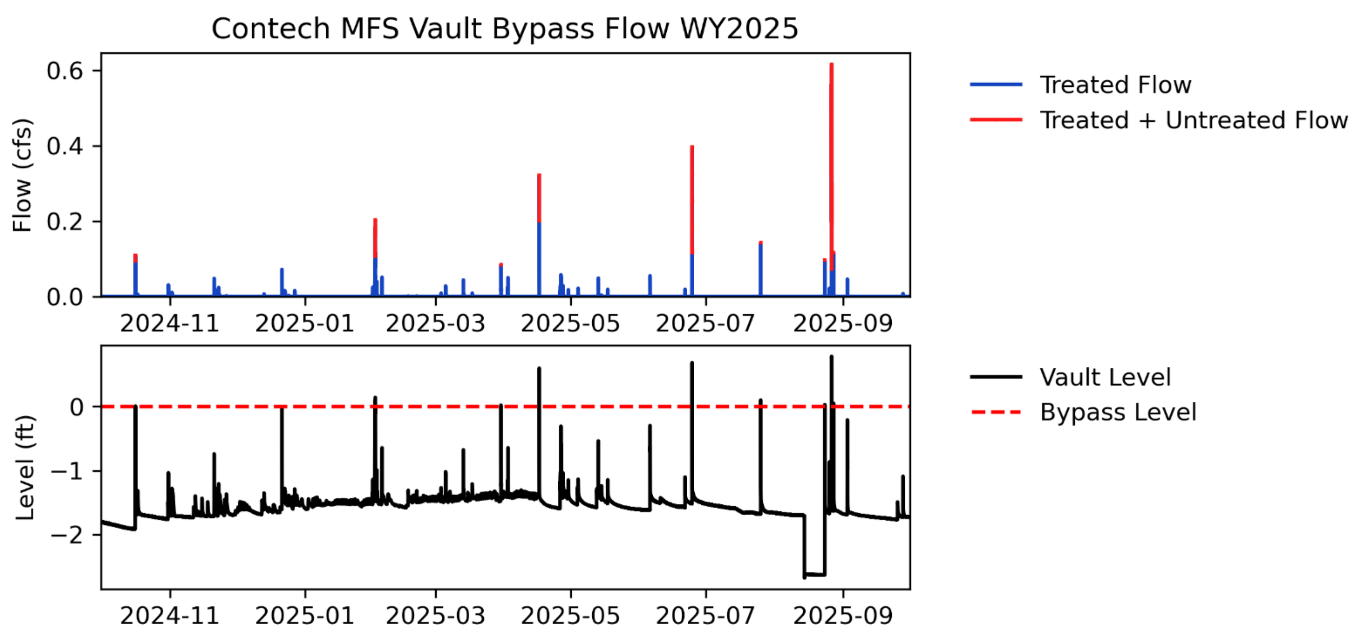

Figure 71 Contech MFS vault level at SR431, WY25 (bottom). Contech MFS outflow shown at top for reference. Vault level greater than 0 indicates bypass flow. The Contech MFS vault bypassed nine times in WY25.

- During periods of flow, the Contech MFS filter was in bypass mode 5.8% of the time in WY25 which represents up to 42% of the flow volume (4,575 cf). During bypass mode treated flow is comingled with untreated (bypass) flow, so the exact amount of untreated flow is difficult to determine.
- Bypass occurred during 9 runoff events:
    - October 16, 2024 during a rain event that produced 0.42 inches of precipitation.
    - February 1, 2025 during a sampled atmospheric river rain on snow event that produced 2.11 inches of precipitation.
    - March 30, 2025 during a sampled rain and snow event that produced 1.73 inches of precipitation.
    - April 16, 2025 during a sampled thunderstorm event that produced 0.16 inches of precipitation.
    - June 24, 2025 during a sampled thunderstorm event that produced 0.38 inches of precipitation.
    - July 25, 2025 during a thunderstorm event that produced 0.10 inches of precipitation.
    - August 23, 2025 during a sampled thunderstorm event that produced 0.17 inches of precipitation.
    - August 26, 2025 during a thunderstorm event that produced 2.00 inches of precipitation.
    - August 27, 2025 during a thunderstorm event that produced 0.17 inches of precipitation.

Table 31 presents the efficiency of the Jellyfish at reducing concentrations and loads of all three pollutants for the individual events sampled in WY25.

Table 31 Event efficiency data from the Jellyfish vault at SR431, WY25.

Event Start Date	Event Volume as a % of Total Annual Volume (cf)	FSP Concentration (mg/L)			FSP Load (lbs)			TN Concentration (ug/L)			TN Load (lbs)			TP Concentration (ug/L)			TP Load (lbs)		
		in-flow	out-flow	% change	in-flow	out-flow	% change	in-flow	out-flow	% change	in-flow	out-flow	% change	in-flow	out-flow	% change	in-flow	out-flow	% change
1/31/2025	23.8%	450	303	-33%	113	61	-46%	1,627	990	-39%	0.41	0.20	-51%	2,039	1,419	-30%	0.51	0.29	-44%
2/4/2025	2.1%	106	63	-41%	2	1	-61%	856	559	-35%	0.02	0.01	-57%	711	490	-31%	0.02	0.01	-55%
3/30/2025	2.3%	1,546	681	-56%	37	11	-70%	5,067	2,409	-52%	0.12	0.04	-67%	6,254	2,744	-56%	0.15	0.05	-70%
4/16/2025	2.1%	1,699	1,688	-1%	37	32	-14%	6,218	6,345	2%	0.14	0.12	-12%	7,523	6,962	-7%	0.16	0.13	-20%
4/26/2025	6.4%	246	153	-38%	17	7	-61%	1,923	1,739	-10%	0.13	0.07	-43%	1,313	866	-34%	0.09	0.04	-58%
6/24/2025	4.6%	348	272	-22%	17	12	-26%	4,855	4,744	-2%	0.24	0.22	-8%	2,148	721	-66%	0.10	0.03	-68%
8/23/2025	1.6%	118	159	34%	2	1	-69%	7,198	7,535	5%	0.12	0.03	-76%	1,410	1,582	12%	0.02	0.01	-74%
8/25/2025	1.4%	21	15	-29%	0.3	0.1	-57%	5,727	5,895	3%	0.09	0.05	-38%	569	385	-32%	0.01	0.004	-59%
9/2/2025	2.1%	28	14	-50%	1	0.2	-68%	3,140	2,353	-25%	0.07	0.03	-52%	300	187	-38%	0.01	0.003	-60%

- The majority of events show a reduction in both concentration and load for all pollutants.
- TN concentration was higher at the outflow than the inflow for the April 16, 2025 event, however, load was still reduced because of the comparatively low outflow volume.
- FSP, TN, and TP concentrations were all higher at the outflow than the inflow for the August 23, 2025 event, however, loads were still reduced because of the comparatively low outflow volume.
- TN concentration was higher at the outflow than the inflow for the August 25, 2025 event, however, load was still reduced because of the comparatively low outflow volume.

Jellyfish vault water level and bypass flow are presented in Figure 72. When bypass occurs, untreated flow comingles with treated flow in the outflow from the Jellyfish vault, resulting in reduced overall treatment efficiency.

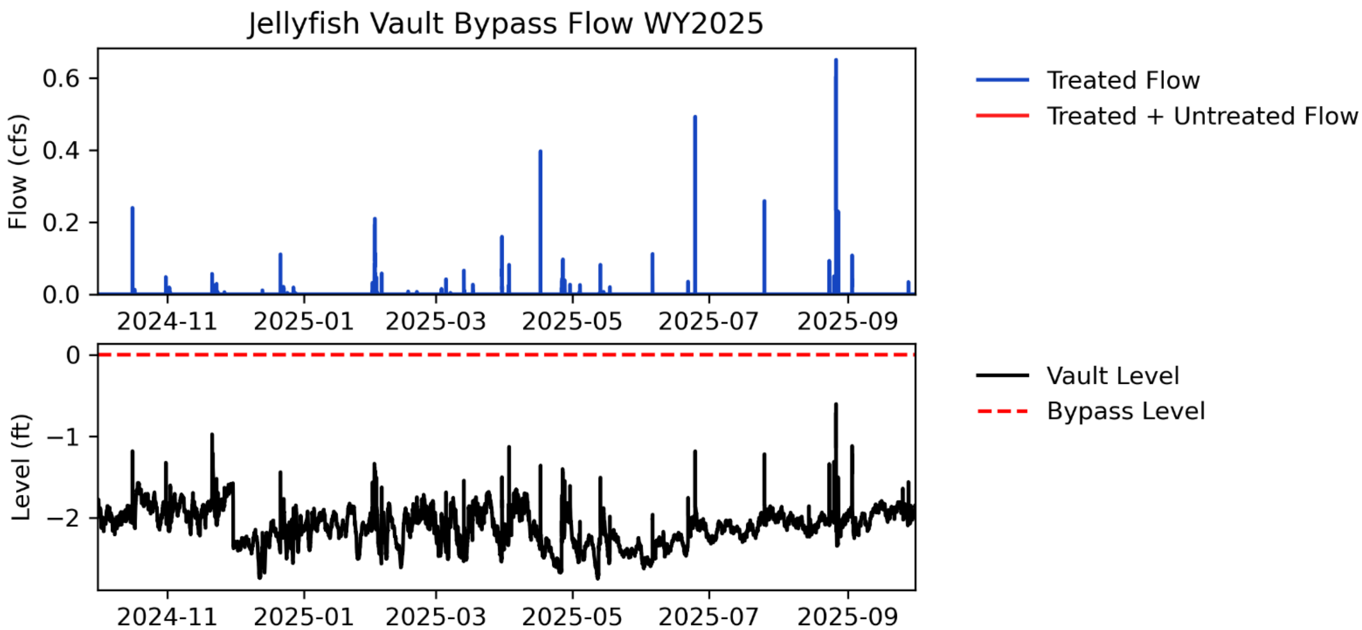

Figure 72 Jellyfish vault level at SR431, WY25 (bottom). Jellyfish outflow shown at the top for reference. Vault level greater than 0 indicates bypass flow. The Jellyfish vault bypassed zero times in WY25.

- During periods of flow, the Jellyfish filter was in bypass mode 0% of the time in WY25 which represents 0% of the flow volume (0 cf). During bypass mode treated flow is comingled with untreated (bypass) flow, so the exact amount of untreated flow is difficult to determine.
- Bypass occurred during zero measured runoff events.

7.2 Elks Club

Elks Club Drive was repaved in August 2018, right before the start of WY19. Data collected at Elks Club in WY18 represents pre-paving conditions. Data collected in WY19, WY20, WY21, WY22, WY23, WY24, and WY25 represent post-paving conditions. Prior to repaving (WY18), Elk's Club Drive was in poor condition, covered in cracks and potholes (Figure 73 - PCI*: 29). In August 2018 (just prior to WY19) it was repaved to excellent condition (Figure 74 - PCI*: 99). Three years later, in October 2021, the average PCI was still excellent (Figure 75 – PCI*: 89). A microseal was applied in August 2024 resulting in a PCI of 98. No PCI assessment was conducted in 2025.

Figure 73 Elks Club Drive in 2018 prior to repaving. (R Wigart)

Figure 74 Elks Club Drive in 2019 after repaving. (A Buxton)

Figure 75 Elks Club Drive in 2021. (C Moore)

Figure 76 Elks Club Drive in 2025 one year after microseal. (C Moore)

* PCI is a numerical index between 0 and 100 used to indicate the general condition of pavement. It requires a manual survey and is widely used by transportation departments to evaluate road condition. PCI was developed by the United States Army Corps of Engineers and surveying and calculation methods were standardized by the American Society for Testing Materials (ASTM). The method is based on a visual survey of the number and types of distresses in the pavement including alligator cracking, block cracking, bumps and sags, corrugations, longitudinal and transverse cracking, patching and utility cut patching, potholes, swelling, weathering, raveling, etc. Assessing PCI on roads is the most widely used and accepted method for determining road surface condition so that condition can be tracked and roads can be prioritized for funding for repaving or resurfacing.

Samples from all water years are analyzed for the same analytes as all other stormwater samples in accordance with RSWMP protocols. In addition to sediment and nutrients, Elks Club runoff samples from WY18 and WY19 also underwent a source apportionment analysis. Samples of asphalt aggregate, asphalt binder, roadside soil (i.e., soil that erodes off the adjacent road shoulder of adjoining land), traction abrasives (i.e., road sand), and vegetation debris collected near the monitoring site were submitted at the beginning of the project and molecular markers were identified for each of these sediment types. Subsequent runoff samples were then analyzed using the molecular markers and a chemical mass balance model to determine what portion of the sediment in each sample originated from each source.

Table 32 shows that there was a statistically significant decrease in the relative contribution of particles from road sources (asphalt aggregate plus binder and traction abrasives), and a significant increase in relative contribution of particles from non-road sources (roadside soil, vegetation debris, and atmospheric deposition) after pavement condition improvement.

Table 32 Results of Elks Club source apportionment analysis. P-values* less than 0.001 indicate highly significant results (highlighted in green). P-values less than 0.05 indicate significant results (highlighted in yellow).

Water Year	Statistic	Source Apportionment Analysis					Sediment Concentrations and Loads			
		Asphalt aggregate + binder (%)	Traction abrasives (%)	Road side soil (%)	Vegetation debris (%)	Atmos-pheric deposition (%)	TSS concen-tration (mg/L)	Normalized TSS load (lbs/acre/in)	FSP concen-tration (mg/L)	Normalized FSP load (lbs/acre/in)
Pre Paving 2018	Mean	45.00	16.60	34.00	3.00	2.70	83.90	6.30	32.50	1.50
	Standard Deviation	6.51	5.26	6.66	0.95	1.25	50.66	7.58	22.12	1.32
	Min	36.00	10.00	24.00	1.50	1.00	17.50	0.25	3.82	0.14
	Median	45.00	17.00	34.00	3.00	3.00	101.30	3.60	37.26	1.83
	Max	56.00	25.00	45.00	4.50	5.00	137.50	22.11	67.58	3.28
Post Paving 2019	Mean	24.90	8.20	42.20	16.50	5.00	22.70	0.60	6.90	0.10
	Standard Deviation	6.10	2.76	6.83	4.33	1.63	15.47	0.82	5.77	0.08
	Min	14.80	3.00	33.00	10.00	2.00	10.00	0.03	0.57	0.01
	Median	26.20	9.00	41.00	16.00	5.00	15.25	0.29	5.10	0.07
	Max	33.70	11.00	55.00	23.00	8.00	57.00	2.47	19.10	0.27
	T-test p-value	**0.000**	**0.004**	**0.023**	**0.000**	**0.003**	**0.018**	**0.050**	**0.013**	**0.026**

*A t-test is a statistical test, resulting in a p-value, that is used to determine if there is a significant difference between the means of two sets of data. If the p-value is less than 0.001, then results are highly significant, meaning that there is only a 0.1% chance that the differences between the two sets of data were by chance. If the p-value is less than 0.05, results are significant, meaning that there is only a 5% chance the differences between the two sets of data were by chance.

Figure 77 shows the percent composition of FSP in stormwater before and after paving. When relative contributions of asphalt aggregate plus binder and traction abrasives decrease, the relative contributions of naturally occurring roadside soil, vegetation debris, and atmospheric deposition increase as these contributions are not changed by improving pavement condition. Assuming that traction abrasive application practices remain fairly consistent from year to year, the decrease in the relative contribution of traction abrasives with improved pavement condition can be reasonably attributed to more efficient sweeping. Street sweeping on a smooth road surface is more effective than on a road surface marred by cracks and potholes allowing more sediment to be recovered. Percent contribution of FSP from each source category in the pre- and post- pave condition describes only how the composition of FSP in stormwater changed, it does not indicate if total sediment loads decreased. However, Table 32 also shows statistically significant decreases in total suspended sediment (TSS) concentration, FSP concentration, normalized TSS load, and normalized FSP load (pounds of sediment per acre per inch of rain).

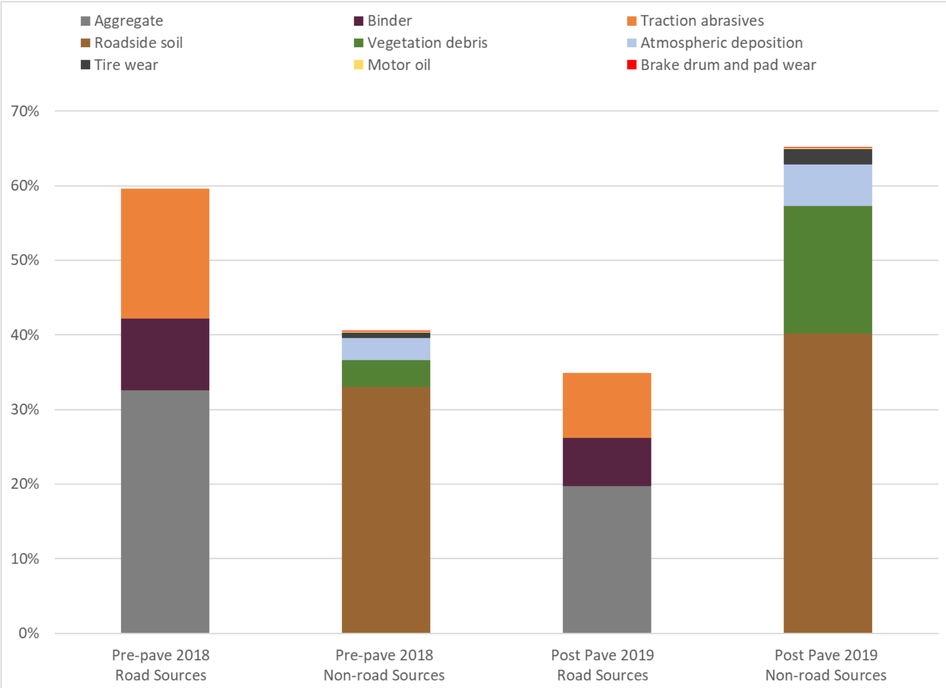

Figure 77 Average annual FSP load attributable to road and non-road sources at Elks Club, WY18 and WY19. 60% and 35% of the FSP in stormwater runoff from Elks Club Drive originated from road sources (asphalt aggregate, asphalt binder, and traction abrasives) in the pre- and post-pave conditions respectively.

Table 33 shows the substantial impact that improving pavement condition on Elk's Club Drive has on water quality in terms of reduced sediment concentrations and loads since repaving until WY24. In WY19, mean annual TSS and FSP concentrations were reduced by 73% and 79% respectively, which resulted in mean annual normalized TSS and FSP load reductions of 90% and 93% respectively. (Normalized load values account for catchment size and remove year to year variability in precipitation frequency, size, intensity, and duration.) In WY20, mean annual TSS and FSP concentrations were reduced by 41% and 50% respectively, which resulted in mean annual normalized TSS and FSP load reductions of 95% and 93% respectively when compared to the pre-restoration condition of WY18. WY20 was a very dry year which may have contributed to higher concentrations but lower loads as compared to the previous post restoration data of WY19. WY21 was an extremely dry year, and TSS and FSP concentrations were reduced by 46% and 33% respectively, which resulted in mean annual normalized TSS and FSP load reductions of 89% and 60% respectively when compared to the pre-paving condition of WY18. WY22 was a wet year and TSS and FSP concentrations were reduced by 63% and 79% respectively, which resulted in mean annual normalized TSS and FSP load reductions of 90% and 87% respectively when compared to the pre-paving condition of WY18. WY23 was a very wet year and TSS and FSP concentrations were reduced by 47% and 54% respectively, which resulted in mean annual normalized TSS and FSP load reductions of 73% and 67% when compared to the pre-paving condition of WY18. WY24 was a median year in terms of precipitation, and TSS and FSP concentrations increased for the first time since repaving occurred. However, normalized loads were still reduced in comparison to the pre-paving condition of WY18. TSS and FSP concentrations increased by 1% and 14% respectively but resulted in mean annual normalized TSS and FSP load reductions of 81% and 67% respectively. WY25 was a wet year, and TSS and FSP concentrations increased over pre-paving conditions for the second year in a row. However, normalized mean annual TSS load was still reduced by 41% and FSP load was equal to the pre-paving condition. Post-paving years WY19-WY23 show a substantial improvement over the pre-paving condition of WY18 with regards to concentration and load reductions for all pollutants. WY24 still shows a substantial decrease in normalized loads despite average annual concentration increases for all pollutants. Likewise, despite average annual concentration increases for all pollutants, WY25 shows decreases in normalized loads for TSS and TP. WY25 normalized FSP loads are equal to and normalized TN load are greater than the pre-paving condition.

