

Sampling Analysis Plan (SAP) for the Nutrient Diffusing Substrates Pilot Project FY 2013

Colorado Department of Public Health and Environment
Water Quality Control Division
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1.0 INTRODUCTION

This Sampling Analysis Plan (SAP) describes the sampling and analysis methods that will be affiliated with the nutrient diffusing substrates (NDS) studies for the State of Colorado during the 2013 fiscal year (July 1, 2012 to June 30, 2013).

The Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (WQCD) has the responsibility to monitor and protect the surface waters in the State of Colorado. The WQCD monitoring program is responsible for collecting scientifically sound water quality monitoring data using established data collection methods and assessing those data using a reproducible approach. This approach includes employing bioassessment techniques for use in gauging the overall ecological integrity, detecting aquatic life impairments and assessing their relative severity. Integrating information from these biological communities, such as benthic macroinvertebrates, as well as from habitat assessments (modified Rapid Bioassessment Protocol (RBP) and pebble counts) and other indicator assemblages, such as periphyton and fisheries, will further provide a comprehensive diagnostic assessment of impacts. Therefore, bioassessment results will be used to appraise the status of surface waters relative to the primary goal of the Clean Water Act and Colorado's Water Quality Act.

The WQCD's Quality Management Plan (QMP) states that the quality assurance and quality control program will be implemented through the mandatory use of smaller Sampling and Analysis Plans (SAPs), which are originated for program-specific projects, under the umbrella of a more comprehensive, long-term Quality Assurance Project Plan (QAPP).

2.0 BACKGROUND

Nutrient diffusing substrates (NDS) are commonly used to measure whether or not benthic biofilm growth is limited by nutrients. Most commonly nitrogen and/or phosphorus are studied, but other micronutrients such as iron may limit benthic algal growth and reproduction. In bioassays using NDS, small plastic cups are filled with nutrient-enriched agar and attached to 1'x1' concrete blocks, anchored to the stream bottom. The nutrients diffuse out of the cups through porous glass disks which serve as a substrate on which benthic biofilms grow. After 21 days in the stream, the disks are harvested and analyzed for chlorophyll *a* (the pigment found in plants and algae) and/or organic matter content (ash-free dry mass).

The Division intends to deploy NDS at three locations (Table 1) in Boulder Creek on August 17, 2012. Water chemistry samples will be also be collected on the date of deployment as well as on August 24th, August 31st and September 7th.

3.0 STATEMENT OF SPECIFIC PROBLEM

The WQCD will use the information collected as part of the FY 2013 NDS pilot project on Boulder creek to further refine NDS methods to be used in an expanded program in subsequent years by the TMDL, Environmental Data, and Standards Units to assess nutrients and nutrient limitation in Colorado rivers and streams.

4.0 RESPONSIBLE AGENCY AND CONTACTS

The WQCD will be responsible for the design and coordination of this FY 2013 study.

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5.0 SAMPLING GOALS AND TARGETS

The objectives of this SAP are as follows:

- 1) Evaluate the effectiveness and efficiency of using nutrient diffusing substrates as a means of determining site specific nutrient limitation and refine methods for use in future studies.
- 2) Collect coincident water quality data for the duration of the NDS deployment
- 3) Determine nutrient limitation at low level nutrient concentrations and how this changes with nutrient enrichment
- 4) Determine the impact of point and non-point sources on nutrient limitation and algal growth.

6.0 SAMPLING DESIGN AND LOCATIONS

The Division intends to deploy NDS at three locations (Table 1) in Boulder Creek on August 17, 2012. Water chemistry samples will be also be collected on the date of deployment as well as on

August 24th, August 31st and September 7th. A continuously monitoring water quality sonde will also be deployed at the furthest downstream station (Duncan Lane).

Table 1. Nutrient Diffusing Substrate Pilot Project – Sampling Locations			
StationID	Location	Lat	Long
5580	BOULDER CK BELOW BARKER DAM @ MILE MARKER 29	39.97900	-105.45550
5577	BOULDER CK @ VALMONT RD. UPSTREAM OF SOUTH BOULDER CK	40.02900	-105.22333
New Station	BOULDER CK @ DUNCAN LANE	40.04927	-105.14471

7.0 REFERENCES

Hauer F.R. and G.A. Lamberti. 2006. Methods in Stream Ecology. Academic Press, San Diego, CA.