Hot Creek Nitrogen Basin Plan Amendment

Background

Hot Creek originates about 2,000 ft upstream of its confluence with Mammoth Creek in Mono County. It is fed by numerous thermal springs as well as snowmelt-dominated flows from Mammoth Creek. Springs near the origin of Hot Creek flow through the Hot Creek Fish Hatchery before releasing into the stream. Another significant source of stream flow comes from the Hot Creek Geological Site where mineral-rich groundwater heated by subsurface molten rock reaches the surface. Hot Creek is also notable for its productive fisheries and abundant aquatic vegetation.

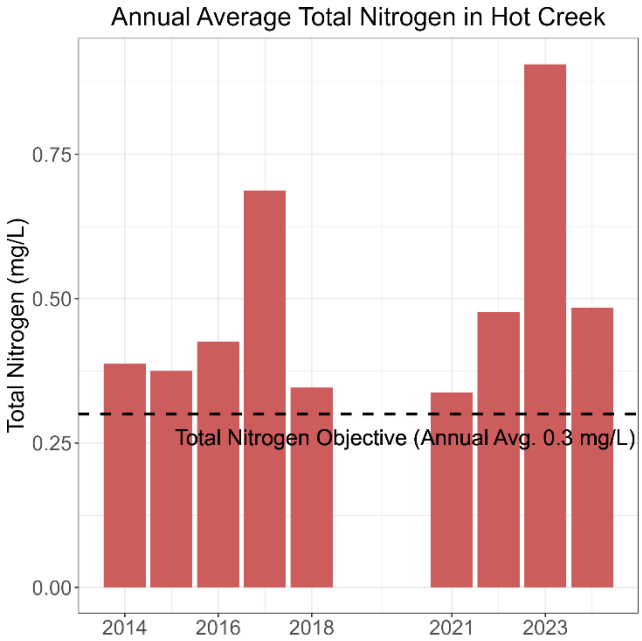
Nitrogen concentrations in Hot Creek often exceed the Total Nitrogen (TN) and Nitrate as N water quality objectives for Hot Creek, which are identified in Chapter 3, Table 3-17 of the Water Quality Control Plan for the Lahontan Region (Basin Plan).

The TN objectives are an annual average of 0.3 mg/L and a 90th percentile of 1.5 mg/L; The Nitrate as N objectives are an annual average of 0.2 mg/L and a 90th percentile of 0.4 mg/L.

Project Objectives

Develop new or revised nitrogen objectives for Hot Creek that:

1. account for background levels of nitrogen in Hot Creek
2. are still protective of the aquatic life beneficial use of Hot Creek.



Description. Annual averages of total nitrogen in Hot Creek between 2014 and 2024. Total Nitrogen consistently exceeds the water quality objective of 0.3 mg/L as an annual average.

Why do we need to revise the objectives?

Nitrogen concentrations in the springs, in the water that discharges from the Hot Creek Fish Hatchery, and in the receiving water downstream of the hatchery exceed the water quality objectives for Hot Creek. Studies suggest that at least some of the nitrogen occurs naturally in the thermal springs that feed Hot Creek[1]. More nitrogen is added to the water from the Hot Creek Fish Hatchery operations and possibly from other groundwater sources. However, given the natural background nitrogen levels in Hot Creek and similar spring-fed systems, it is essential to update the Lahontan Region's Basin Plan to reflect this unique ecosystem. To do so, Water Board staff are reviewing available water quality data to better understand the various inputs of nitrogen to Hot Creek, to characterize stream health, and ultimately to determine appropriate water quality objectives that protect the beneficial uses of Hot Creek.

What are Beneficial Uses?

Beneficial uses, which are defined in Chapter 2 of the Basin Plan, are the uses of a waterbody that support, or benefit, a particular activity or natural function, and require water quality protections so those uses continue to be supported. Examples include water supply (agricultural, municipal, industrial), swimming, and fishing. The beneficial uses most relevant to this project include the recreational and aquatic life uses of Hot Creek.

Is water quality still protected?

Understanding the health of Hot Creek's biological community and ecosystem will allow staff to develop objectives appropriate for the protection of the unique conditions present in Hot Creek and prevent water quality degradation. Hot Creek can still support its beneficial uses even if the water quality objectives are changed. To ensure that Hot Creek's water quality is protected, the development of new objectives requires analysis of past and current conditions to derive appropriate objectives. The analysis then must undergo a peer review process. To develop these new or revised objectives, staff are taking into consideration the various inputs of nitrogen to Hot Creek and determining whether the creek is experiencing symptoms of eutrophication (e.g., excessive algal growth, fish die-offs, large daily swings in dissolved oxygen and pH, benthic macroinvertebrate community health).

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Reference: 1. Deas M, Laird J, Tanaka S, Dahlgren RA. 2024 Geologically-derived nitrogen phosphorus as a source of riverine nutrients. *Earth Critical Zone* 1: 100003