Table 33 Mean annual sediment and nutrient concentrations and normalized load reductions for WY19, WY20, WY21, WY22, WY23, WY24, and WY25 compared to WY18. Values highlighted in pink show greater than or equal values to WY18.

Water Year	TSS concen-tration (mg/L)	Normalized TSS load (lbs/acre/in)	FSP concen-tration (mg/L)	Normalized FSP load (lbs/acre/in)	TN concen-tration (ug/L)	Normalized TN load (lbs/acre/in)	TP concen-tration (ug/L)	Normalized TP load (lbs/acre/in)
Pre Paving 2018	84	6.3	33	1.5	723	0.029	258	0.011
Post Paving 2019	23	0.6	7	0.1	417	0.010	85	0.002
Post Paving 2020	49	0.3	16	0.1	553	0.003	227	0.001
Post Paving 2021	46	0.7	22	0.6	524	0.006	169	0.002
Post Paving 2022	31	0.6	7	0.2	520	0.011	159	0.005
Post Paving 2023	44	1.7	15	0.5	388	0.015	187	0.009
Post Paving 2024	85	1.2	37	0.5	1,533	0.017	376	0.003
Post Paving 2025	88	3.7	35	1.5	1,799	0.035	519	0.005
2019 % Reduction	73%	90%	79%	93%	42%	65%	67%	77%
2020 % Reduction	41%	95%	50%	93%	24%	90%	12%	91%
2021 % Reduction	46%	89%	33%	60%	28%	80%	34%	82%
2022 % Reduction	63%	90%	79%	87%	28%	62%	38%	54%
2023 % Reduction	47%	73%	54%	67%	46%	49%	28%	17%
2024 % Reduction	-1%	81%	-14%	67%	-112%	42%	-46%	72%
2025 % Reduction	-5%	41%	-7%	0%	-149%	-20%	-101%	54%

8. Trends Analysis

In accordance with the RSWMP FIG section 2.1, monitoring for trends at urban catchment outfalls is important because it provides information needed for evaluating progress toward TMDL and other regulatory goals. The objective of the trends monitoring is to detect and report the cumulative load reduction benefits of all actions implemented within the catchment over long time frames and ultimately demonstrate a local and regional reduction in pollutant loading to the lake.

Trend analyses are only performed on monitoring sites with at least five years of continuous data. WY25 marked the twelfth year of monitoring at SR431, Pasadena, and Tahoma, the eleventh year of monitoring at Speedboat, Tahoe Valley, and Upper Truckee, the ninth year of monitoring at Lakeshore, the eighth year of monitoring at Elks Club, and the sixth year for Tahoe City. Trend analyses will only be reported for the inflow locations at SR431 (CI and JI) as these results will indicate trends in pollutant loading from the catchment. Trend analyses on the outflow locations (CO and JO) are an indication of how well the vaults are maintained over the years and will be included in the seasonal progress reports submitted to NDOT and available on Tahoe RCD's website.

8.1 SR431 Contech MFS Inflow

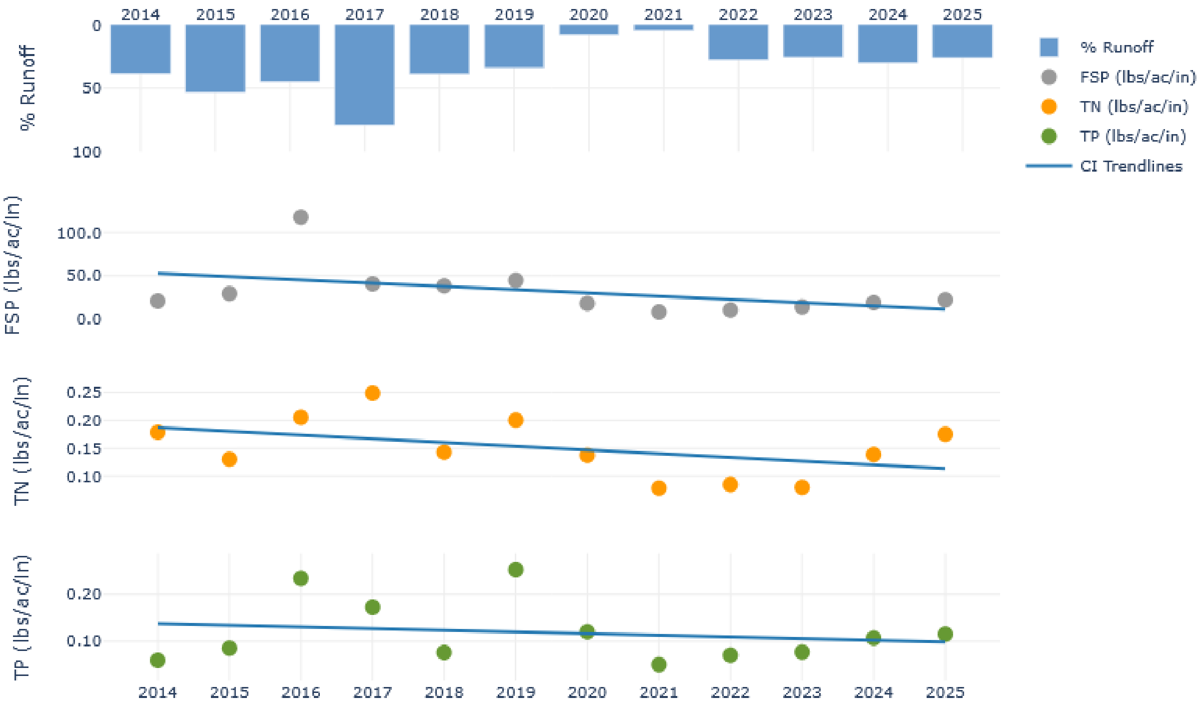

Figure 78 12-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at the Contech MFS Inflow, WY14-25.

- Percent runoff varied between 4.4% in WY21 to 78.9% in WY17. Differences in % runoff between CI and JI are attributed to sediment accumulation in the splitter chamber that caused an unequal division of runoff to each vault.
- There is no significant trend in normalized annual FSP loads ($p>0.05$).
- There is no significant trend in normalized annual TN loads ($p>0.05$).
- There is no significant trend in normalized annual TP loads ($p>0.05$).

Table 34 12-year seasonal and annual rainfall normalized pollutant loads at the Contech MFS Inflow, WY14-25.

Year	% Runoff	FSP (lbs/acre/inch) Fall/ Winter	FSP Spring	FSP Summer	FSP Annual	TN (lbs/acre/inch) Fall/ Winter	TN Spring	TN Summer	TN Annual	TP (lbs/acre/inch) Fall/ Winter	TP Spring	TP Summer	TP Annual
2014	38.6%	8.358	43.467	23.094	20.612	0.065	0.230	0.386	0.179	0.021	0.122	0.079	0.060
2015	53.2%	29.875	41.461	7.517	29.122	0.127	0.164	0.086	0.130	0.097	0.110	0.015	0.086
2016	44.7%	84.812	183.564	0.000	118.153	0.179	0.260	0.000	0.205	0.149	0.399	0.000	0.234
2017	78.9%	19.239	139.993	20.235	40.646	0.178	0.611	0.048	0.248	0.064	0.688	0.035	0.173
2018	39.0%	23.391	51.881	20.808	38.173	0.136	0.116	0.554	0.143	0.083	0.068	0.113	0.076
2019	34.2%	11.578	153.825	8.569	44.624	0.083	0.565	0.227	0.200	0.066	0.866	0.070	0.253
2020	8.0%	9.896	26.907	39.794	17.783	0.040	0.148	0.723	0.138	0.068	0.175	0.288	0.120
2021	4.4%	2.493	22.475	23.756	8.003	0.010	0.130	0.671	0.079	0.016	0.132	0.185	0.051
2022	27.7%	3.203	44.055	10.439	10.133	0.050	0.191	0.184	0.085	0.030	0.267	0.076	0.070
2023	25.7%	2.939	45.010	7.690	13.743	0.025	0.150	0.209	0.080	0.022	0.230	0.054	0.077
2024	30.2%	11.214	36.125	14.671	18.802	0.106	0.148	0.507	0.139	0.072	0.188	0.086	0.107
2025	25.9%	12.339	40.674	31.677	21.994	0.051	0.159	0.677	0.175	0.062	0.179	0.227	0.115
Tau	na	-0.333	-0.273	0.182	-0.273	-0.364	-0.242	0.333	-0.273	-0.212	0.091	0.364	0.000
P-Value	na	0.131	0.217	0.411	0.217	0.100	0.273	0.131	0.217	0.337	0.681	0.100	1.000
Theil Slope (per year)	na	-2.051	-2.087	0.702	-2.095	-0.010	-0.006	0.033	-0.006	-0.003	0.003	0.009	0.000

Figure 79 through Figure 86 show sediment and nutrient loads for the Contech MFS compared to total annual precipitation for WY14 through WY25. This illustrates how loading and precipitation have varied over the monitored period.

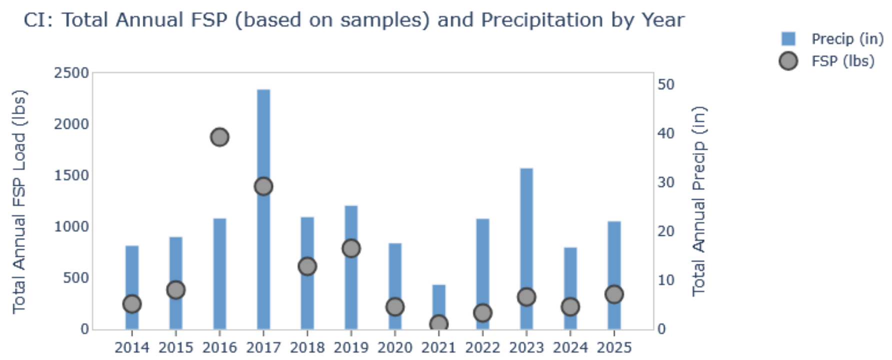

Figure 79 Total annual FSP load (based on samples) and precipitation by year for Contech MFS Inflow WY14-WY25.

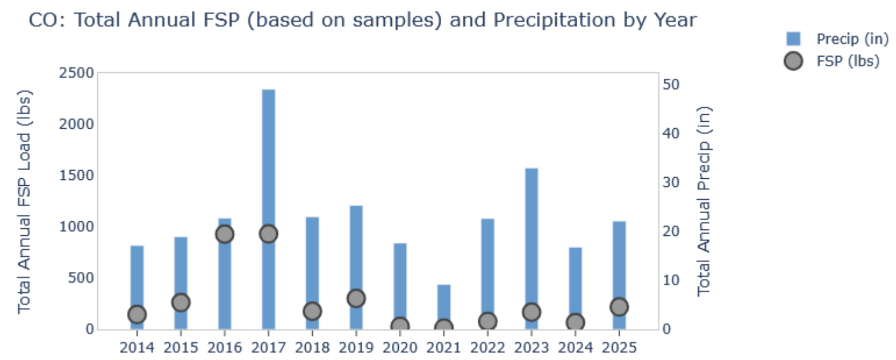

Figure 80 Total annual FSP load (based on samples) and precipitation by year for Contech MFS Outflow WY14-WY25.

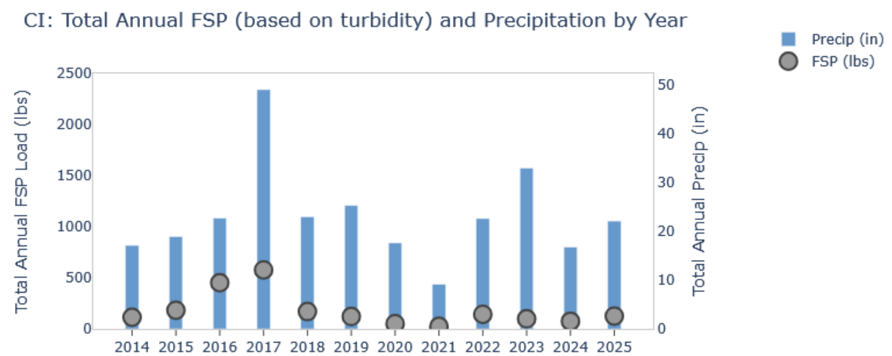

Figure 81 Total annual FSP load (based on continuous turbidity) and precipitation by year for Contech MFS Inflow WY14-WY25.

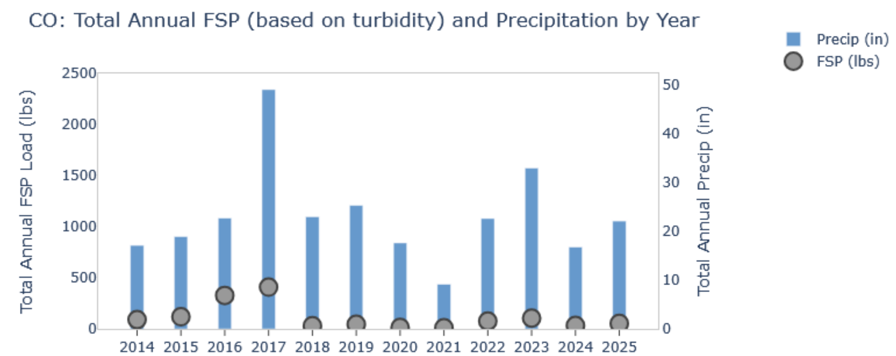

Figure 82 Total annual FSP load (based on continuous turbidity) and precipitation by year for Contech MFS Outflow WY14-WY25.

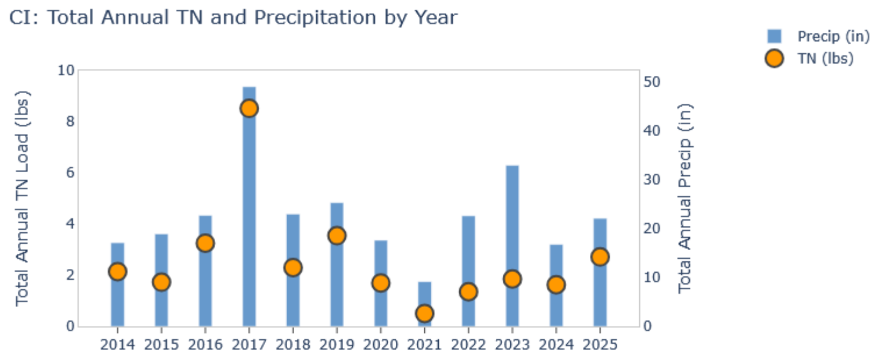

Figure 83 Total annual TN load and precipitation by year for Contech MFS Inflow WY14-WY25.

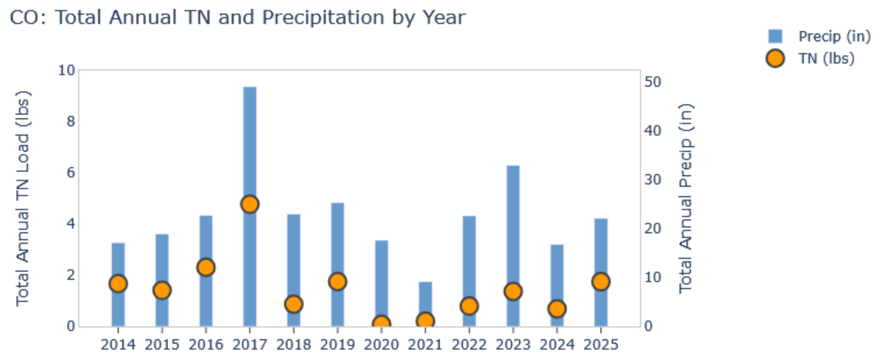

Figure 84 Total annual TN load and precipitation by year for Contech MFS Outflow WY14-WY25.

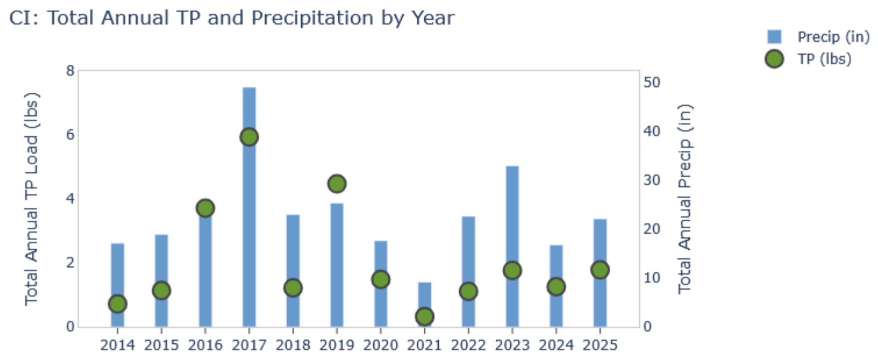

Figure 85 Total annual TP load and precipitation by year for Contech MFS Inflow WY14-WY25.

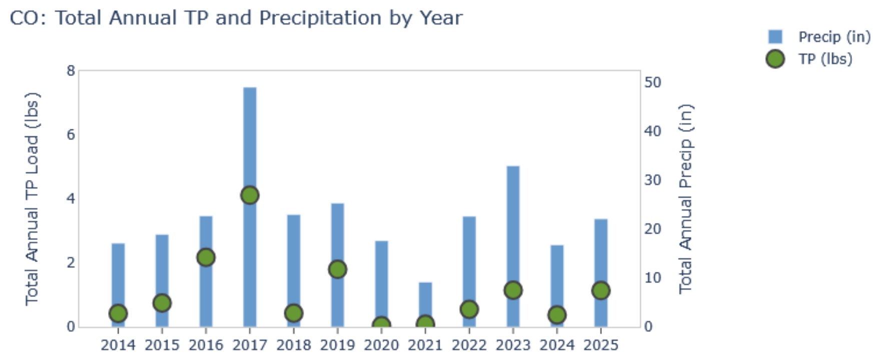

Figure 86 Total annual TP load and precipitation by year for Contech MFS Outflow WY14-WY25.

8.2 SR431 Jellyfish Inflow

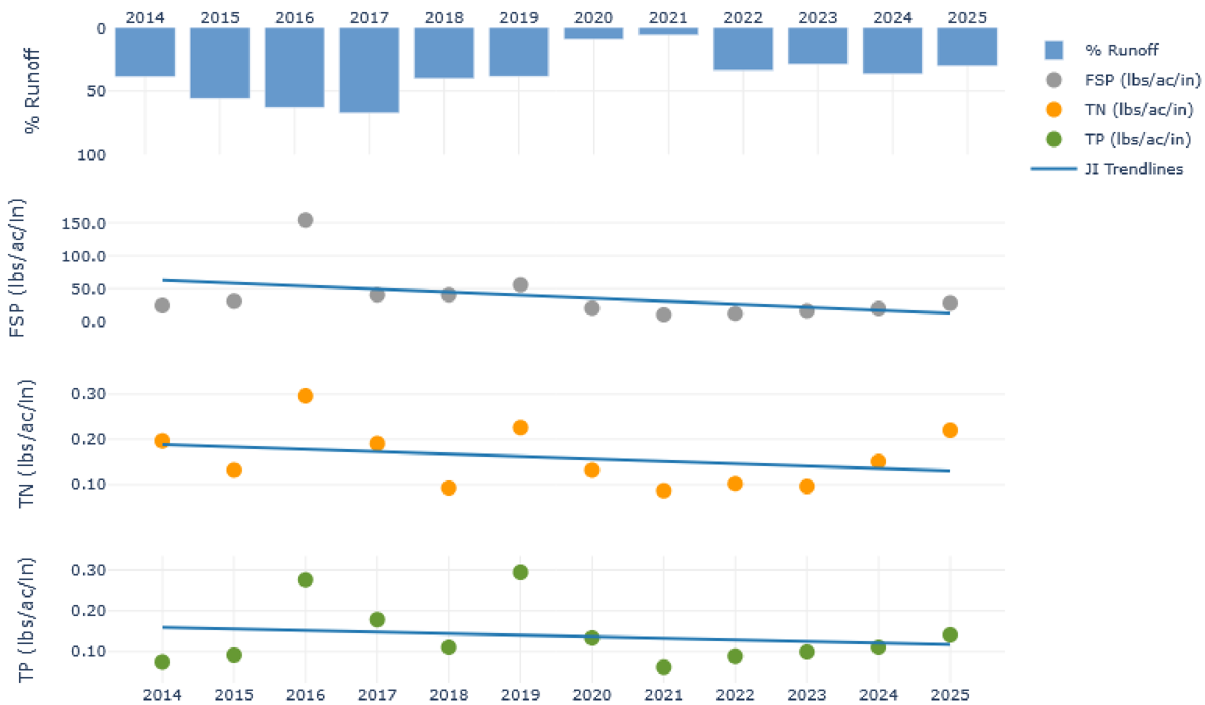

Figure 87 12-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at the Jellyfish Inflow, WY14-25.

