



2011 Wadeable Stream Water Quality Resource Brief

Lassen Volcanic National Park

Why monitor streams?

Water quality and aquatic communities were identified as high-priority vital signs. Streams are a dominant feature of the landscape, both aesthetically and functionally in the parks. Their position in the watershed, integrating upstream watershed disturbances, both naturally occurring and man-made makes them powerful vital signs for monitoring park conditions. See the full, [final protocol](#) for additional details.

Water Quality parameters of concern

This resource brief focuses on four chemical Water Quality parameters that are monitored by the Klamath Inventory and Monitoring Network. They are: (1) Total Phosphorous, (2) Total Nitrogen, (3) Specific conductivity, and (4) Acid Neutralizing Capacity (ANC). These four parameters comprise the chemical conditions used by the Environmental Protection Agency's [Wadeable Streams Assessment](#).



Total Phosphorous/Total Nitrogen –These nutrients are indicators of the process of Eutrophication. The condition of eutrophication can lead to increased algal growth, which in turn can affect animal communities, impair the aesthetic qualities of the stream, reduce fishing and swimming opportunities, and even be directly toxic to animals. Nutrient enrichment generally occurs through agricultural or urban run-off, leaking septic systems, or other anthropogenic impacts. In the Klamath Network, we take water samples from a random, but spatially balanced selection of streams and send them for analysis at a specialized laboratory. Based on EPA water quality criteria, least disturbed sites have less than 0.125 mg/L of Total Nitrogen, and less than 0.01 mg/L of Total Phosphorous. Most disturbed sites have great than 0.2 mg/L of Total Nitrogen, and 0.04 mg/L of Total Phosphorous.

Specific Conductivity – The total amount of solutes or salts in the water contribute to the amount of electrical conductivity in the waterbody. Excessive conductivity occurs as a result of irrigation uses and water withdrawal. Based on EPA water quality criteria, least disturbed sites have less than 500 $\mu\text{S}/\text{cm}$ conductance (“microsiemens per centimeter” – the amount of electricity conducted over a distance), and most disturbed sites have greater than 1000 $\mu\text{S}/\text{cm}$ conductance.

Acid Neutralizing Capacity – Acid Neutralizing Capacity, or ANC, is a measure of the ability of the water to resist changes in pH with the addition of acids, through acid rain, or acid mine drainages. Values below 25 microequivalents per liter are considered sensitive to acidification. However, only streams with $\text{ANC} < 0$ are acidic (or impaired). Additionally, when ANC is low and sulfate concentrations are low, the likely source is acid rain; whereas with low ANC but high sulfate concentrations, the likely source is acid mine drainages.



