



2011 Wadeable Stream Water Quality Resource Brief Whiskeytown National Recreation Area

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 Phosphorus.

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 Whiskeytown (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 excellent conditions. Based on Total Nitrogen, Specific Conductivity, and ANC, all sites were in the EPA category “least disturbed,” although probe malfunction prevented measure Specific Conductivity at two sites. For Total Phosphorous, half of the 22 sites were “least disturbed,” with the remaining half of sites in the moderate category. Follow-up in these sites should be done, with anthropogenic fertilizer as a potential source of elevated phosphorous. 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 phosphorous. See the forthcoming annual report for more information.

Questions? Contact Dr. Eric Dinger, Klamath Network Aquatic Ecologist: Eric_Dinger@nps.gov
(541) 552-8574

	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	22	22	20	22
Average (SE)	0.013 (± 0.002)	0.079 (± 0.004)	83 (± 11)	738 (± 67)
Median	0.011	0.08	58	645
Range	0.005 - 0.032	0.03 - 0.11	32 - 202	345 - 1350
# Least Disturbed	11	22	20	22
# Moderate	11	0	0	0
# Most Disturbed	0	0	0	0

Whiskeytown NRA Wadeable Streams Sampling Sites

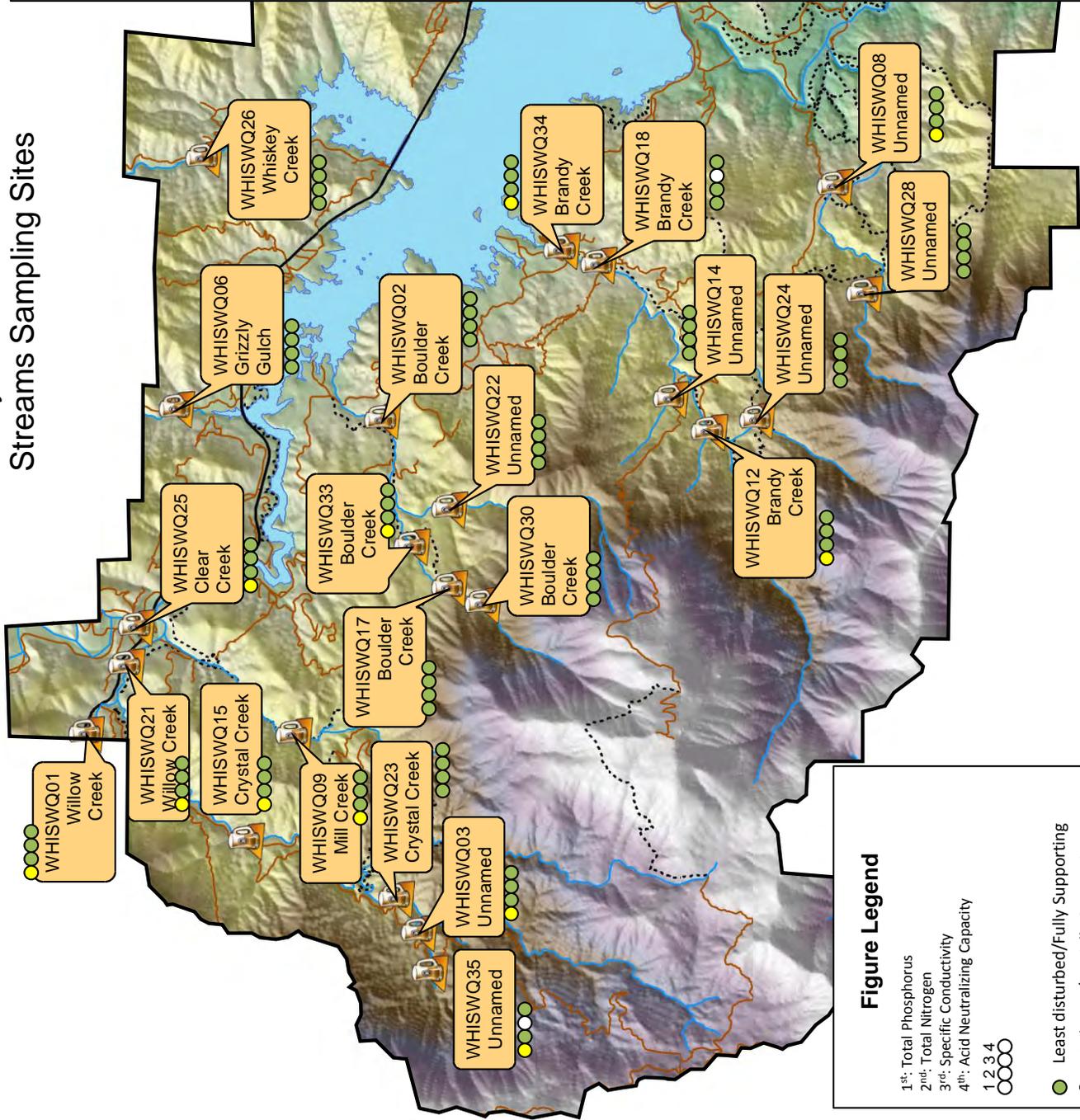


Figure Legend

- 1st: Total Phosphorus
- 2nd: Total Nitrogen
- 3rd: Specific Conductivity
- 4th: Acid Neutralizing Capacity
- 1 2 3 4

- Least disturbed/Fully Supporting
- Moderate/Partially Supporting
- Most disturbed/Not Supporting
- No Data/Not Applicable

Actual Values

Stream Name	WHISWQXX	Parameter		
		Total P (mg/l)	Total N (mg/l)	Sp. Cond. (µS/cm)
Willow Creek	01	0.025	0.06	202
Boulder Creek	02	0.009	0.05	39
Unnamed	03	0.015	0.06	130
Grizzly Gulch	06	0.01	0.07	162
Unnamed	08	0.011	0.09	51
Mill Creek	09	0.016	0.06	102
Brandy Creek	12	0.011	0.09	43
Unnamed	14	0.005	0.06	86
Crystal Creek	15	0.011	0.09	54
Boulder Creek	17	0.009	0.03	32
Brandy Creek	18	0.01	0.08	
Willow Creek	21	0.013	0.1	176
Unnamed	22	0.008	0.08	118
Crystal Creek	23	0.01	0.07	62
Unnamed	24	0.007	0.11	38
Clear Creek	25	0.032	0.1	88
Whiskey Creek	26	0.03	0.11	108
Unnamed	28	0.01	0.06	40
Boulder Creek	30	0.009	0.1	38
Boulder Creek	33	0.012	0.09	49
Brandy Creek	34	0.011	0.07	53
Unnamed	35	0.021	0.11	

Condition Thresholds*

	Total P (mg/l)	Total N (mg/l)	Sp. Cond. (µS/cm)	ANC (µeq/l)
Least Disturbed	≤ 0.01	≤ 0.2	≤ 500	> 0
Most Disturbed	> 0.04	> 0.125	> 1000	< 0

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