- Percent runoff varied between 5.7% in WY21 to 67.2% in WY17. Differences in % runoff between CI and JI are attributed to sediment accumulation in the splitter chamber that caused an unequal division of runoff to each vault.
- There is no significant trend in normalized annual FSP loads (p>0.05).
- There is no significant trend in normalized annual TN loads (p>0.05).
- There is no significant trend in normalized annual TP loads (p>0.05).

Table 35 12-year seasonal and annual rainfall normalized pollutant loads at the Jellyfish Inflow, WY14-25.

Year	% Runoff	FSP (lbs/acre/inch)				TN (lbs/acre/inch)				TP (lbs/acre/inch)			
		Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual
2014	38.6%	13.733	51.563	18.989	24.558	0.060	0.313	0.384	0.197	0.033	0.160	0.075	0.075
2015	55.5%	30.438	46.614	8.065	31.038	0.116	0.174	0.109	0.132	0.095	0.133	0.017	0.092
2016	62.9%	117.285	228.200	0.000	154.437	0.214	0.457	0.000	0.296	0.223	0.385	0.000	0.276
2017	67.2%	19.818	137.664	15.455	40.456	0.096	0.643	0.061	0.191	0.065	0.714	0.033	0.179
2018	40.2%	20.067	59.455	18.262	40.577	0.072	0.076	0.526	0.093	0.070	0.146	0.105	0.111
2019	38.3%	12.118	199.427	9.225	55.670	0.090	0.649	0.263	0.227	0.059	1.068	0.071	0.294
2020	9.1%	7.699	43.672	29.192	20.335	0.034	0.172	0.630	0.132	0.057	0.263	0.221	0.134
2021	5.7%	2.562	32.779	26.575	10.351	0.011	0.166	0.672	0.087	0.016	0.183	0.197	0.062
2022	33.7%	3.405	54.860	11.002	11.978	0.060	0.253	0.189	0.102	0.039	0.331	0.094	0.089
2023	28.8%	3.350	54.324	8.714	16.387	0.033	0.181	0.235	0.096	0.028	0.300	0.069	0.100
2024	36.4%	9.552	41.981	16.938	19.578	0.094	0.203	0.582	0.152	0.061	0.223	0.097	0.111
2025	30.2%	20.110	48.042	30.813	28.303	0.075	0.205	0.802	0.220	0.092	0.213	0.223	0.141
Tau	na	-0.364	-0.303	0.242	-0.273	-0.303	-0.061	0.424	-0.152	-0.212	0.061	0.424	0.030
P-Value	na	0.100	0.170	0.273	0.217	0.170	0.784	0.055	0.493	0.337	0.784	0.055	0.891
Theil Slope (per year)	na	-1.950	-1.952	1.067	-1.663	-0.004	-0.003	0.040	-0.005	-0.003	0.005	0.010	0.001

Figure 88 through Figure 95 show sediment and nutrient loads for the Jellyfish compared to total annual precipitation for WY14 through WY25. This illustrates how loading and precipitation have varied over the monitored period.

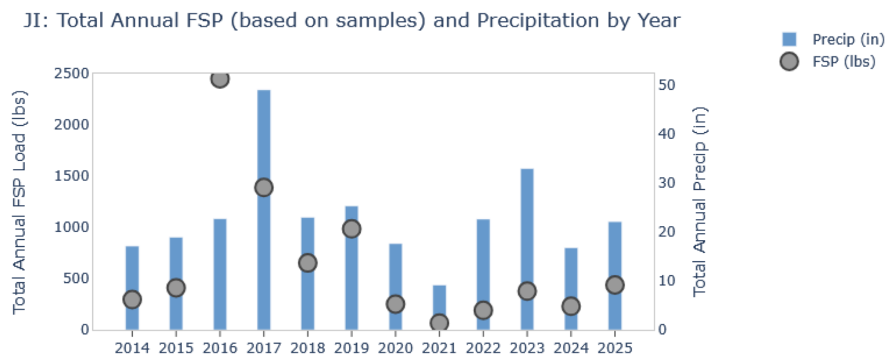

Figure 88 Total annual FSP load (based on samples) and precipitation by year for Jellyfish Inflow WY14-WY25.

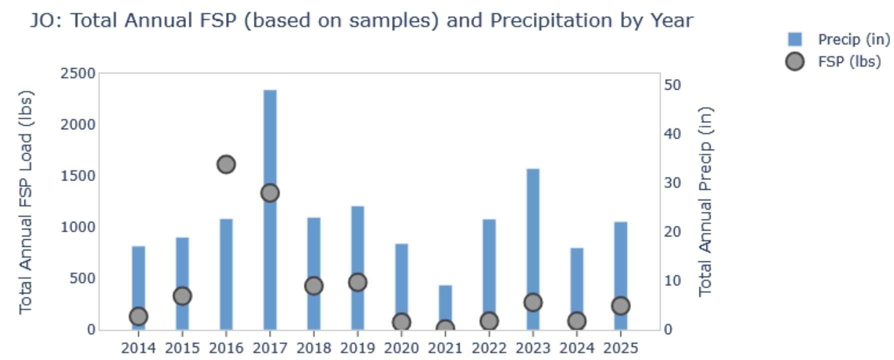

Figure 89 Total annual FSP load (based on samples) and precipitation by year for Jellyfish Outflow WY14-WY25.

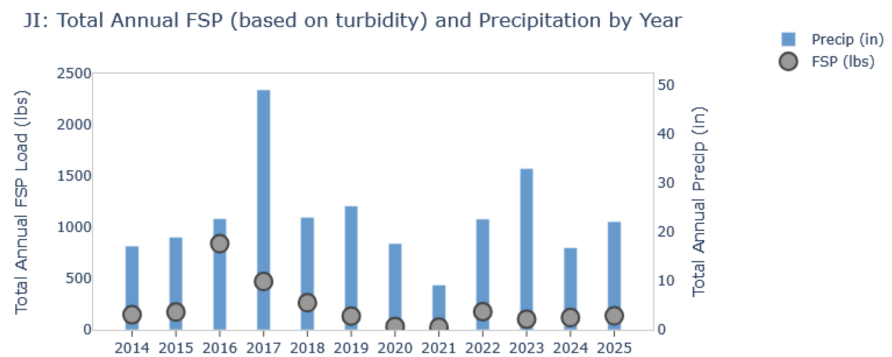

Figure 90 Total annual FSP load (based on continuous turbidity) and precipitation by year for Jellyfish Inflow WY14-WY25.

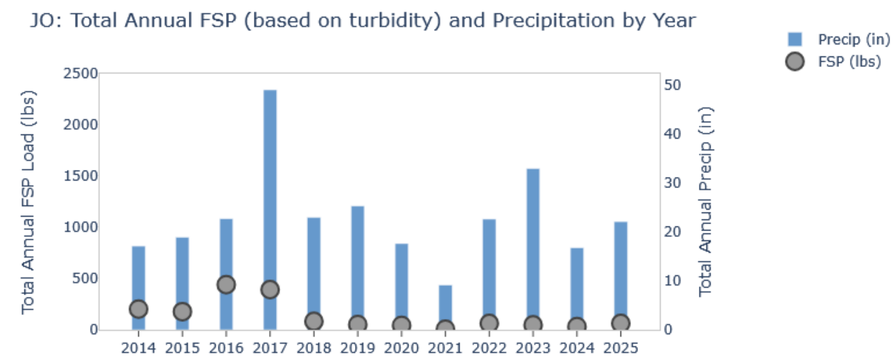

Figure 91 Total annual FSP load (based on continuous turbidity) and precipitation by year for Jellyfish Outflow WY14-WY25.

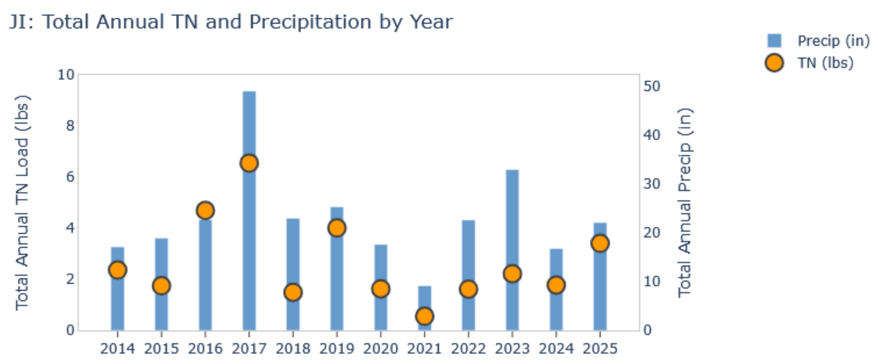

Figure 92 Total annual TN load and precipitation by year for Jellyfish Inflow WY14-WY25.

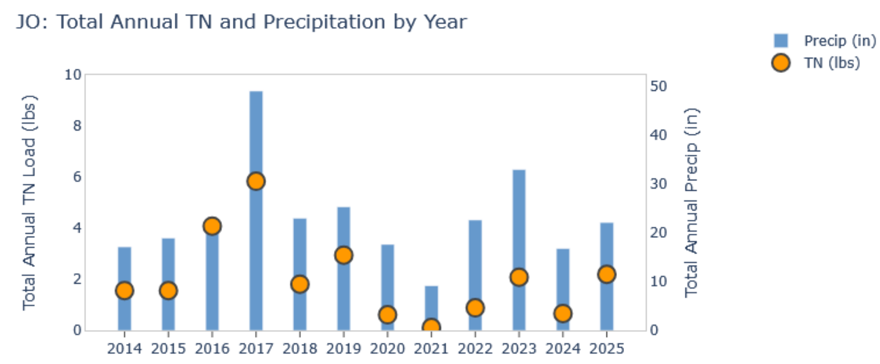

Figure 93 Total annual TN load and precipitation by year for Jellyfish Outflow WY14-WY25.

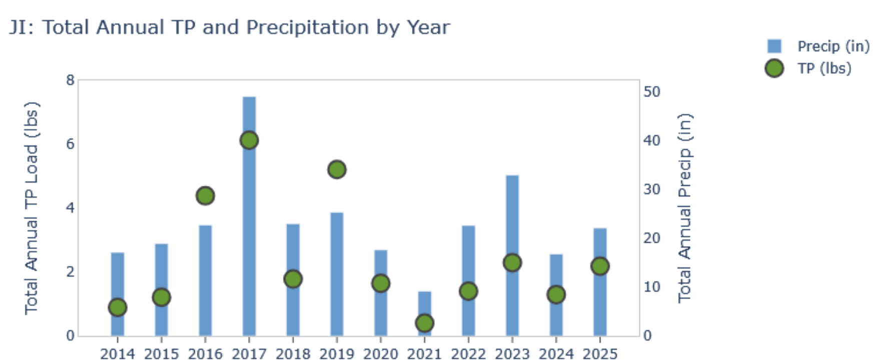

Figure 94 Total annual TP load and precipitation by year for Jellyfish Inflow WY14-WY25.

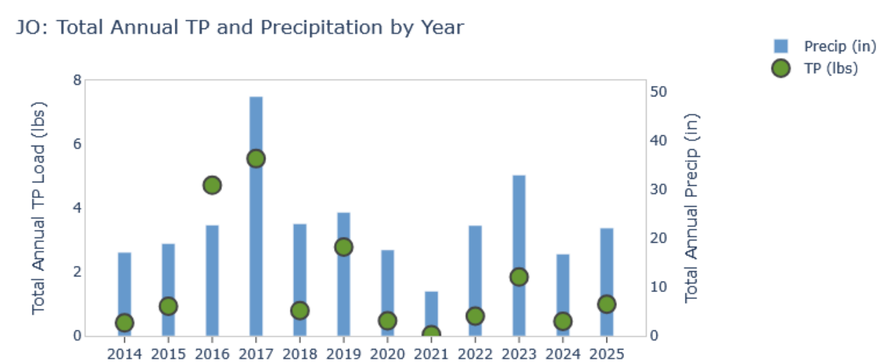

Figure 95 Total annual TP load and precipitation by year for Jellyfish Outflow WY14-WY25.

8.3 Elks Club

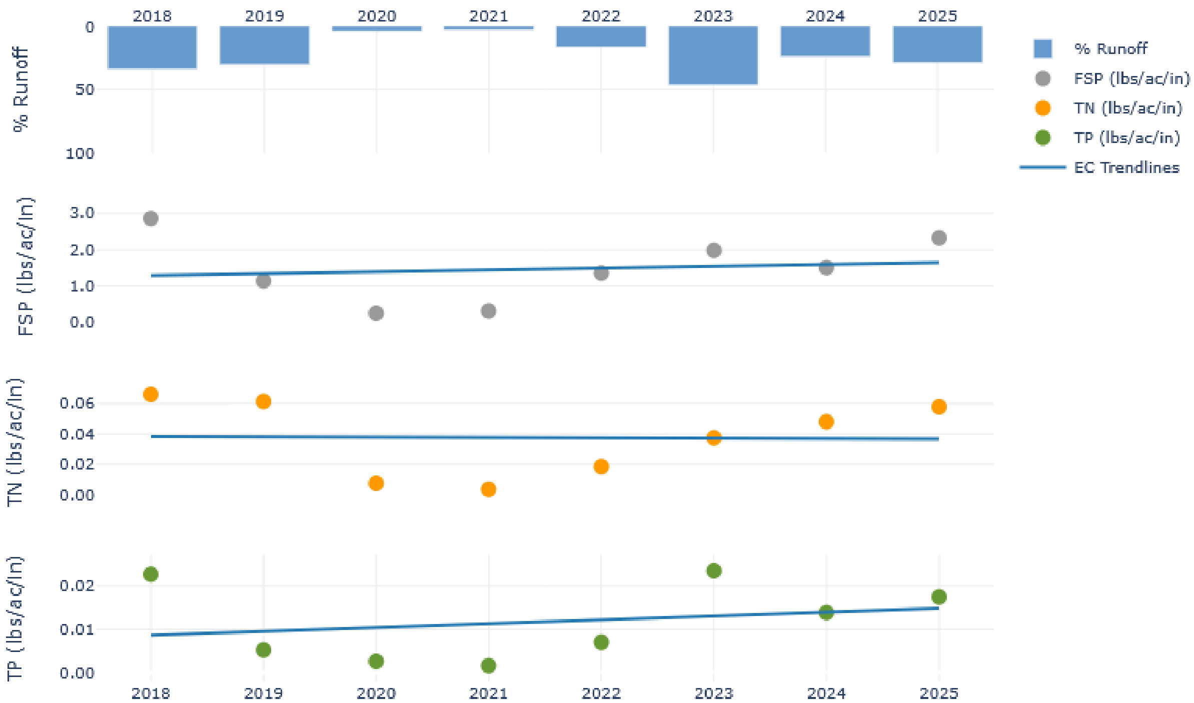

Figure 96 8-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at Elks Club, WY18-25.

- Percent runoff varied between 2.81% in WY21 to 46.12% in WY23.
- There is no significant trend in normalized annual FSP loads (p>0.05).
- There is no significant trend in normalized annual TN loads (p>0.05).
- There is no significant trend in normalized annual TP loads (p>0.05). However, there is a significant increasing trend in the normalized summer TP load (p=0.032 and Tau= 0.618.)

Table 36 8-year seasonal and annual rainfall normalized pollutant loads at Elks Club, WY18-25.

		FSP (lbs/acre/inch)				TN (lbs/acre/inch)				TP (lbs/acre/inch)			
Year	% Runoff	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual
2018	33.8%	0.347	5.367	0.000	2.860	0.037	0.095	0.000	0.066	0.007	0.038	0.000	0.023
2019	30.3%	0.102	1.893	12.354	1.138	0.008	0.051	0.960	0.061	0.002	0.012	0.012	0.005
2020	3.8%	0.190	0.033	1.762	0.248	0.009	0.001	0.034	0.007	0.003	0.001	0.013	0.003
2021	2.8%	0.004	1.352	0.000	0.307	0.001	0.014	0.000	0.004	0.000	0.007	0.000	0.002
2022	16.3%	0.144	7.760	0.251	1.361	0.009	0.050	0.043	0.019	0.004	0.019	0.011	0.007
2023	46.1%	0.818	1.555	11.046	1.978	0.011	0.065	0.159	0.038	0.005	0.051	0.084	0.024
2024	23.9%	0.119	1.823	11.745	1.504	0.004	0.037	0.429	0.048	0.001	0.017	0.107	0.014
2025	28.7%	0.937	1.069	15.124	2.323	0.019	0.036	0.385	0.058	0.009	0.005	0.106	0.018
Tau	na	0.214	-0.214	0.473	0.286	0.071	-0.214	0.400	0.000	0.143	-0.071	0.618	0.214
P-Value	na	0.458	0.458	0.101	0.322	0.805	0.458	0.166	1.000	0.621	0.805	0.032	0.458
Theil Slope (per year)	na	0.049	-0.111	1.998	0.123	0.000	-0.003	0.043	0.002	0.001	-0.001	0.016	0.002

Figure 97 through Figure 100 show sediment and nutrient loads for Elks Club compared to total annual precipitation for WY18-WY25. This illustrates how loading and precipitation have varied over the monitored period.

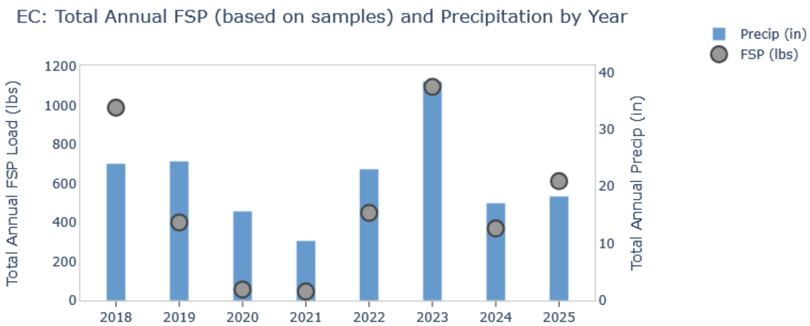

Figure 97	Total annual FSP load (based on samples) and precipitation by year for Elks Club WY18-WY25.

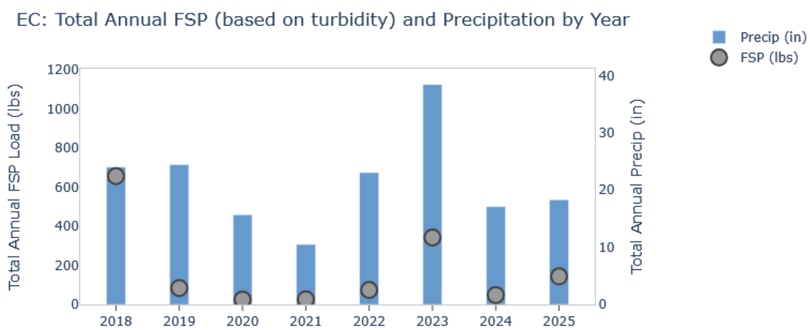

Figure 98	Total annual FSP load (based on continuous turbidity) and precipitation by year for Elks Club WY18-WY25.