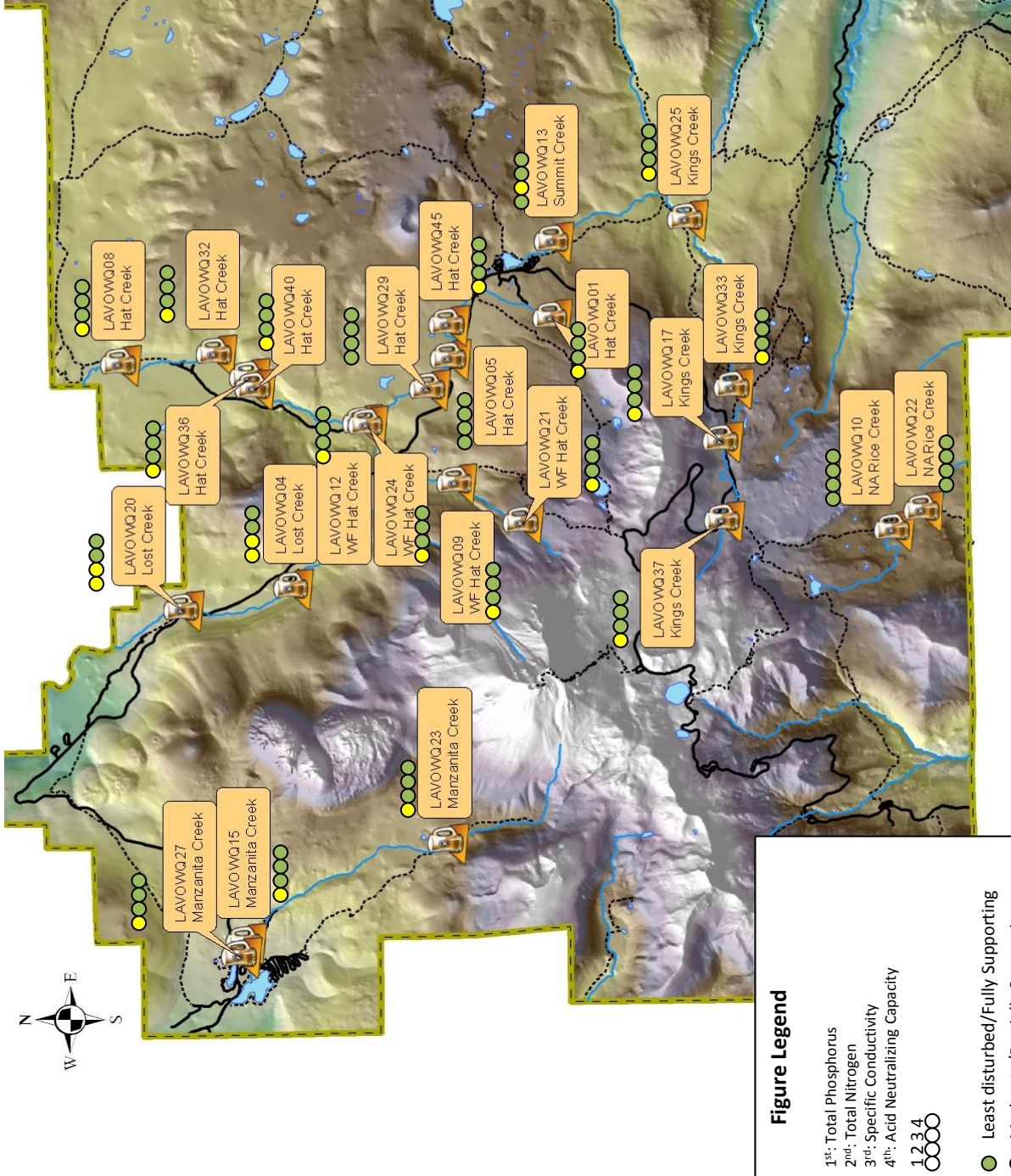
Results

Twenty-two sites were sampled in the summer of 2011, the first field season for Lassen Volcanic National Park (see map/results on back). Future years (2014, 2017, etc.) will resample these same sites (plus additional ones if time allows) for current status and eventual trend detection.

In general, water chemistry indicated overall good conditions. Based on Specific Conductivity and ANC, all sites were in the EPA category “least disturbed.” For Total Phosphorous, five of the 24 sites were “least disturbed,” with the remaining sites in the “Moderate” category. Elevated phosphorous, however, is natural for areas of volcanic activity, and these values probably do not indicate anthropogenic influences. For Total Nitrogen, 21 of the sites were “Least Disturbed,” and 3 were ranked “Moderate”. However, many of these values are close to the threshold value of being “least disturbed,” and there is no current impairment to water quality from Nitrogen. See the forthcoming annual report for more information.

	Total Phosphorous (mg/L)	Total Nitrogen (mg/L)	Specific Conductivity ($\mu\text{S}/\text{cm}$)	Acid Neutralizing Capacity ($\mu\text{eq}/\text{L}$)
Sample Size	24	24	24	24
Average (SE)	0.018 ($\pm$ 0.002)	0.05 ($\pm$ 0.007)	70 ($\pm$ 6)	645 ($\pm$ 59)
Median	0.018	0.04	70	631
Range	0.005 - 0.037	0.03 - 0.15	26 - 119	232 - 1120
# Least Disturbed	5	21	24	24
# Moderate	19	3	0	0
# Most Disturbed	0	0	0	0

Lassen Volcanic NP Wadeable Streams Sampling Sites



Actual Values

Site Code	Parameter			
	Total P (mg/l)	Total N (mg/l)	Sp. Cond (µS/cm)	ANC (µeq/l)
Hat Creek	0.011	0.03	50	475
Lost Creek	0.016	0.15	84	850
Hat Creek	0.009	0.06	48	420
Hat Creek	0.018	0.05	72	642
WF Hat Creek	0.033	0.09	109	1030
NA Rice Creek	0.008	0.04	38	330
WF Hat Creek	0.024	0.04	97	940
Summit Creek	0.009	0.15	26	365
Manzanita Creek	0.015	0.04	105	960
Kings Creek	0.027	0.03	34	265
Lost Creek	0.015	0.13	89	700
WF Hat Creek	0.029	0.07	96	950
NA Rice Creek	0.005	0.04	37	318
Manzanita Creek	0.018	0.07	69	619
WF Hat Creek	0.029	0.04	119	1120
Kings Creek	0.022	0.05	35	265
Manzanita Creek	0.014	0.05	112	870
Hat Creek	0.005	0.03	27	428
Hat Creek	0.021	0.04	48	910
Kings Creek	0.026	0.04	95	232
Hat Creek	0.021	0.03	34	920
Kings Creek	0.037	0.04	97	397
Hat Creek	0.022	0.05	97	930
Hat Creek	0.011	0.04	54	533

Condition Thresholds*

	Total P (mg/l)	Total N (mg/l)	Sp. Cond. (µS/cm)	ANC (µeq/l)
Least Disturbed	≤ 0.01	≤ 0.125	≤ 500	> 0
Most Disturbed	> 0.04	> 0.2	> 1000	< 0
				Not Acidic
				Acidic

*Sources: [Stoddard et al. 2005](#), [EPA 2006](#)