



DEPARTMENT OF
ECOLOGY
State of Washington

Addendum to Quality Assurance Project Plan

Clover Creek Dissolved Oxygen, Fecal Coliform, and Temperature Total Maximum Daily Load: Riparian Canopy Hemispherical Imagery Assessment

July 2013

Publication No. 13-03-115

Publication Information

Addendum

This addendum is on the Department of Ecology's website at <https://fortress.wa.gov/ecy/publications/SummaryPages/1303115.html>

This addendum is an addition to an original Quality Assurance Project Plan. It is not a correction (errata) to the original plan.

Activity Tracker code

Ecology's Activity Tracker Code for this addendum is 13-012.

Original Publication

Quality Assurance Project Plan: Clover Creek Dissolved Oxygen, Fecal Coliform, and Temperature Total Maximum Daily Load Water Quality Study Design

Publication website link <https://fortress.wa.gov/ecy/publications/SummaryPages/1303109.html>.

Publication Number 13-03-109

Author and Contact Information

James Kardouni
Environmental Assessment Program
Washington State Department of Ecology
Olympia, Washington 98504-7710

For more information contact:

Communications Consultant
Phone: 360-407-6834

Any use of product or firm names in this publication is for descriptive purposes only and does not imply endorsement by the author or the Department of Ecology.

*If you need this document in a format for the visually impaired, call 360-407-6834.
Persons with hearing loss can call 711 for Washington Relay Service.
Persons with a speech disability can call 877-833-6341.*

Addendum to Quality Assurance Project Plan

Clover Creek Dissolved Oxygen, Fecal Coliform, and Temperature Total Maximum Daily Load: Riparian Canopy Hemispherical Imagery Assessment

July 2013

Approved by:

Signature: _____ Date: July 2013
Cindy James, Client, Water Quality Program, Southwest Regional Office

Signature: _____ Date: July 2013
Andrew Kolosseus, Client's Interim Unit Supervisor, Water Quality Program, Southwest Regional Office

Signature: _____ Date: July 2013
Greg Zentner, Client's Section Manager, Water Quality Program, Southwest Regional Office

Signature: _____ Date: July 2013
James Kardouni, Author / Project Manager / Principal Investigator / EIM Data Engineer, EAP

Signature: _____ Date: July 2013
George Onwumere, Author's Unit Supervisor, EAP

Signature: _____ Date: July 2013
Robert F. Cusimano, Author's Section Manager, EAP

Signature: _____ Date: July 2013
Joel Bird, Director, Manchester Environmental Laboratory

Signature: _____ Date: July 2013
Bill Kammin, Ecology Quality Assurance Officer

Signatures are not available on the Internet version.

EAP: Environmental Assessment Program

EIM: Environmental Information Management database

Riparian Canopy Hemispherical Imagery Assessment

Summary

One objective presented in the initial Clover Creek Quality Assurance (QA) Project Plan (Kardouni, 2013) is to assess riparian shade. This addendum to the QA Project Plan describes an additional riparian assessment procedure which uses a recently acquired Solmetric SunEye™ field instrument. Shade values produced by the Solmetric SunEye™ will be compared to those produced by the HemiView® field instrument and associated software. Comparison results will be incorporated into the final technical report of the Clover Creek study.

This addendum provides:

1. Summary of the original QA Project Plan in relation to hemispherical photography
2. Description of data acquisition and analysis using the Solmetric SunEye™
3. Comparison approach between the two techniques

Summary of Original QA Project Plan Riparian Canopy Imagery Assessment

Effective shade is defined as the fraction of the potential solar shortwave radiation that is blocked by vegetation and topography before it reaches the stream surface. Effective shade accounts for the interception of solar radiation by vegetation and topography.

Hemispherical photography analysis generates site-specific information by taking 360° pictures of the sky to calculate the effective shade provided by vegetation and topography at the center of the stream. Digital photographs will be taken at each fixed-network site and at a few reference reaches to document and verify existing riparian vegetation compared to aerial photos. The digital images will be processed and analyzed using the HemiView® software program to estimate effective shade (Kardouni, 2013).

Data acquisition and analysis procedures will follow Standard Operating Procedures (SOPs) developed by Ecology's Environmental Assessment Program including:

- EAP045 *Hemispherical Digital Photography Field Surveys Collected as part of a Temperature Total Maximum Daily Load (TMDL) or Forests and Fish Unit Technical Study*
- EAP046 *Computer Analysis of Hemispherical Digital Images Collected as part of a Temperature Total Maximum Daily Load (TMDL) or Forests and Fish Unit Technical Study*

SOP documents can be found on the web at: www.ecy.wa.gov/programs/eap/quality.html.

Additional Proposed Riparian Canopy Assessment

The Solmetric SunEye™ is a handheld unit with integrated 360° camera lens (fish-eye lens). Its processing software can determine annual, seasonal, monthly, and quarter-hourly shading percentages (© Solmetric Corporation, 2010).

HemiView® and SunEye™ Comparison

Digital photos will be taken at each fixed-network site using both methods. Additional photos may be taken for increased characterization of the watershed's riparian canopy.

Photos and exported data will be documented into a library for analysis and future reference. Both methods can assess and report effective shade. Effective shade will be expressed as a shading percentage (percent effective shade) for the months of June, July, August, and September. Monthly percent effective shade will be used for comparison between the two methods using the relative percent difference statistic (Kardouni, 2013).

Finally, an SOP will be developed to document the use and application of the Solmetric SunEye™. However, if the two methods are not comparable, additional studies may be necessary to further confirm their differences. Regardless of the comparison results, the SunEye™ should remain a useful tool to estimate effective shade.

References

Kardouni, J., 2013. Clover Creek Dissolved Oxygen, Fecal Coliform, and Temperature Total Maximum Daily Load Water Quality Study Design (Quality Assurance Project Plan) Washington State Department of Ecology, Olympia, WA. Publication No. 13-03-109. <https://fortress.wa.gov/ecy/publications/SummaryPages/1303109.html>.

Solmetric Corporation, 2010. Solmetric SunEye™ User's Guide version 4.22. Sebastopol, CA. <http://www.solmetric.com/buy210.html>.