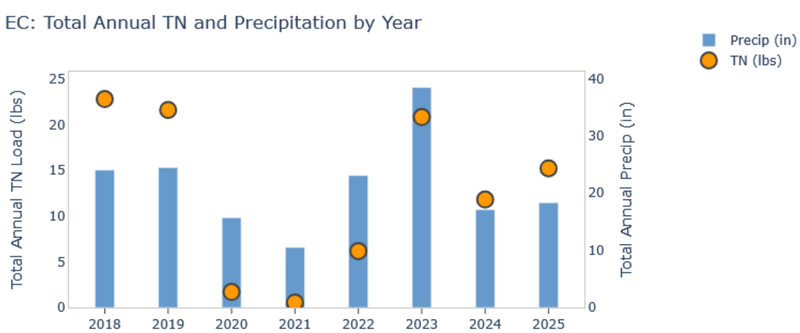

Figure 99	Total annual TN load and precipitation by year for Elks Club WY18-WY25.

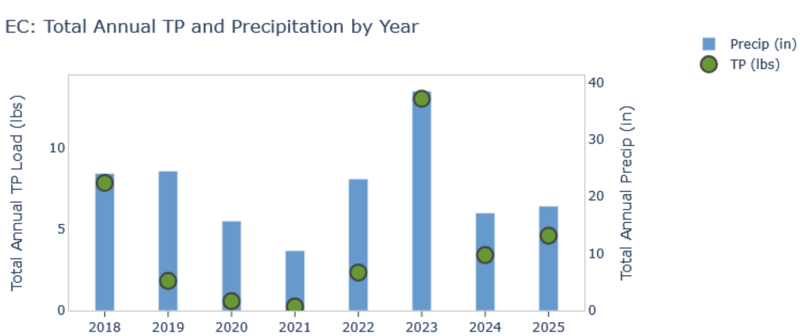

Figure 100	Total annual TP load and precipitation by year for Elks Club WY18-WY25.

8.4 Lakeshore

Figure 101 9-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at Lakeshore, WY17-25.

- Percent runoff was less than 4% in all monitored water years but varied between 0.0% in WY20 and WY24 to 3.6% in WY17.
- There is no significant trend in normalized annual FSP loads (p>0.05). However, there is a significant decreasing trend in the normalized spring FSP load (p=0.050 and Tau= -0.523.)
- There is no significant trend in normalized annual TN loads (p>0.05). However, there is a significant decreasing trend in the normalized fall/winter TN load (p=0.045 and Tau= -0.535.)
- There is no significant trend in normalized annual TP loads (p>0.05).

Table 37 9-year seasonal and annual rainfall normalized pollutant loads at Lakeshore, WY17-25.

Year	% Runoff	FSP (lbs/acre/inch) Fall/ Winter	FSP Spring	FSP Summer	FSP Annual	TN (lbs/acre/inch) Fall/ Winter	TN Spring	TN Summer	TN Annual	TP (lbs/acre/inch) Fall/ Winter	TP Spring	TP Summer	TP Annual
2017	3.6%	0.173	0.211	0.000	0.174	0.004	0.006	0.000	0.004	0.001	0.002	0.000	0.001
2018	1.3%	0.037	0.053	0.000	0.045	0.003	0.001	0.000	0.002	0.001	0.001	0.000	0.001
2019	1.0%	0.024	0.005	0.030	0.020	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000
2020	0.0%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2021	0.01%	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2022	0.2%	0.007	0.000	0.000	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2023	2.5%	0.060	0.056	0.020	0.054	0.001	0.013	0.001	0.004	0.000	0.003	0.000	0.001
2024	0.0%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2025	0.1%	0.001	0.000	15.959	1.167	0.000	0.000	0.053	0.004	0.000	0.000	0.072	0.005
Tau	na	-0.366	-0.523	0.327	-0.085	-0.535	-0.458	0.327	-0.197	-0.423	-0.458	0.400	-0.085
P-Value	na	0.169	0.050	0.219	0.751	0.045	0.086	0.219	0.459	0.113	0.086	0.133	0.751
Theil Slope (per year)	na	-0.005	-0.002	0.000	-0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Figure 102 through Figure 105 show sediment and nutrient loads for Lakeshore compared to total annual precipitation for WY17-WY25. This illustrates how loading and precipitation have varied over the monitored period.

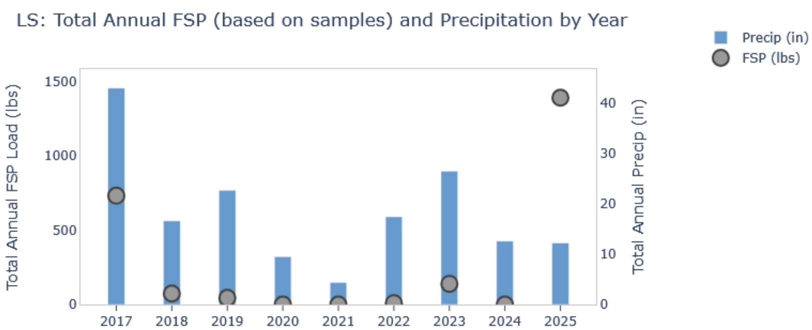

Figure 102 Total annual FSP load (based on samples) and precipitation by year for Lakeshore WY17-WY25.

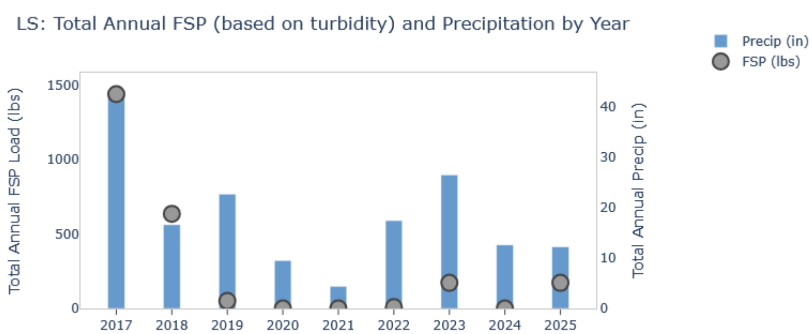

Figure 103 Total annual FSP load (based on continuous turbidity) and precipitation by year for Lakeshore WY17-WY25.

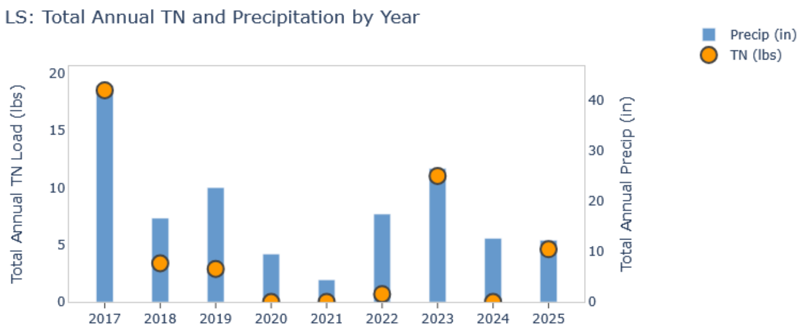

Figure 104 Total annual TN load and precipitation by year for Lakeshore WY17-WY25.

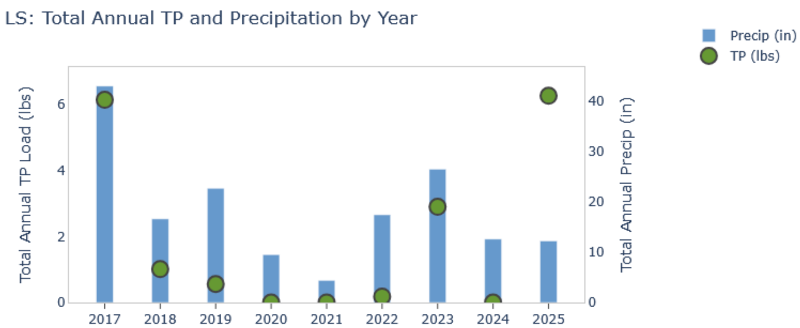

Figure 105 Total annual TP load and precipitation by year for Lakeshore WY17-WY25.

8.5 Pasadena

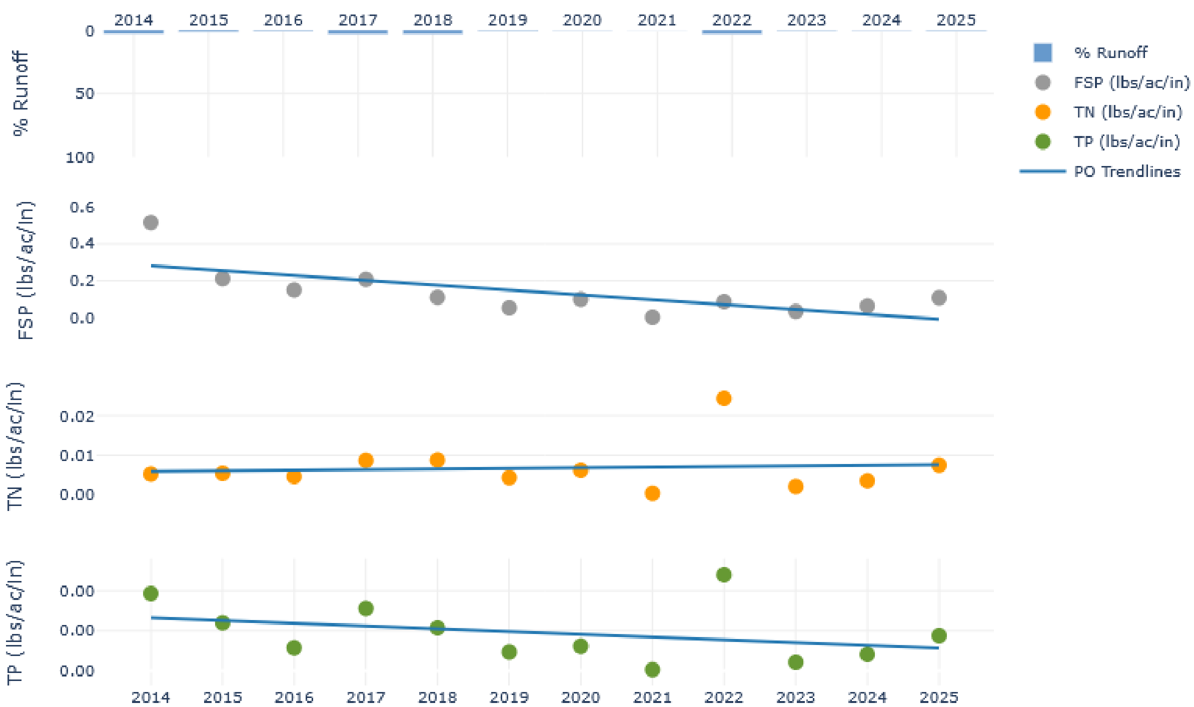

Figure 106 12-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at the Pasadena Outflow, WY14-25.

- Percent runoff was less than 4% in all monitored water years but varied between 0.05% in WY21 to 3.2% in WY17 and WY22.
- There is a significant decreasing trend in normalized annual FSP loads (p=.009 and Tau= -0.576) and normalized fall/winter FSP loads (p=0.020 and Tau=-0.515).
- There is no significant trend in normalized annual TN loads (p>0.05).
- There is no significant trend in normalized annual TP loads (p>0.05).

Table 38 12-year seasonal and annual rainfall normalized pollutant loads at the Pasadena Outflow, WY14-25

		FSP (lbs/acre/inch)				TN (lbs/acre/inch)				TP (lbs/acre/inch)			
Year	% Runoff	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual
2014	2.8%	0.453	0.000	1.042	0.517	0.006	0.000	0.009	0.005	0.004	0.000	0.007	0.004
2015	1.4%	0.166	0.038	0.495	0.212	0.004	0.001	0.013	0.005	0.002	0.000	0.006	0.002
2016	0.8%	0.129	0.178	0.000	0.150	0.006	0.002	0.000	0.005	0.001	0.001	0.000	0.001
2017	3.2%	0.213	0.137	0.307	0.207	0.009	0.003	0.020	0.009	0.003	0.001	0.004	0.003
2018	3.1%	0.140	0.082	0.090	0.110	0.014	0.003	0.012	0.009	0.003	0.001	0.002	0.002
2019	1.0%	0.074	0.003	0.039	0.053	0.006	0.001	0.005	0.004	0.001	0.000	0.000	0.001
2020	0.2%	0.001	0.000	1.240	0.100	0.000	0.000	0.077	0.006	0.000	0.000	0.015	0.001
2021	0.05%	0.003	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2022	3.2%	0.100	0.036	0.000	0.086	0.030	0.002	0.000	0.024	0.006	0.000	0.000	0.005
2023	0.5%	0.021	0.047	0.075	0.033	0.001	0.002	0.008	0.002	0.000	0.000	0.002	0.000
2024	0.3%	0.020	0.116	0.189	0.063	0.001	0.005	0.016	0.004	0.000	0.001	0.003	0.001
2025	1.0%	0.090	0.000	0.439	0.108	0.007	0.000	0.026	0.008	0.002	0.000	0.005	0.002
Tau	na	-0.515	-0.127	-0.107	-0.576	0.000	0.000	0.137	-0.061	-0.212	-0.032	-0.107	-0.333
P-Value	na	0.020	0.565	0.629	0.009	1.000	1.000	0.534	0.784	0.337	0.886	0.629	0.131
Theil Slope (per year)	na	-0.019	0.000	-0.015	-0.019	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000

Figure 107 through Figure 110 show sediment and nutrient loads for Pasadena compared to total annual precipitation for WY14-WY25. This illustrates how loading and precipitation have varied over the monitored period.

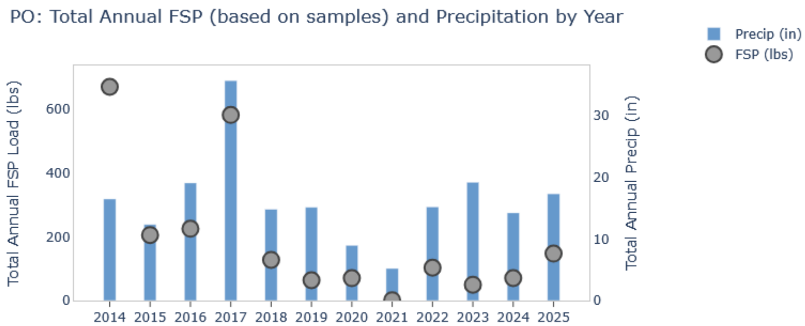

Figure 107 Total annual FSP load (based on samples) and precipitation by year for Pasadena WY14-WY25.

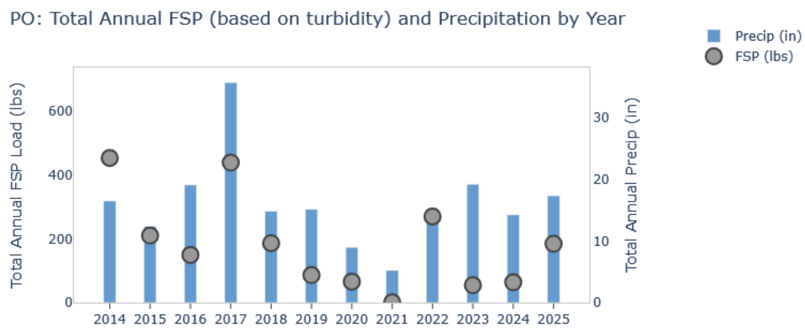

Figure 108 Total annual FSP load (based on continuous turbidity) and precipitation by year for Pasadena WY14-WY25.

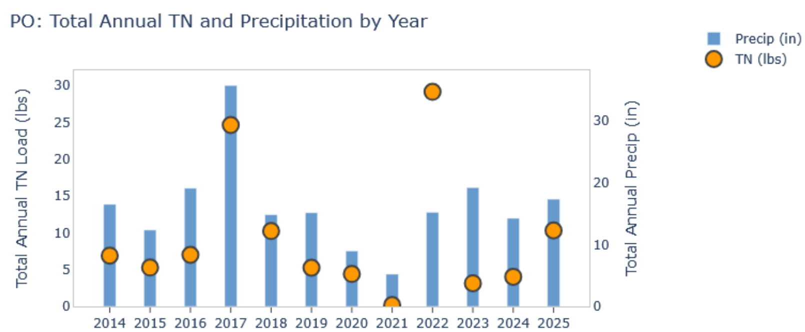

Figure 109 Total annual TN load and precipitation by year for Pasadena WY14-WY25.

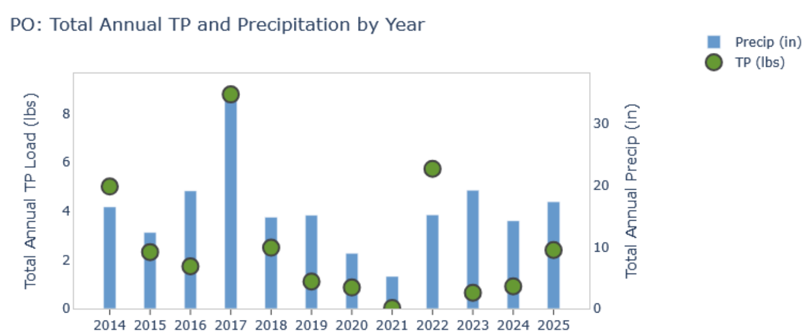

Figure 110 Total annual TP load and precipitation by year for Pasadena WY14-WY25.

8.6 Speedboat

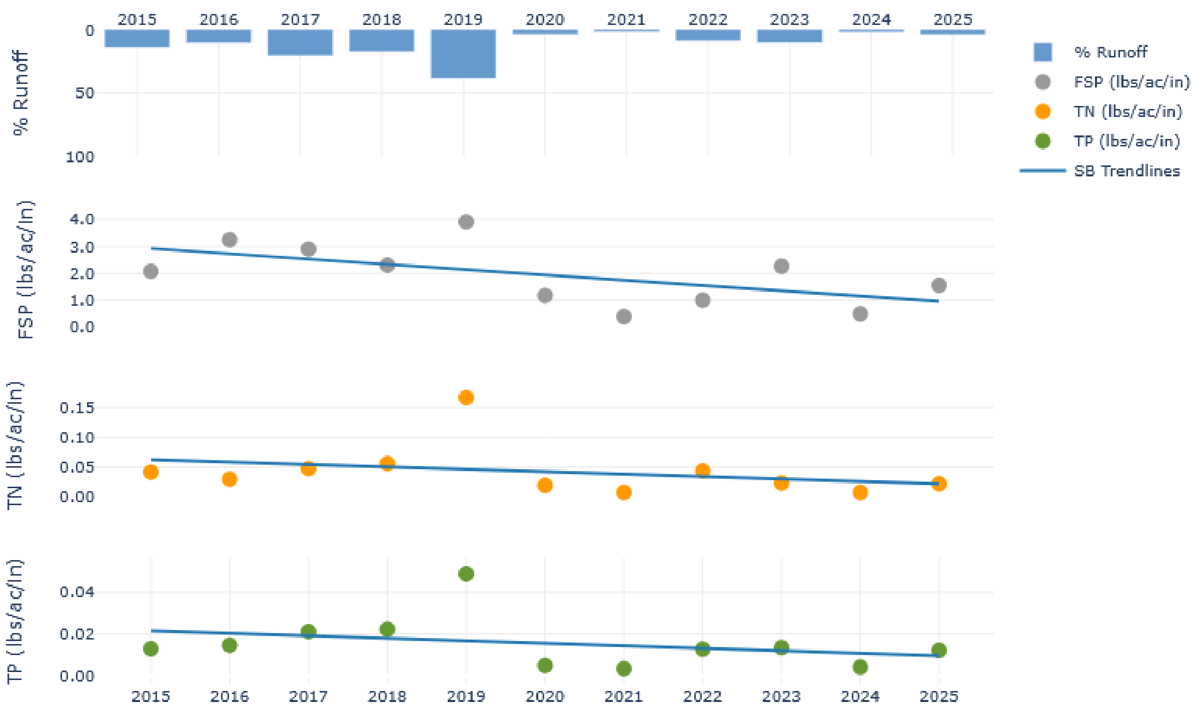

Figure 111 11-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at Speedboat, WY15-25.

- Percent runoff varied between 1.8% in WY21 to 38.4% in WY19.
- There is no significant trend in normalized annual FSP loads (p>0.05).
- There is no significant trend in normalized annual TN loads (p>0.05).
- There is no significant trend in normalized annual TP loads (p>0.05).

Table 39 11-year seasonal and annual rainfall normalized pollutant loads at Speedboat, WY15-25.

Year	% Runoff	FSP (lbs/acre/inch)				TN (lbs/acre/inch)				TP (lbs/acre/inch)			
		Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual
2015	13.8%	2.342	2.125	1.110	2.071	0.039	0.037	0.060	0.042	0.015	0.010	0.008	0.013
2016	10.6%	2.532	4.798	0.317	3.247	0.031	0.028	0.035	0.030	0.014	0.015	0.007	0.014
2017	20.7%	2.379	6.468	0.270	2.909	0.037	0.113	0.021	0.048	0.017	0.049	0.004	0.021
2018	17.3%	1.171	3.236	0.000	2.303	0.081	0.037	0.000	0.056	0.017	0.027	0.000	0.022
2019	38.4%	1.262	7.682	14.491	3.925	0.191	0.107	0.158	0.166	0.045	0.054	0.069	0.049
2020	3.7%	0.514	0.249	14.011	1.176	0.010	0.002	0.233	0.020	0.005	0.002	0.023	0.005
2021	1.8%	0.446	0.156	0.046	0.391	0.009	0.002	0.003	0.008	0.004	0.001	0.001	0.003
2022	8.7%	0.765	1.319	2.509	1.005	0.045	0.016	0.076	0.044	0.011	0.009	0.031	0.013
2023	10.2%	1.893	2.657	3.732	2.262	0.017	0.028	0.057	0.024	0.013	0.011	0.026	0.013
2024	2.2%	0.387	0.701	0.313	0.490	0.007	0.007	0.013	0.008	0.004	0.004	0.004	0.004
2025	3.8%	1.515	0.360	4.659	1.551	0.017	0.003	0.114	0.022	0.011	0.003	0.045	0.012
Tau	na	-0.418	-0.345	0.127	-0.382	-0.309	-0.382	0.055	-0.345	-0.382	-0.309	0.164	-0.273
P-Value	na	0.073	0.139	0.586	0.102	0.186	0.102	0.815	0.139	0.102	0.186	0.484	0.243
Theil Slope (per year)	na	-0.153	-0.341	0.089	-0.179	-0.003	-0.004	0.002	-0.003	-0.001	-0.002	0.002	-0.001

Figure 112 through Figure 115 show sediment and nutrient loads for Speedboat compared to total annual precipitation for WY15-WY25. This illustrates how loading and precipitation have varied over the monitored period.

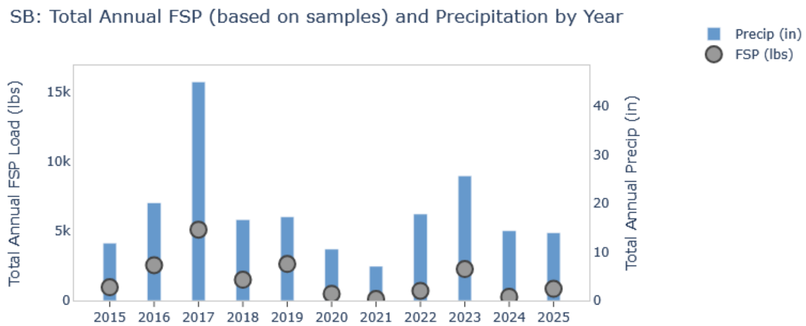

Figure 112 Total annual FSP load (based on samples) and precipitation by year for Speedboat WY15-WY25.

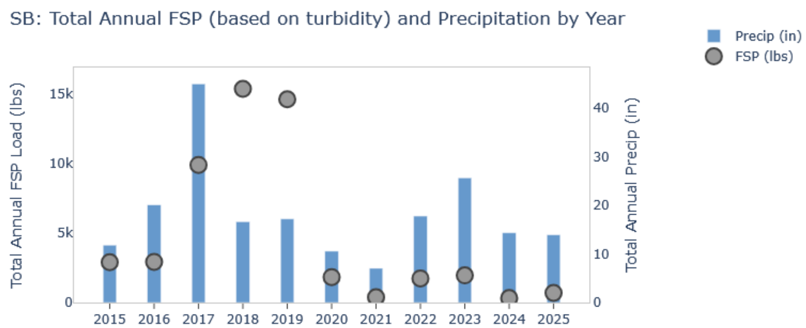

Figure 113 Total annual FSP load (based on continuous turbidity) and precipitation by year for Speedboat WY15-WY25.

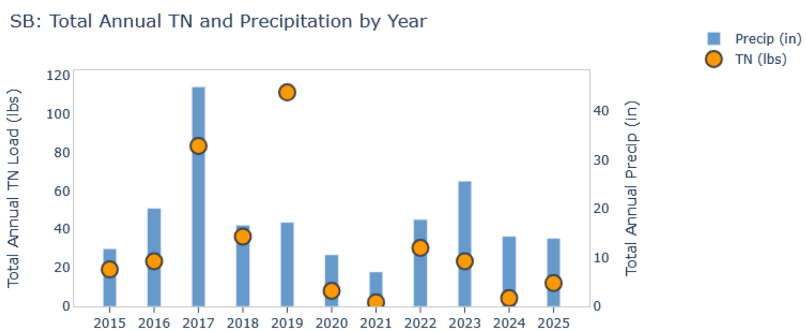

Figure 114 Total annual TN load and precipitation by year for Speedboat WY15-WY25.

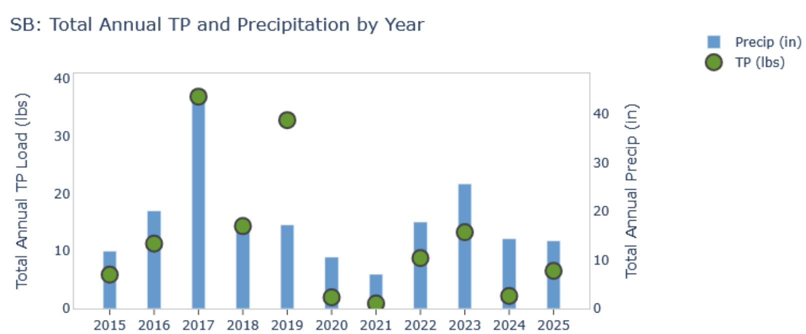

Figure 115 Total annual TP load and precipitation by year for Speedboat WY15-WY25.

8.7 Tahoe City

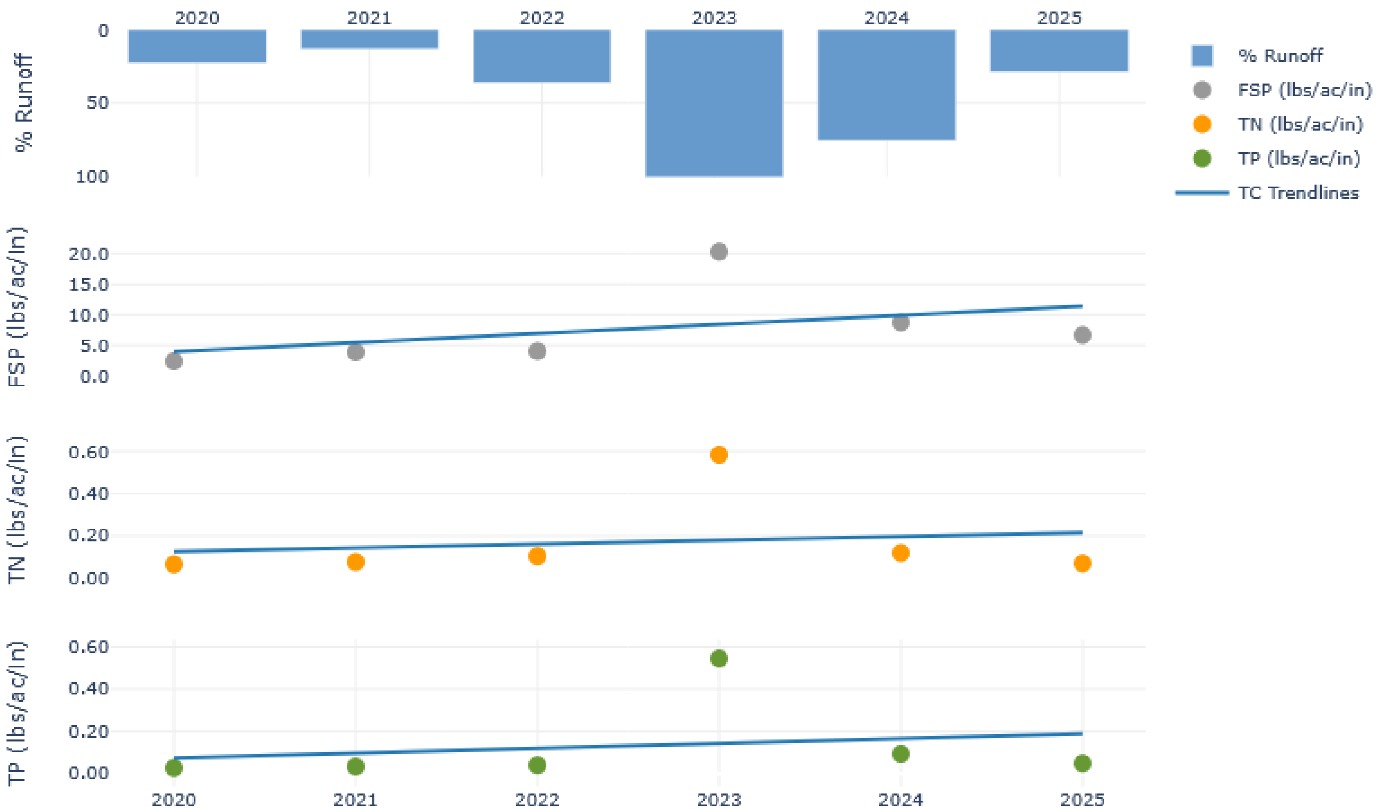

Figure 116 6-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at Tahoe City, WY20-25.

- Percent runoff varied between 13.2% in WY21 to 75.6% in WY24. Percent runoff of 371.2% in WY23 was likely due to runoff from neighboring catchments entering the TC catchment because snow and ice blocked drop inlets in the neighboring catchments.
- There is no significant trend in normalized annual FSP loads ($p>0.05$).
- There is no significant trend in normalized annual TN loads ($p>0.05$).
- There is no significant trend in normalized annual TP loads ($p>0.05$).

Table 40 6-year seasonal and annual rainfall normalized pollutant loads at Tahoe City, WY20-25. Runoff greater than 100% in WY23 is likely due to runoff from neighboring catchments entering the Tahoe City catchment because snow and ice blocked drop inlets in neighboring catchments.

		FSP (lbs/acre/inch)				TN (lbs/acre/inch)				TP (lbs/acre/inch)			
Year	% Runoff	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual
2020	22.6%	3.416	1.086	0.000	2.429	0.088	0.033	0.000	0.065	0.039	0.012	0.000	0.028
2021	13.2%	2.697	10.328	11.840	3.897	0.051	0.153	0.373	0.076	0.024	0.073	0.098	0.032
2022	36.2%	2.128	13.404	1.335	4.036	0.075	0.178	0.224	0.103	0.025	0.109	0.031	0.040
2023	371.2%	6.107	72.457	9.990	20.330	0.127	2.216	0.336	0.583	0.062	2.352	0.113	0.545
2024	75.6%	5.435	15.367	9.770	8.756	0.049	0.232	0.382	0.119	0.044	0.196	0.082	0.094
2025	28.6%	7.451	4.547	5.412	6.709	0.064	0.054	0.151	0.069	0.055	0.027	0.050	0.049
Tau	na	0.467	0.333	0.067	0.600	-0.200	0.333	0.200	0.333	0.467	0.333	0.200	0.600
P-Value	na	0.188	0.348	0.851	0.091	0.573	0.348	0.573	0.348	0.188	0.348	0.573	0.091
Theil Slope (per year)	na	0.898	1.677	0.668	0.891	-0.004	0.026	0.030	0.011	0.007	0.041	0.008	0.006

Figure 117 through Figure 121 show sediment and nutrient loads for Tahoe City compared to total annual precipitation for WY20-WY25. This illustrates how loading and precipitation have varied over the monitored period.

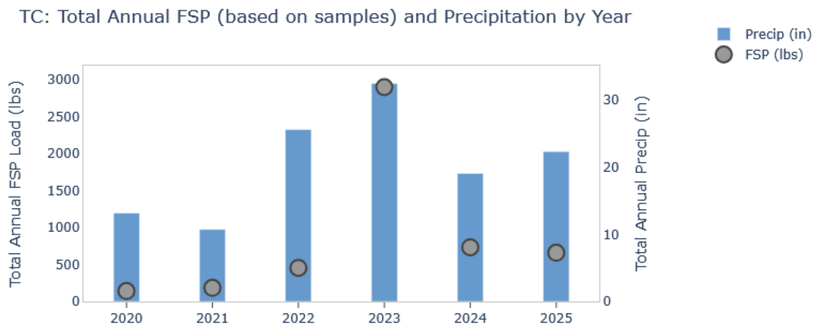

Figure 117 Total annual FSP load (based on samples) and precipitation by year for Tahoe City WY20-WY25.

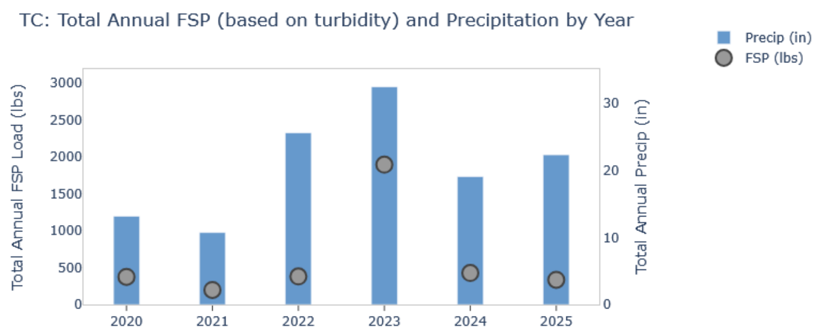

Figure 118 Total annual FSP load (based on continuous turbidity) and precipitation by year for Tahoe City WY20-WY25.

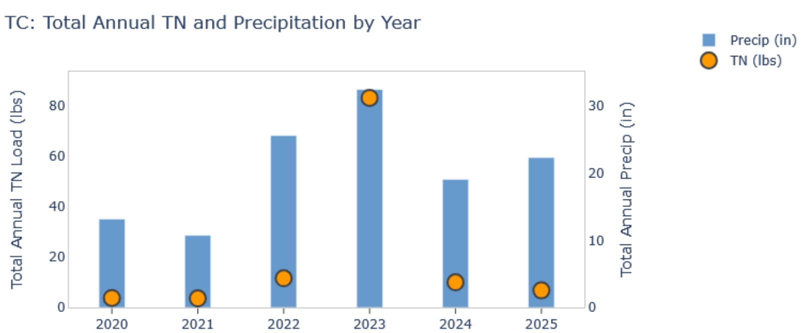

Figure 119 Total annual TN load and precipitation by year for Tahoe City WY20-WY25.

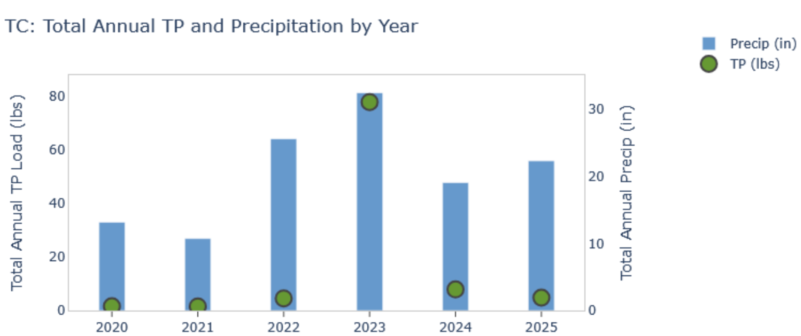

Figure 120 Total annual TP load and precipitation by year for Tahoe City WY20-WY25.

8.8 Tahoe Valley

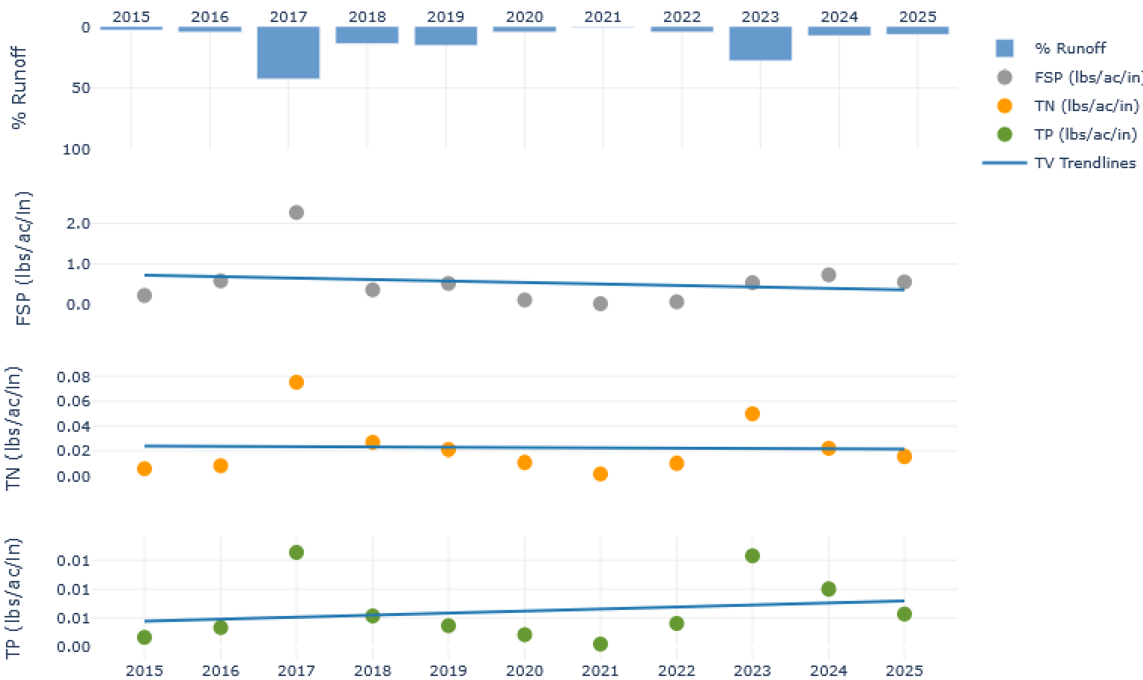

Figure 121 11-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at Tahoe Valley, WY15-25.

- Percent runoff varied between 0.4% in WY21 to 42.6% in WY17.
- There is no significant trend in normalized annual FSP loads (p>0.05).
- There is no significant trend in normalized annual TN loads (p>0.05).
- There is no significant trend in normalized annual TP loads (p>0.05).

Table 41 11-year seasonal and annual rainfall normalized pollutant loads at Tahoe Valley, WY15-25.

Year	% Runoff	FSP (lbs/acre/inch) Fall/ Winter	FSP Spring	FSP Summer	FSP Annual	TN (lbs/acre/inch) Fall/ Winter	TN Spring	TN Summer	TN Annual	TP (lbs/acre/inch) Fall/ Winter	TP Spring	TP Summer	TP Annual
2015	2.7%	0.320	0.001	0.194	0.230	0.008	0.003	0.004	0.006	0.002	0.001	0.001	0.002
2016	4.7%	0.439	0.919	0.000	0.588	0.006	0.014	0.000	0.009	0.002	0.005	0.000	0.003
2017	42.6%	1.948	3.292	2.933	2.269	0.053	0.144	0.137	0.075	0.013	0.025	0.025	0.016
2018	13.9%	0.089	0.623	0.238	0.370	0.028	0.027	0.018	0.027	0.004	0.007	0.003	0.005
2019	15.5%	0.113	1.787	0.945	0.529	0.009	0.058	0.047	0.021	0.001	0.012	0.001	0.004
2020	4.6%	0.154	0.081	0.069	0.119	0.014	0.007	0.007	0.011	0.003	0.001	0.001	0.002
2021	0.4%	0.018	0.080	0.019	0.030	0.002	0.003	0.002	0.002	0.000	0.001	0.000	0.000
2022	4.5%	0.074	0.122	0.000	0.076	0.012	0.008	0.000	0.010	0.005	0.002	0.000	0.004
2023	28.0%	0.326	1.361	0.237	0.543	0.011	0.178	0.032	0.050	0.003	0.060	0.005	0.016
2024	7.4%	1.026	0.240	0.297	0.737	0.027	0.014	0.013	0.022	0.014	0.003	0.003	0.010
2025	6.4%	0.516	0.836	0.297	0.562	0.018	0.012	0.007	0.016	0.006	0.006	0.002	0.006
Tau	na	0.055	0.018	0.091	0.018	0.127	0.018	-0.018	0.091	0.309	0.127	0.055	0.236
P-Value	na	0.815	0.938	0.697	0.938	0.586	0.938	0.938	0.697	0.186	0.586	0.815	0.312
Theil Slope (per year)	na	0.008	0.013	0.004	0.004	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000

Figure 122 through Figure 125 show sediment and nutrient loads for Tahoe Valley compared to total annual precipitation for WY15-WY25. This illustrates how loading and precipitation have varied over the monitored period.

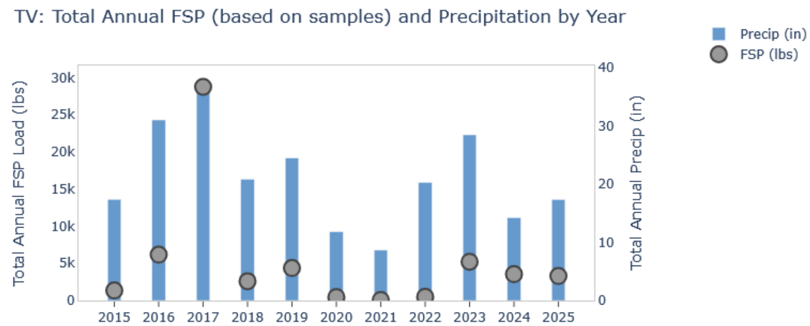

Figure 122 Total annual FSP load (based on samples) and precipitation by year for Tahoe Valley WY15-WY25.

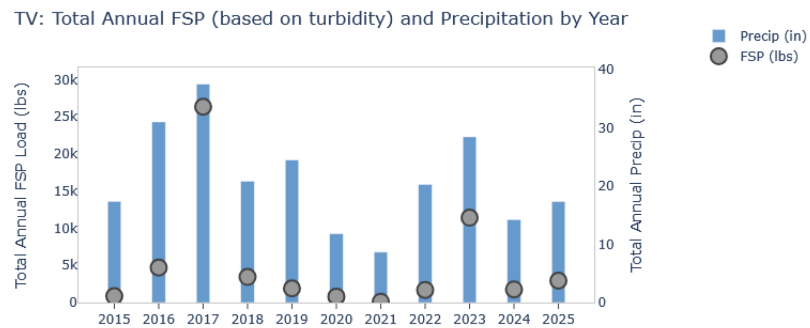

Figure 123 Total annual FSP load (based on continuous turbidity) and precipitation by year for Tahoe Valley WY15-WY25.

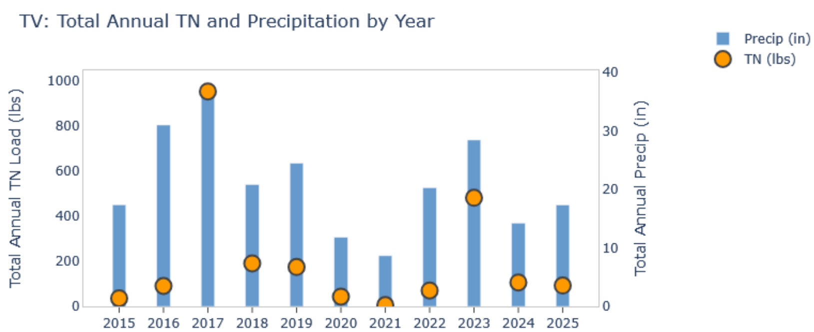

Figure 124 Total annual TN load and precipitation by year for Tahoe Valley WY15-WY25.

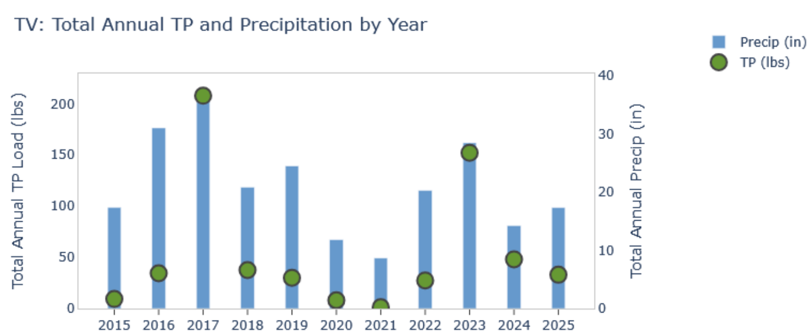

Figure 125 Total annual TP load and precipitation by year for Tahoe Valley WY15-WY25.

8.9 Tahoma

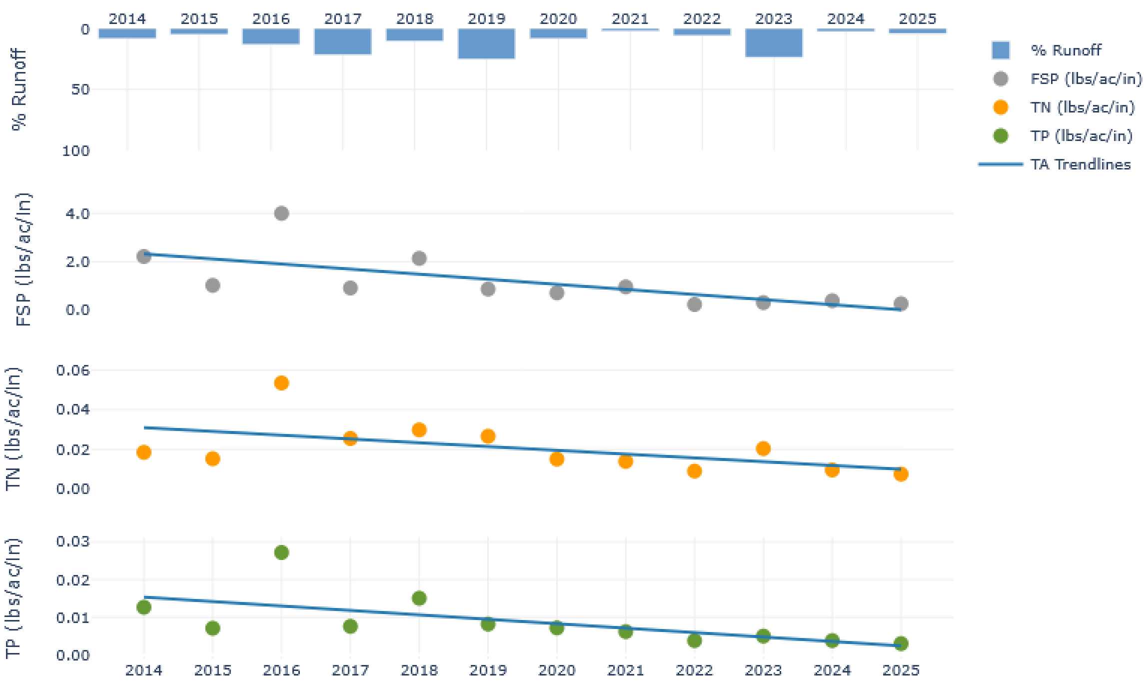

Figure 126 12-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at Tahoma, WY14-25.

- Percent runoff varied between 2.0% in WY21 to 23.5% in WY23. Backwatered conditions in WY19 may have resulted in a falsely elevated percent runoff.
- There is a significant decreasing trend in normalized annual FSP loads (p=0.003 and Tau=-0.667), and fall/winter FSP loads (p=0.028 and Tau= -0.485).
- There is a significant decreasing trend in normalized annual TN loads (p=0.020 and Tau=-0.515), and fall/winter TN load (p=0.028 and Tau= -0.485.)
- There is a significant decreasing trend in normalized annual TP loads (p=0.003 and Tau=-0.667).

Table 42 12-year seasonal and annual rainfall normalized pollutant loads at Tahoma, WY14-25. Percent runoff in 2019 highlighted in pink may be artificially high due to runoff volume errors associated with backwatering.

Year	% Runoff	FSP (lbs/acre/inch) Fall/ Winter	FSP Spring	FSP Summer	FSP Annual	TN (lbs/acre/inch) Fall/ Winter	TN Spring	TN Summer	TN Annual	TP (lbs/acre/inch) Fall/ Winter	TP Spring	TP Summer	TP Annual
2014	8.2%	1.231	3.876	4.412	2.205	0.009	0.031	0.042	0.019	0.006	0.022	0.029	0.013
2015	4.8%	0.971	0.567	1.858	1.020	0.006	0.009	0.067	0.015	0.006	0.003	0.015	0.007
2016	13.1%	4.410	2.797	9.639	4.002	0.036	0.016	0.634	0.053	0.028	0.010	0.181	0.027
2017	21.5%	0.970	0.810	0.000	0.908	0.026	0.029	0.000	0.025	0.008	0.008	0.000	0.008
2018	10.1%	0.220	4.032	0.000	2.132	0.020	0.041	0.000	0.030	0.004	0.027	0.000	0.015
2019	24.9%	0.296	2.689	0.251	0.861	0.016	0.062	0.015	0.027	0.005	0.019	0.000	0.008
2020	8.3%	0.719	0.733	0.026	0.697	0.017	0.010	0.043	0.015	0.008	0.006	0.003	0.007
2021	2.0%	0.057	5.031	0.179	0.954	0.002	0.068	0.021	0.014	0.001	0.032	0.003	0.006
2022	5.8%	0.062	0.993	0.087	0.224	0.006	0.023	0.009	0.009	0.003	0.009	0.002	0.004
2023	23.5%	0.120	0.714	0.727	0.300	0.004	0.058	0.061	0.021	0.002	0.013	0.015	0.005
2024	2.4%	0.229	0.534	1.818	0.373	0.004	0.009	0.118	0.010	0.002	0.005	0.032	0.004
2025	3.9%	0.233	0.041	0.991	0.243	0.006	0.003	0.044	0.008	0.003	0.001	0.012	0.003
Tau	na	-0.485	-0.394	-0.015	-0.667	-0.485	-0.061	0.137	-0.515	-0.424	-0.212	0.046	-0.667
P-Value	na	0.028	0.075	0.945	0.003	0.028	0.784	0.534	0.020	0.055	0.337	0.836	0.003
Theil Slope (per year)	na	-0.095	-0.259	-0.002	-0.139	-0.002	-0.001	0.002	-0.002	-0.001	-0.001	0.000	-0.001

Figure 127 through Figure 130 show sediment and nutrient loads for Tahoma compared to total annual precipitation for WY14-WY25. This illustrates how loading and precipitation have varied over the monitored period.

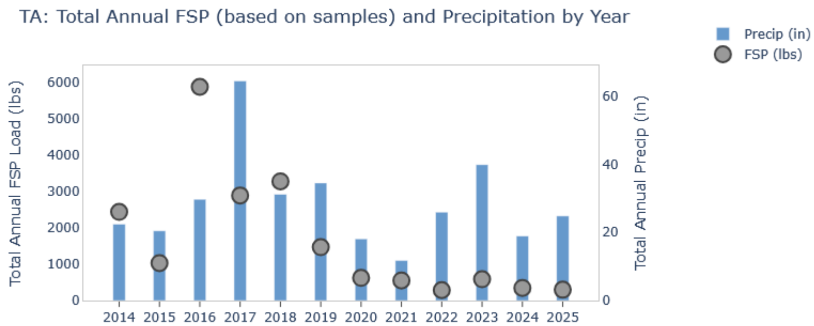

Figure 127 Total annual FSP load (based on samples) and precipitation by year for Tahoma WY14-WY25.

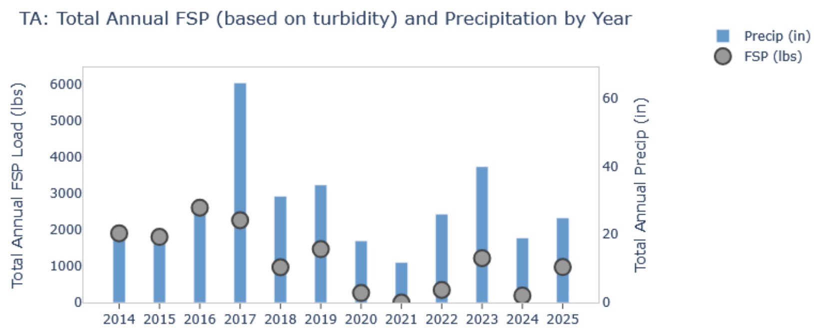

Figure 128 Total annual FSP load (based on continuous turbidity) and precipitation by year for Tahoma WY14-WY25.

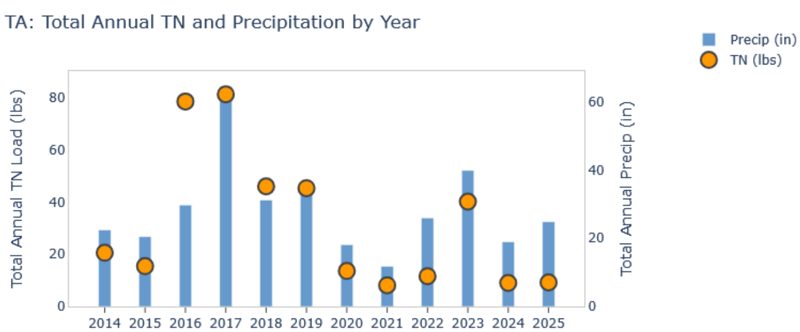

Figure 129 Total annual TN load and precipitation by year for Tahoma WY14-WY25.

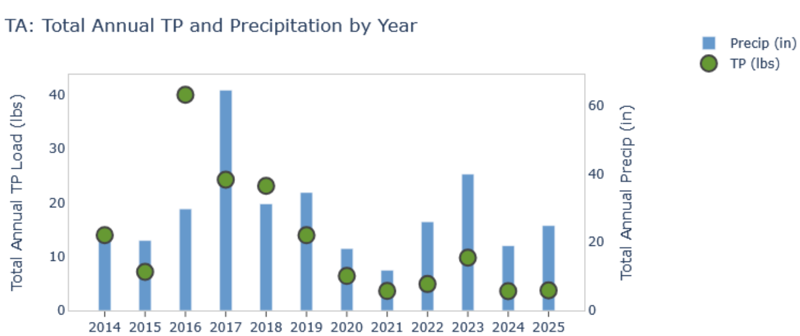

Figure 130 Total annual TP load and precipitation by year for Tahoma WY14-WY25.

8.10 Upper Truckee

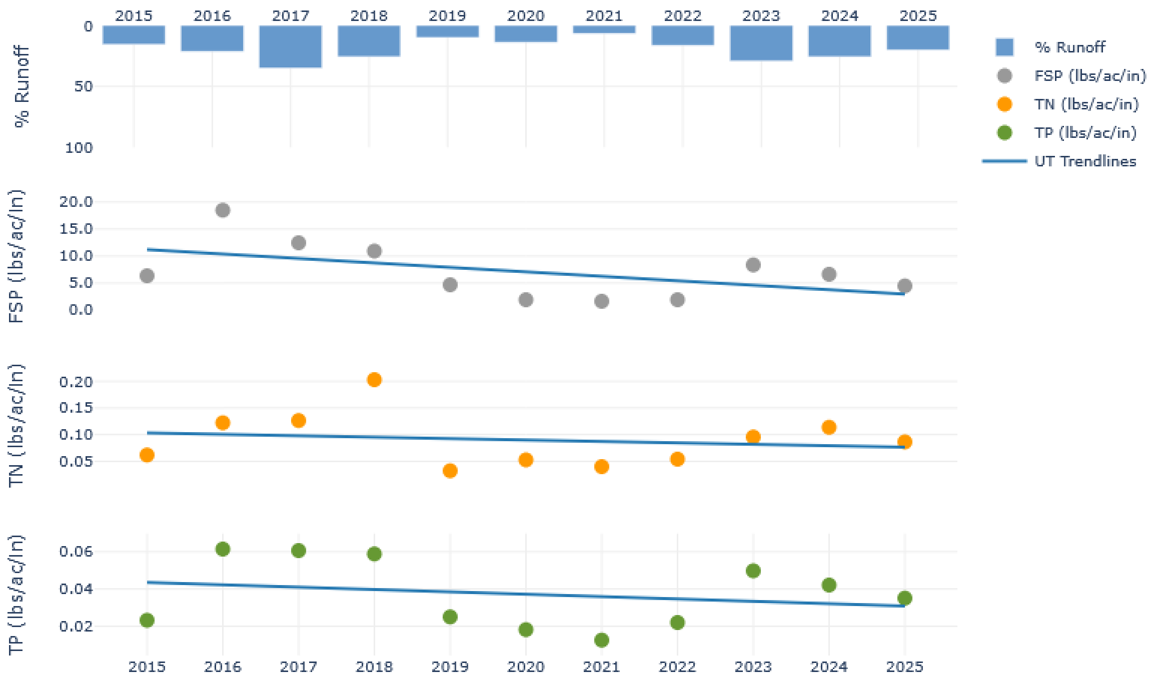

Figure 131 11-year rainfall normalized annual pollutant load trends in FSP, TN, and TP loads at Upper Truckee, WY15-25.

- Percent runoff varied between 6.4% in WY21 to 34.8% in WY17.
- There is no significant trend in normalized annual FSP loads (p>0.05).
- There is no significant trend in normalized annual TN loads (p>0.05).
- There is no significant trend in normalized annual TP loads (p>0.05).

Table 43 11-year seasonal and annual rainfall normalized pollutant loads at Upper Truckee, WY15-25.

		FSP (lbs/acre/inch)				TN (lbs/acre/inch)				TP (lbs/acre/inch)			
Year	% Runoff	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual	Fall/ Winter	Spring	Summer	Annual
2015	15.5%	6.297	11.878	0.000	6.367	0.049	0.151	0.000	0.062	0.022	0.047	0.000	0.023
2016	21.1%	14.220	28.052	0.000	18.498	0.121	0.128	0.000	0.122	0.053	0.081	0.000	0.061
2017	34.8%	11.426	13.747	22.499	12.420	0.095	0.137	0.580	0.127	0.055	0.062	0.143	0.061
2018	25.6%	7.244	15.326	0.000	10.956	0.350	0.100	0.000	0.203	0.048	0.075	0.000	0.059
2019	9.8%	4.188	6.599	0.000	4.673	0.027	0.053	0.000	0.032	0.022	0.037	0.000	0.025
2020	13.7%	1.728	2.150	2.339	1.940	0.045	0.054	0.115	0.053	0.015	0.022	0.019	0.018
2021	6.4%	1.632	2.119	0.000	1.653	0.039	0.057	0.000	0.040	0.013	0.015	0.000	0.013
2022	16.2%	1.960	2.513	0.637	1.943	0.047	0.077	0.093	0.054	0.023	0.024	0.009	0.022
2023	29.2%	7.472	14.816	1.133	8.392	0.073	0.149	0.127	0.096	0.041	0.093	0.019	0.050
2024	25.6%	7.421	7.020	0.200	6.600	0.123	0.132	0.010	0.114	0.041	0.059	0.002	0.042
2025	19.9%	3.687	5.931	6.425	4.479	0.075	0.068	0.194	0.086	0.036	0.028	0.047	0.035
Tau	na	-0.273	-0.309	0.342	-0.345	0.055	-0.164	0.382	-0.018	-0.091	-0.200	0.382	-0.236
P-Value	na	0.243	0.186	0.143	0.139	0.815	0.484	0.102	0.938	0.697	0.392	0.102	0.312
Theil Slope (per year)	na	-0.620	-1.320	0.040	-0.831	0.001	-0.005	0.003	-0.001	-0.001	-0.003	0.000	-0.002

Figure 132 through Figure 135 how sediment and nutrient loads for Upper Truckee compared to total annual precipitation for WY15-WY25. This illustrates how loading and precipitation have varied over the monitored period.

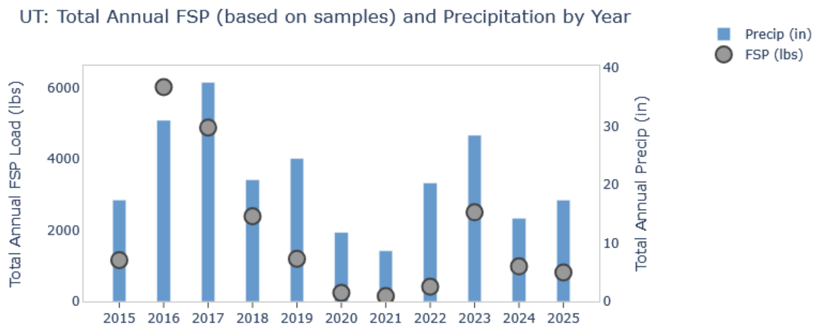

Figure 132 Total annual FSP load (based on samples) and precipitation by year for Upper Truckee WY15-WY25.

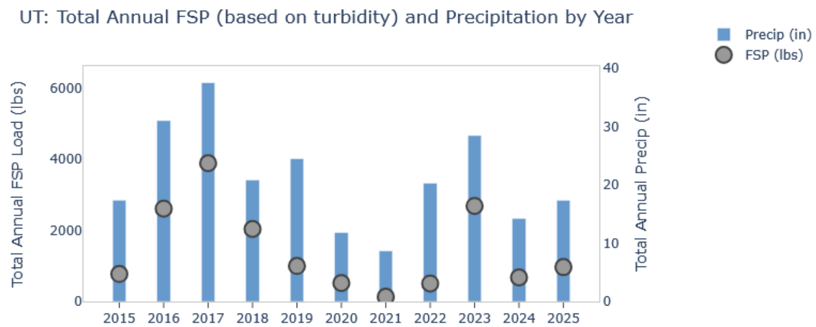

Figure 133 Total annual FSP load (based on continuous turbidity) and precipitation by year for Upper Truckee WY15-WY25.

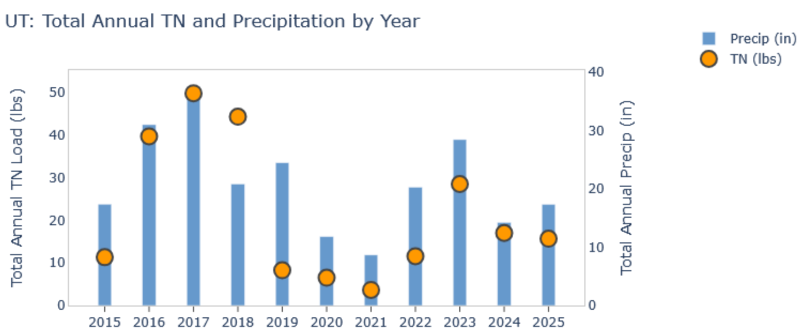

Figure 134 Total annual TN load and precipitation by year for Upper Truckee WY15-WY25.

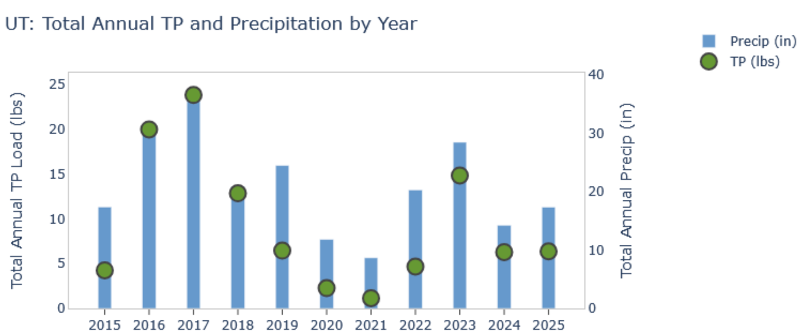

Figure 135 Total annual TP load and precipitation by year for Upper Truckee WY15-WY25.

9. PLRM Modeling Results

PLRM is the standard basin-wide model for pollutant load reduction estimates for the Lake Tahoe TMDL. All seven jurisdictions in two states are required to use the same modeling tool for estimating pollutant loads, allowing for comparisons of pollutant load reductions to be made across jurisdictions.

The SR431 model was built by Tahoe RCD staff and uses average CEC values from WY14-19 and registered road operations for the Jellyfish and Contech MFS filters. Elks Club falls within a stormwater treatment BMP registration for El Dorado County, however none of the registered stormwater treatment BMPs fall within the monitored catchment outfall drainage area, so this PLRM model uses El Dorado County's registration methodology minus any registered stormwater treatment BMPs. The Lakeshore PLRM model used for this analysis was sourced directly from Washoe County (built by NTCD) therefore matches the registered model exactly. The Pasadena model was developed by Tahoe RCD staff for City of South Lake Tahoe registration; it uses baseline conditions from 2004, average filter characteristic effluent concentrations from WY14-17, registered stormwater treatment BMPs, and registered road operations. The Speedboat model uses Caltrans registered road operations, assumed baseline conditions from 2004, and current parcel BMP status. The Tahoe Valley model was originally provided by the City of South Lake Tahoe, modified by Tahoe RCD staff, and includes baseline 2004 conditions, baseline private parcel BMP percentages, recently installed stormwater treatment BMPs, and registered road operations. Upper Truckee was originally provided by the City of South Lake Tahoe, modified by Tahoe RCD staff, includes all registered and unregistered stormwater treatment BMPs and registered road operations, and uses baseline parcel BMPs. Both Tahoe Valley and Upper Truckee PLRM models match the models built for registrations as closely as possible, but don't match the official registered catchments exactly because their areas are slightly different and they are pieced together from two jurisdictions (Caltrans and City of South Lake Tahoe). Tahoe City and Tahoma are unregistered catchments and these models assume baseline conditions from 2004 and current parcel BMP status.

Tahoe RCD compared average annual runoff volumes and pollutant loads predicted by PLRMv2.1 to annual volumes and pollutant loads measured in WY25 at all sites; results are presented in Table 44. In reviewing model performance, **it is important to highlight that PLRM represents average annual conditions based on an 18-year meteorological average, and each water year is unique. Therefore, differences between PLRM estimates and measured values are expected.**

WY25 was a wet precipitation year for the Tahoe Basin, therefore field measured runoff volumes and FSP, TN, and TP loads are expected to be higher than PLRM modeled values. However, all sites except for Elks Club had lower measured runoff volumes than PLRM modeled values. For FSP, TN, and TP, all measured load values were lower than PLRM modeled results, with the exception of TP at Jellyfish Inflow, which was higher. Despite variations in model performance, models may provide reasonable ranges for runoff volume and pollutant loads.

It is unrealistic to expect the model to perform perfectly; however, PLRM is a reasonable estimate of relative conditions. For example, Tahoe Valley has the greatest annual runoff volume and pollutant loading of all sites, which was predicted by PLRM. Additionally, PLRM assumes that roads and commercial properties tend to be the highest polluting land uses, while multi-family residential and single family residential are less so, which conforms to our basic understanding of Tahoe stormwater pollutant sources.

Table 44 PLRM predicted and WY25 measured values for all monitored catchments. The first FSP column represents the FSP load calculated using event mean concentrations based on samples, while the second FSP column represents the FSP load estimated using continuous turbidity data. Registered catchments use models that include BMPs and improved road operations. Unregistered catchments use models based on baseline (2004) conditions with current parcel BMP status.

Water Year 2025 Oct. 1, 2024 - Sept. 30, 2025		Catchment Registered for BMPs?	Catchment Registered for Roads?	Annual Runoff Volumes (cf)		Annual FSP Loads (Based on Samples) (lbs)		Annual FSP Loads (Based on Turbidity) (lbs)		Annual TN Loads (lbs)		Annual TP Loads (lbs)	
Catchment Name	Station Name			PLRM	Measured	PLRM	Measured	PLRM	Measured	PLRM	Measured	PLRM	Measured
SR431	Contech Inflow	No	Yes	43,560	14,552	530	340	810	126	9.0	2.7	2.0	1.8
	Contech Outflow	No	Yes	43,560	10,851	529	218	279	53	4.0	1.7	2.0	1.1
	Jellyfish Inflow	No	Yes	43,560	16,977	530	438	810	136	9.0	3.4	2.0	2.2
	Jellyfish Outflow	No	Yes	43,560	12,369	529	234	318	62	4.0	2.2	2.0	1.0
Elk's Club	Elk's Club	Yes	No	209,088	274,309	3,092	611	3,092	143	40.0	15.2	11.0	4.6
Lakeshore	Lakeshore	Yes	Yes	357,192	4,322	2,885	1,392	2,885	172	56.0	4.6	14.0	6.3
Pasadena	Pasadena Out	Yes	Yes	117,612	47,395	489	147	489	184	12.0	10.3	4.0	2.4
Speedboat	Speedboat	No	Yes	317,988	75,261	4,344	839	4,344	691	56.0	12.2	16.0	6.6
Tahoe City	Tahoe City	No	No	213,444	102,085	2,874	658	2,874	335	32.0	6.8	8.0	4.8
Tahoe Valley	Tahoe Valley	No	Yes	5,549,544	1,353,355	24,734	3,293	24,734	2,952	109.0	92.6	595.0	33.0
Tahoma	Tahoma	No	No	662,112	174,832	10,781	298	10,781	978	126.0	9.2	37.0	3.7
Upper Truckee	Upper Truckee	Yes	Yes	352,836	131,268	2,875	814	2,875	967	46.0	15.7	10.0	6.4

10. Lessons Learned

Monitoring stations should be checked regularly, especially during runoff events, to identify any potential equipment malfunctions that may result in data gaps. There are a multitude of technical difficulties that can be encountered with stormwater monitoring, including equipment failure, freezing conditions, power failure, vandalism, accidents, and obstruction by sediment, snow, trash or other debris. Identifying and correcting these problems early results in a more accurate data set with fewer and shorter data gaps. Beginning WY17 all monitoring and weather stations are remotely accessible. This enables access to the stations and their status during all weather conditions and any time of day or night and allows for problems to be detected and remedied earlier than was previously possible when site visits were required to know station status.

The biggest cause of data gaps is power failure. Although all stations are equipped with solar panels to recharge batteries, some stations do not have enough sun exposure to keep batteries continuously charged (especially during winter), and during periods of extended cloud cover or snow blockage and subsequent decrease in solar recharge, all stations are subject to power failure. Checking battery voltage remotely on a regular basis has helped to alleviate this problem by continuously checking and changing batteries.

High lake levels following WY17 and WY19 caused intermittent backwatered conditions at Tahoma. Previously, flow monitoring under backwatered conditions was not possible. On August 1, 2019 a duplicate set of monitoring sensors were installed about 50 feet upstream of the original sensors at Tahoma. They are now available for use during backwatered conditions.

Construction activities can impact monitoring sites. In WY22 construction activities severed a pressure transducer cord at SR431, which caused an electrical short that caused a power outage and damaged one of the control ports on the datalogger. Luckily this was the extent of the damage, as this could have caused much more costly damage to the equipment. When construction activities are planned near monitoring sites, it is prudent to communicate the plans with Tahoe RCD staff as well as the construction staff to ensure equipment isn't damaged.

Monitoring equipment at SR431 is located under the pavement in a wide pull-out and accessed through two hatches, one for the inflow locations and one for the outflow locations. Often, the hatches are located under many feet of hard icy snow that has been plowed off SR431 and stored in the pull-out making access impossible. NDOT maintenance crews must be called ahead of sample collection to remove the snow with heavy equipment. In WY23 a truck hit the housing containing the data logger and tore all sensor cords, rendering the site inoperable. The site took three and a half months to rebuild and began recording reliable data at the end of December 2023 (see destroyed and rebuilt equipment at SR431 in Figure 136). Unanticipated events can occur that require additional staff hours to address.

When snow accumulation is frequent and excessive, it is very important to stay on top of site maintenance (See Figure 137). Keeping the sites dug out and unfrozen is a continuous task necessary to maintain data integrity. The remote access system is beneficial in identifying when the sites are frozen and in need of maintenance.

Field verifying data as a QAQC procedure is essential to ensure an accurate and reliable dataset. Tahoe RCD staff members regularly check stage and make note of precipitation type and totals during storms to ensure equipment is functioning properly. The greater the level of QAQC during precipitation events, the higher the level of certainty that the dataset is representative. The importance of detailed field notes and photographs cannot be understated. With passing time, the human memory lapses, while field notes and photographs can be referred to years and even decades after a monitoring event to explain what happened throughout the monitoring period.

Short duration, high intensity summer thunderstorms tend to be very episodic in nature and can be particularly difficult to sample. The sometimes unpredictably large flow volumes can quickly fill all 24 sample bottles in the autosampler if the flow pacing is set too low. The result is that a portion of the end of the runoff hydrograph is not sampled. Therefore, it is important to optimize the flow pacing volume. Alternatively, one mitigating method is to sample based on time rather than flow. Even with time-based sampling, flow weighted composites can be made. Due to the short nature of these events, it is incredibly difficult for staff to reach sites before runoff has ended to replace the full bottles with empty ones if pacing is not set correctly, but the remote access to the sites makes successfully sampling these events more feasible. Not all sites receive sufficient runoff in the summer to sample.

Storm events not captured in a particular season due to insufficient runoff can be substituted by a different storm in the next season to meet permit and agreement requirements of one storm event per season as approved by the Lahontan Regional Water Quality Control Board (Lahontan). All efforts are made to successfully sample several events during each season so that average seasonal pollutant concentrations and loads can be calculated. However, annual precipitation patterns are highly variable, and in some years, there is insufficient runoff for sampling in any given season. Approval of the annual permit/ILA monitoring requirement should not be withheld for this reason. Fortunately, estimated FSP concentrations and loads can be calculated from the continuous turbidity data, so these values should never be missing from any season unless there is no runoff at all.

Figure 136	Boxes containing monitoring equipment at SR431 before the car accident on September 15, 2023 (image 1), after the accident showing the box pushed down the embankment (image 2) and reprogramming the equipment during the rebuild (image 3) .

Figure 137	Snow at Tahoma March 7, 2023 before snow removal (image 1) and after snow removal (image 2). It is critical to stay on top of snow removal after snowfall events to maintain access to stormwater monitoring sites.

11. Changes: Accepted and Proposed

Changes Accepted

The NPDES permit issued to California jurisdictions in 2017 aligned all monitoring activities with the Regional Stormwater Monitoring Program (RSWMP) Framework and Implementation Guidance Document (Tahoe RCD et al 2015), most notably that six (rather than four) catchment outfalls and two (rather than three) BMPs must be monitored. Additionally, the first flush sampling requirement was dropped as sample analysis costs are high and continuous turbidimeter readings can replace this information. The Nevada Inter-local Agreements (ILAs) were issued in 2016 and require participation in IMP.

In the spring of WY17 Tahoe RCD proposed a new BMP monitoring site. The new location was approved by IMP, Lahontan, NDEP and monitoring equipment was removed from the Pasadena Inflow and installed at Elks Club Drive as described in section 2.2. Monitoring at Elks Club began in WY18. Elks Club Drive is considered a BMP site as resurfacing the road with a polymer enhanced asphalt mixture should be considered a best management practice for reducing FSP in stormwater runoff since it will be easier to sweep and less prone to degradation from chains, heavy equipment, plow blades, and the freeze/thaw cycle.

In the winter of WY19 the California Department of Transportation (Caltrans) joined IMP. A new site capturing only stormwater runoff from state route 89 in Tahoe City was installed in August of 2019. Monitoring of this site began October 1, 2019 at the commencement of WY20.

The Lakeshore monitoring site receives very little flow. In drier years like WY20 and WY24, it did not flow at all. In WY21 it only flowed once. Due to the difficulty of finding suitable monitoring sites, it was decided that nothing would change for WY22, WY23, WY24, WY25, or WY26. Lakeshore will be replaced in WY27 with a new BMP monitoring site for the Bourne Meadow Biochar Project. Pasadena will also be replaced in WY27 for this Project. IMP agreed to these changes in October 2024.

Changes Proposed

Because annual precipitation during all seasons is highly variable, and summer thunderstorms tend to be very episodic in nature, not all sites receive sufficient runoff to sample the requisite number of events in every season, especially in the summer. **It may be advisable to amend permit and agreement language to acknowledge that all efforts are made to successfully sample several events during each season so that average seasonal pollutant concentrations and loads can be calculated. However, this is not always possible, and approval of the annual permit/ILA monitoring requirement should not be withheld for this reason.**

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Appendix A: Raw Analytical Data

Table A.1-Table A.10 present all available raw analytical data for autosampler composite (AC) samples. Other than QAQC samples, only AC samples were analyzed in WY25. Raw analytic data shows turbidity; TSS, FSP, TN, and TP concentrations; and particle size distribution.

Table A.1 Raw analytical data for samples taken at the inflow and outflow of the SR431 Contech MFS in WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
CI-AC	1/31/2025 15:07	492	396	347	1,423	1,723	0.35	4.00	12.8	26.9	48.0	70.5	76.7	93.1	98.4	100	100	100	100
CI-AC	2/4/2025 18:13	135	61	87	566	541	0.33	3.57	10.9	22.5	41.0	64.6	72.2	94.3	99.0	100	100	100	100
CI-AC	3/30/2025 10:49	1,670	2,194	1,371	4,062	5,928	0.37	4.43	15.3	33.3	58.7	82.1	87.8	97.9	100.0	100	100	100	100
CI-AC	4/16/2025 17:05	2,930	2,367	1,910	6,342	7,642	0.28	3.07	9.28	19.9	39.3	65.2	72.7	92.4	97.6	100	100	100	100
CI-AC	4/26/2025 3:06	343	255	231	1,694	1,282	0.38	4.24	13.3	26.9	46.4	67.4	73.7	93.9	99.1	100	100	100	100
CI-AC	6/24/2025 17:16	933	309	369	4,012	2,338	0.19	1.90	5.15	10.3	21.3	39.6	46.2	74.9	87.7	96.7	99.4	100	100
CI-AC	8/23/2025 13:21	343	185	128	7,067	1,346	0.18	1.89	5.40	11.3	22.0	37.2	43.0	78.4	92.2	100	100	100	100
CI-AC	8/25/2025 16:03	80	65	21	5,429	493	0.21	2.02	5.18	9.68	16.6	26.8	31.1	67.4	88.9	99.2	100	100	100
CI-AC	9/2/2025 17:30	75	52	26	3,115	350	0.21	2.08	5.50	10.7	19.9	35.0	41.1	71.3	84.5	98.2	99.3	100	100
CO-AC	1/31/2025 15:11	362	296	291	1,372	1,451	0.40	4.67	15.4	32.7	57.3	80.4	86.0	96.6	99.6	100	100	100	100
CO-AC	2/4/2025 18:13	145	69	92	712	629	0.34	3.67	11.0	22.2	40.5	63.6	71.1	93.6	98.7	100	100	100	100
CO-AC	3/30/2025 10:51	1,082	1,156	915	3,407	4,131	0.40	4.67	15.7	34.0	60.4	84.6	90.1	98.5	100	100	100	100	100
CO-AC	4/16/2025 17:07	2,137	1,762	1,472	5,464	5,979	0.31	3.34	9.98	21.2	42.0	68.9	76.5	94.2	98.6	100	100	100	100
CO-AC	4/26/2025 4:42	295	222	219	1,661	1,137	0.41	4.63	14.8	29.8	50.5	74.3	81.2	96.7	100	100	100	100	100
CO-AC	6/24/2025 17:24	574	272	251	3,440	1,567	0.21	2.15	6.02	12.2	24.6	43.7	50.5	77.8	87.3	95.3	98.1	100	100
CO-AC	8/23/2025 14:00	291	196	122	6,341	1,359	0.22	2.34	6.97	14.5	26.8	41.9	47.4	79.5	93.9	100	100	100	100
CO-AC	8/25/2025 17:22	77	63	26	4,773	543	0.27	2.71	7.00	12.6	21.0	34.0	39.5	81.9	95.3	100	100	100	100
CO-AC	9/2/2025 18:59	93	55	39	2,486	388	0.26	2.62	6.80	12.9	23.7	42.3	49.5	78.6	88.4	97.9	99.4	100	100

Table A.2 Raw analytical data for samples taken at the inflow and outflow of the SR431 Jellyfish in WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
JI-AC	1/31/2025 15:05	618	394	450	1,627	2,039	0.37	4.25	13.6	28.3	50.2	72.8	78.7	93.2	98.5	100	100	100	100
JI-AC	2/4/2025 18:13	169	61	106	856	711	0.32	3.48	10.6	21.8	39.5	62.6	70.3	94.2	99.1	100	100	100	100
JI-AC	3/30/2025 10:49	2,011	2,496	1,546	5,067	6,254	0.35	4.07	13.8	29.9	53.0	76.9	83.2	96.3	99.5	100	100	100	100
JI-AC	4/16/2025 17:06	2,659	2,114	1,699	6,218	7,523	0.28	3.02	9.05	19.3	38.3	63.9	71.4	91.4	97.1	100	100	100	100
JI-AC	4/26/2025 3:14	362	280	246	1,923	1,313	0.38	4.24	13.4	27.0	46.1	67.9	74.4	94.2	99.6	100	100	100	100
JI-AC	6/24/2025 17:16	880	337	348	4,855	2148	0.19	1.93	5.22	10.4	21.4	39.5	46.2	77.7	92.1	99.9	100	100	100
JI-AC	8/23/2025 13:21	322	193	118	7,198	1410	0.18	1.90	5.41	11.2	21.6	36.7	42.5	77.1	89.4	97.2	98.8	100	100
JI-AC	8/25/2025 16:03	86	72	21	5,727	569	0.17	1.73	4.55	8.79	15.4	24.6	28.3	62.9	88.0	98.8	100	100	100
JI-AC	9/2/2025 17:29	73	50	28	3,140	300	0.22	2.20	5.86	11.4	21.2	37.8	44.2	75.0	86.8	97.3	99.5	100	100
JO-AC	1/31/2025 15:07	406	304	303	990	1,419	0.39	4.38	13.9	29.1	52.0	74.7	80.7	94.6	99.2	100	100	100	100
JO-AC	2/4/2025 18:13	101	46	63	559	490	0.35	3.77	11.0	21.8	38.9	62.1	69.6	93.1	98.7	100	100	100	100
JO-AC	3/30/2025 10:51	841	663	681	2,409	2,744	0.40	4.53	14.6	31.0	55.6	81.0	87.3	98.7	100	100	100	100	100
JO-AC	4/16/2025 17:07	2,763	2,043	1,688	6,345	6,962	0.28	3.03	8.89	18.5	36.4	61.1	68.7	91.3	97.4	100	100	100	100
JO-AC	4/26/2025 4:41	203	186	153	1,739	866	0.44	4.99	15.7	31.4	52.3	75.4	81.9	95.7	99.3	100	100	100	100
JO-AC	6/24/2025 17:20	679	262	272	4,744	721	0.19	1.93	5.26	10.5	21.6	40.0	46.6	75.3	86.8	94.6	97.3	100	100
JO-AC	8/23/2025 14:05	390	283	159	7,535	1582	0.21	2.27	6.81	14.2	26.2	40.7	45.8	77.6	93.7	100	100	100	100
JO-AC	8/25/2025 16:10	65	58	15	5,895	385	0.17	1.69	4.46	8.50	14.5	23.1	26.5	58.9	84.7	97.5	99.4	100	100
JO-AC	9/2/2025 18:11	46	34	14	2,353	187	0.17	1.64	4.08	7.83	15.4	29.7	36.0	72.2	86.3	97.8	100	100	100

Table A.3 Raw analytical data for samples taken at Elks Club in WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
EC-AC	11/22/2024 22:00	27	20	10	300	179	0.21	2.13	5.80	11.3	21.1	37.9	44.6	75.3	91.7	100	100	100	100
EC-AC	12/27/2024 2:33	18	18	13	208	74	0.80	7.97	20.4	34.3	51.4	74.3	80.8	93.8	97.8	100	100	100	100
EC-AC	12/29/2024 8:33	44	54	34	425	222	0.49	5.22	15.1	29.4	50.8	76.9	84.1	97.9	100	100	100	100	100
EC-AC	1/31/2025 13:06	86	49	32	693	324	0.19	1.89	5.02	9.92	19.8	37.2	44.3	83.8	95.2	100	100	100	100
EC-AC	3/16/2025 13:28	6	6	2	223	25	0.23	2.26	5.79	10.0	18.8	33.9	41.9	69.8	87.9	100	100	100	100
EC-AC	3/22/2025 10:00	12	2	7	174	29	0.39	4.16	11.5	19.2	36.1	55.0	66.4	90.2	99.6	100	100	100	100
EC-AC	3/30/2025 17:01	19	20	11	272	37	0.32	3.26	8.92	17.3	31.8	55.8	64.3	91.3	98.0	100	100	100	100
EC-AC	7/1/2025 14:21	799	534	312	6,951	2,181	0.13	1.37	4.26	10.4	22.0	39.0	45.2	77.9	90.3	98.3	99.5	100	100
EC-AC	8/23/2025 13:26	495	439	226	6,941	1,602	0.21	2.13	5.88	12.2	24.9	45.7	53.7	87.2	94.8	100	100	100	100

Table A.4 Raw analytical data for samples taken at Lakeshore in WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
LS-AC	2/4/2025 19:45	42	42	28	466	305	0.38	4.00	11.4	22.8	41.3	67.4	76.0	94.7	97.3	99.9	100	100	100
LS-AC	8/26/2025 16:50	8,244	10,896	5,911	19,512	26617	0.34	3.91	12.9	28.0	50.3	71.7	77.4	92.0	97.8	100	100	100	100

Table A.5 Raw analytical data for samples taken at Pasadena in WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
PO-AC	12/29/2024 11:36	42	45	21	1,381	401	0.26	2.74	7.87	16.0	29.8	49.5	56.9	91.8	97.6	100	100	100	100
PO-AC	1/31/2025 21:28	100	90	32	2,756	679	0.14	1.38	3.87	8.33	17.3	31.7	37.5	71.7	89.9	99.8	100	100	100
PO-AC	2/4/2025 18:31	94	77	34	1,460	559	0.14	1.51	4.43	9.72	20.0	36.5	43.0	80.5	94.5	100	100	100	100
PO-AC	7/2/2025 15:11	646	587	202	12,134	2224	0.14	1.43	3.85	8.03	16.8	31.2	36.8	68.4	87.8	96.8	98	100	100
PO-AC	8/23/2025 14:03	385	407	176	9,131	1848	0.18	1.79	5.00	10.9	23.9	45.7	53.8	86.3	96.8	100	100	100	100
PO-AC	8/26/2025 19:25	53	83	22	5,797	942	0.20	1.99	5.43	11.1	22.0	40.7	47.6	78.9	95.5	99.9	100	100	100

Table A.6 Raw analytical data for samples taken at Speedboat, WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
SB-AC	12/21/2024 15:36	96	118	32	969	544	0.18	1.87	5.12	9.78	18.2	33.1	39.4	75.4	92.1	100	100	100	100
SB-AC	12/24/2024 8:13	218	245	177	1547	1,225	0.54	6.02	18.4	35.7	58.1	81.2	87.2	97.4	99.7	100	100	100	100
SB-AC	12/27/2024 2:51	70	81	59	929	487	0.70	7.33	20.7	38.1	60.3	84.6	90.9	99.3	100	100	100	100	100
SB-AC	12/29/2024 9:56	280	220	176	2003	1,244	0.31	3.42	10.3	21.3	39.5	62.8	70.1	90.7	97.0	100	100	100	100
SB-AC	1/31/2025 14:51	220	144	127	1,451	938	0.30	3.13	9.04	18.2	34.4	57.8	65.4	88.4	96.2	100	100	100	100
SB-AC	3/15/2025 13:41	160	157	125	919	736	0.45	4.94	15.1	30.4	53.4	78.4	84.7	96.3	99.4	100	100	100	100
SB-AC	3/30/2025 22:36	278	224	168	1,352	1,086	0.36	3.96	12.1	23.9	40.9	60.4	66.1	85.1	94.6	100	100	100	100
SB-AC	4/1/2025 12:50	90	62	52	560	1106	0.33	3.58	10.6	21.1	36.8	57.5	64.4	89.1	96.7	100	100	100	100
SB-AC	8/23/2025 13:15	1,979	787	649	15,924	6208	0.15	1.57	4.23	8.39	17.0	32.8	39.3	74.6	89.7	98.6	100	100	100

Table A.7 Raw analytical data for samples taken at Tahoe City, WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
TC-AC	11/22/2024 21:51	55	52	15	799	432	0.18	1.84	4.86	9.2	16.4	28.0	32.7	66.5	89.9	100	99.6	100	100
TC-AC	12/21/2024 14:33	238	327	199	1,719	1,628	0.63	6.76	19.6	36.8	60.1	83.7	89.4	98.1	100	100	100	100	100
TC-AC	12/24/2024 7:48	226	287	186	1,207	1,388	0.59	6.41	19.0	36.4	59.9	82.4	87.7	97.0	99.5	100	100	100	100
TC-AC	1/31/2025 16:25	208	157	131	1,014	881	0.35	3.68	10.5	20.7	38.5	63.2	71.1	92.7	98.2	100	100	100	100
TC-AC	3/13/2025 14:15	141	175	131	1,058	736	0.80	8.71	26.1	48.7	73.4	93.1	96.5	99.5	100	100	100	100	100
TC-AC	3/23/2025 13:51	23	11	16	544	106	0.63	6.37	16.5	28.0	44.9	70.2	79.9	97.8	99.7	100	100	100	100
TC-AC	4/8/2025 10:05	14	4	7	248	62	0.28	3.07	9.34	17.1	31.0	51.9	62.2	89.7	100	100	100	100	100
TC-AC	6/21/2025 13:35	195	161	116	7,279	2,224	0.30	3.23	10.1	21.7	39.4	59.5	65.2	83.2	97.0	100	100	100	100
TC-AC	8/25/2025 15:36	523	297	252	4,929	1,853	0.25	2.60	7.13	14.2	27.7	48.2	55.7	87.7	95.3	100	100	100	100
TC-AC	9/2/2025 17:56	82	60	38	3,414	678	0.29	2.95	8.19	16.1	28.4	46.5	53.6	87.9	96.3	100	100	100	100

Table A.8 Raw analytical data for samples taken at Tahoe Valley, WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
TV-AC	11/22/2024 21:56	48	34	21	1032	344	0.23	2.39	6.67	13.6	25.6	43.6	50.5	83.5	93.35	99.7	100	100	100
TV-AC	12/22/2024 0:38	39	55	19	864	336	0.53	4.93	11.1	17.8	29.2	48.9	57.1	90.6	95.6	99.9	100	100	100
TV-AC	12/27/2024 2:53	92	99	63	1,393	363	0.52	5.38	14.7	27.1	44.8	68.0	75.3	93.3	98.4	100	100	100	100
TV-AC	12/29/2024 10:01	132	95	69	1,471	620	0.30	3.09	8.78	17.3	31.3	52.1	59.4	85.9	94.4	99.9	100	100	100
TV-AC	2/1/2025 3:23	58	51	20	1,003	331	0.18	1.80	4.85	9.67	18.9	34.1	40.3	77.2	91.6	99.9	100	100	100
TV-AC	3/16/2025 14:31	98	130	84	964	490	0.79	8.34	23.6	42.8	65.2	86.2	90.6	97.5	99.8	100	100	100	100
TV-AC	3/30/2025 21:01	58	76	36	804	235	0.54	5.40	14.1	24.7	40.3	62.6	70.2	90.9	97.2	100	100	100	100
TV-AC	3/31/2025 11:13	86	60	28	692	351	0.16	1.67	4.80	9.86	18.6	32.1	37.7	76.7	93.5	100	100	100	100
TV-AC	7/2/2025 14:43	365	442	204	5,101	1270	0.23	2.38	6.90	15.0	31.1	55.9	64.5	91.1	97.1	100	100	100	100

Table A.9 Raw analytical data for samples taken at Tahoma, WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
TA-AC	11/22/2024 15:43	46	27	13	797	394	0.14	1.48	4.13	8.18	15.2	27.4	32.6	68.6	88.0	98.5	99.4	100	100
TA-AC	12/21/2024 15:21	86	96	48	826	620	0.40	4.09	11.2	20.9	35.5	55.3	62.4	92.0	98.0	100	100	100	100
TA-AC	12/27/2024 3:11	54	47	27	465	269	0.36	3.59	9.39	17.3	30.6	50.7	57.9	87.6	95.9	100	100	100	100
TA-AC	1/31/2025 16:18	82	52	33	760	400	0.22	2.28	6.16	12.0	22.5	39.7	46.6	83.1	93.4	99.9	100	100	100
TA-AC	3/13/2025 12:53	53	32	23	347	424	0.24	2.51	6.95	13.3	24.3	42.8	50.1	83.3	94.5	100	100	100	100
TA-AC	3/23/2025 12:28	14	12	6	286	66	0.24	2.56	7.39	14.5	25.5	43.3	49.5	78.4	91.9	99.3	100	100	100
TA-AC	4/8/2025 9:30	7	3	3	171	38	0.17	1.82	5.45	10.4	20.7	36.3	45.5	74.0	93.4	99.8	100	100	100
TA-AC	7/26/2025 13:11	579	204	193	9,216	2118	0.15	1.57	4.22	8.38	17.1	33.4	40.0	75.7	91.3	99.9	100	100	100
TA-AC	8/24/2025 18:13	608	286	244	7,934	2048	0.15	1.61	4.90	11.2	23.0	40.1	46.3	75.1	86.7	96.8	99.1	100	100
TA-AC	8/26/2025 17:13	807	290	170	7,959	2172	0.11	1.09	2.86	5.48	10.8	21.1	25.8	56.4	71.1	85.1	92.9	100	100
TA-AC	9/2/2025 17:40	109	61	42	2,644	539	0.18	1.83	5.17	11.0	22.0	38.9	45.3	80.5	91.4	99.2	100	100	100

Table A.10 Raw analytical data for samples taken at Upper Truckee, WY25.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
UT-AC	11/2/2024 1:20	29	21	12	2211	264	0.16	1.69	4.84	10.1	21.1	42.0	50.2	82.3	89.2	97.0	100	100	100
UT-AC	11/22/2024 20:30	95	113	61	1749	489	0.39	4.01	11.3	22.5	40.3	63.7	70.8	89.4	96.3	99.9	100	100	100
UT-AC	12/21/2024 13:26	276	394	255	2293	1,338	0.88	9.32	26.4	47.0	70.6	92.3	96.2	99.3	100	100	100	100	100
UT-AC	12/24/2024 8:13	64	372	58	2022	1,269	0.69	7.47	21.8	41.0	66.7	90.5	95.8	100	100	100	100	100	100
UT-AC	1/31/2025 16:40	148	159	64	1,292	729	0.21	2.19	6.39	13.5	26.0	43.0	49.1	77.7	88.7	98.2	100	100	100
UT-AC	3/13/2025 10:40	285	336	270	2,223	1,145	0.68	7.58	23.7	46.9	74.5	94.6	98.3	100	100	100	100	100	100
UT-AC	3/30/2025 21:51	162	250	132	1,359	588	0.57	6.20	18.7	35.7	58.7	81.4	86.6	96.2	99.5	100	100	100	100
UT-AC	5/4/2025 1:10	58	79	34	1,976	376	0.42	4.25	11.5	21.2	36.6	58.9	65.8	84.9	92.0	99.2	100	100	100
UT-AC	7/2/2025 14:51	462	274	179	4,610	1384	0.17	1.76	4.68	9.3	19.7	38.8	46.2	78.1	90.2	98.2	99	100	100
UT-AC	8/26/2025 18:46	60	46	40	3,954	457	0.36	3.68	10.3	20.6	39.9	67.3	74.6	89.5	95.9	100	100	100	100
UT-AC	8/27/2025 12:15	211	144	108	3,391	652	0.26	2.68	7.38	14.7	28.6	51.3	59.2	85.4	94.1	99.9	100	100	100

Appendix B: Quality Assurance/Quality Control Summary

Field duplicates are samples collected at the same time and treated identically and are used to assess the reproducibility of collected data. This provides a measure of analytical precision and can be used for detecting problems in sample collection, handling, transport processing, and analysis. The actual procedures for collecting field duplicate samples depend on the sampling methods and protocols used. When automated sampling equipment is used, duplicates need to be collected manually either by: (a) triggering the sampler manually twice in quick succession (two MS samples) or (b) manually triggering a sample and then collecting a grab sample at the same time (one MS sample and one GS sample), (RSWMP SAP, 2011). Differences in paired samples greater than 20% indicate a problem. Field blanks (FB) are collected to identify sample contamination occurring during field collection, handling, transport, storage, and during laboratory handling and analysis. Field blanks are collected throughout the sampling season by pouring reagent-grade “blank” water into the autosampler bottles in the field and then exposing them to conditions equivalent to the standard sample bottles.

Paired sample results with a difference between them of greater than 20% are highlighted in pink in Table B.1. The difference between the paired MS/MS samples for several sediment indicators (TSS, turbidity, FSP, and particle size class) may be due to fluctuations in sediment concentrations from minute to minute. Two MS samples cannot be triggered at the same time and end up occurring 1-3 minutes apart. Differences in paired MS/GS samples for several sediment indicators are likely because the autosampler does not sample from the exact same place as the grab sample is taken from. Table B.2 shows sample results from field blanks. All field blanks are too clear for particle size distribution.

Table B.1 GS/MS and MS/MS paired sample data from WY25. Paired sample results with a difference between them of greater than 20% are highlighted pink. No paired samples had a difference of greater than 20% this water year.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
EC-GS	2/1/2025 9:11	8	14	2	277	83	0.15	1.47	3.64	6.5	12.1	24.5	30.2	66.2	87.1	99.6	100	100	100
EC-MS	2/1/2025 9:11	8	14	2	302	79	0.15	1.48	3.67	6.6	12.3	25.6	31.7	68.0	86.9	99.3	100.0	100	100
CI-MS	2/1/2025 16:53	594	404	377	1,697	2,115	0.31	3.41	10.60	22.1	40.8	63.5	70.1	89.6	96.8	100	100	100	100
CI-MS	2/1/2025 16:54	620	385	390	1,489	2,153	0.32	3.50	10.70	22.1	40.9	62.9	69.4	89.7	97.0	100	100	100	100
TC-MS	8/25/2025 15:37	1,345	833	655	8,155	3,839	0.25	2.53	6.85	13.6	27.2	48.7	56.4	86.3	94.0	100	100	100	100
TC-MS	8/25/2025 15:38	1,292	733	662	7,776	3,554	0.25	2.57	7.14	14.5	29.0	51.2	58.9	87.4	95.3	100	100	100	100
UT-MS	8/27/2025 12:55	109	123	66	2,549	527	0.31	3.17	8.80	17.7	34.4	60.4	69.4	94.7	99.1	100.0	100	100	100
UT-MS	8/27/2025 12:56	106	125	64	2,582	527	0.33	3.36	9.22	18.2	34.7	60.0	68.7	92.5	97.0	100.0	100	100	100

Table B.2 Field blank sample data from all sites in WY25. Most turbidity values were greater than the method reporting limit of 0.1 ug/L, however the reported values are negligible in comparison to average turbidity values for stormwater samples. No other values were greater than the method reporting limit indicating no TSS or nutrient contamination. All samples were too clear for PSD analysis, therefore there is no PSD or FSP data available.

Sample	Sample Start (Date/Time)	Total TSS (mg/L)	Turbidity (NTU)	FSP (mg/L)	TN (ug/L)	TP (ug/L)	%< 0.5	%< 1	%< 2	%< 4	%< 8	%< 16	%< 20	%< 63	%< 125	%< 250	%< 500	%< 1000	%< 2000
UT-FB	12/26/2024 10:00	<0.4	0.1	na	<40	<2	na	na	na	na	na	na	na	na	na	na	na	na	na
TV-FB	12/26/2024 11:00	<0.4	0.1	na	<40	<2	na	na	na	na	na	na	na	na	na	na	na	na	na
TA-FB	8/24/2025 18:00	<0.4	1.2	na	<40	6	na	na	na	na	na	na	na	na	na	na	na	na	na
EC-FB	8/24/2025 13:00	<0.4	0.3	na	<40	<2	na	na	na	na	na	na	na	na	na	na	na	na	na
PO-FB	8/26/2025 14:00	<0.4	0.7	na	<40	<2	na	na	na	na	na	na	na	na	na	na	na	na	na
SB-FB	8/23/2025 14:00	<0.4	0.4	na	<40	<2	na	na	na	na	na	na	na	na	na	na	na	na	na