

# Prototype Project Assessment and Evaluation Plan

## Load Reduction

### *Reducing Pesticide-induced Sediment Toxicity from Stonefruit Orchards in the Mill Creek Watershed*

#### I. Project Summary

##### A. Funding Program

*The Project is supported by Proposition 50 as part of the Agricultural Water Quality Grant Program and local and federal matching funds.*

##### B. Project Description

*The middle and lower reaches of Mill Creek and two of its tributaries have been placed on the “impaired waters list” for pesticide toxicity attributable to agricultural land use practices. This project is designed to demonstrate the efficacy of reducing pesticide use by 20% throughout the watershed and restore aquatic life beneficial uses in Mill Creek. It builds on several preceding efforts that assessed beneficial use impairment, developed a detailed conceptual model describing water and sediment transport processes throughout the watershed, as well as pesticide transport and fate. Targets for TMDL implementation have been adopted by USEPA, and implementation plans are currently under development. The project will contribute to fine-tuning several proposed implementation steps and provide “proof-of-concept” documentation for large-scale application of selected Best Management Practices.*

##### C. Problem Statement:

###### i. Identify or characterize baseline data

*More than 40% of the watershed below river mile 42 is comprised of land cover consisting of stonefruit orchards and associated farm infrastructure (roads, both paved and unpaved, storage buildings, irrigation canals, etc.). The most recent pesticide use statistics show annual application rates of roughly 20,000 lbs of various synthetic pyrethroid compounds, comprising 95% of all pesticides applied. During synoptic sampling of Mill Creek and its two major tributaries draining agricultural land uses, nine out of ten samples exhibited sediment toxicity to bioassay organisms (*Hyalella* spp.).*

###### ii. Identify one or more sources of pollution

*Stonefruit orchards are suspected to be the main source of pollution.*

###### iii. Identify and describe current (if applicable) and proposed restoration activities; Best Management Practices (BMPs); load reduction activities; prevention activities

*Several landowners with a combined acreage of 1,100 acres are transitioning to organic farming practices and are in their third year of conversion. The UC Cooperative Extension Program has begun to promote its Integrated Pesticide Management training curriculum, and the recent waiver conditions for Waste Discharge Requirements caused 99% of landowners to enroll in continuing education classes pertaining to IPM, and management practices for pesticide impact reduction to receiving waters.*

- iv. Describe the manner in which BMPs or Management Measures are proposed to be implemented

*This project will be testing the efficacy of three types of Management Measures in reducing sediment toxicity: 1) Enrolling 1,000 additional contiguous stonefruit acres in the “Going Organic” program. 2) Establishing detention ponds collecting orchard runoff at each discharge point into Mill Creek and tributaries that prevent contaminated sediment from being transported into receiving waters. 3)*

*Implementing a combination of Integrated Pest Management practices by 90% of the stonefruit farmers in the Dry Creek watershed (one of the tributaries to Mill Creek), cover crop and buffer strip BMPs according to recent UC Cooperative Extension handbooks. Detention pond engineering designs have already been approved by all necessary local, state, and federal agencies, and 90% of Dry Creek watershed farmers have already signed up for the demonstration program.*

- v. Summarize how the effectiveness of project implementation will be measured

*We will measure effectiveness of the project by taking an initial sediment sample set (n=30) distributed randomly in the middle and lower reaches of Mill Creek and its two tributaries to assess pre-implementation sediment toxicity. These random samples will be augmented by targeted water samples at the confluence of the ditches draining the largest contiguous parcels enrolled in the “Going Organic” program and the confluence of Dry Creek and ten farm drain outlets. The water samples will receive a pesticide scan and will be analyzed for pyrethroid pesticides. In addition, samples will be taken concurrently with sediment samples according to the recently developed bioassessment methodology for low-gradient streams and analyzed for aquatic macroinvertebrates. The same sampling regime will be followed in Year 3 after implementation of pesticide reduction measures.*

- vi. Determine, to the extent feasible, changes in flow pattern in affected water bodies

N/A

- vii. Determine, to the extent feasible, changes in flow pattern in affected water bodies

N/A

- viii. Determine economic benefits of implementing project

N/A. Not a requirement of AWQGP.

#### D. Project Activities or Tasks

Task 1: Project Management and Administration

Task 2: Develop detailed monitoring plan, stating hypotheses to be tested, desired statistical power to be achieved, number of sampling sites required, and appropriate sample timing.

Task 3: Develop Quality Assurance Project Plan linking project objectives with data quality objectives.

Task 4: Work with UC Cooperative Extension staff to agendize feedback on monitoring plan by landowners and enhance participation in Dry Creek BMP pilot if necessary.

Task 5: Obtain access permission to candidate sampling sites (including replacement sites where permission is denied).

Task 6: Conduct landowner outreach and use existing education material to enroll additional farmers in “Going Organic” program.

*Task 7: Implement pre-implementation sampling.*

*Task 8: Work with landowners and UC Cooperative Extension staff to track implementation progress.*

*Task 9: Conduct post-implementation sampling at the end of Year 2 and beginning of Year 3.*

*Task 10: Assess data and write evaluation report.*

*Task 11: Submit data to SWAMP database.*

E. Category of Project Activities or Tasks:

*All project activities and tasks fall into the Load Reduction Category.*

## II. Project Goals & Desired Outcomes

*The goals of this project are:*

- 1) Demonstrate the environmental response to pesticide use reductions of 20%.13)*
- 2) Contribute to achievement of TMDL target of zero sediment toxicity.*

*The desired outcomes of this project are:*

- 1) Enrollment of an additional 1,000 contiguous acres in the "Going Organic" Program*
- 2) Enrollment of 90% of Dry Creek farms in BMP testing program.*
- 3) Reduction in pesticide use by 20%*
- 4) Reduction of toxic "hits" between pre-project conditions and project implementation by 75%*
- 5) Increase in benthic macroinvertebrate diversity*

## III. Project Performance Measures Table



**Table 4**  
**Example Performance Indicators for Load Reduction**  
*Reducing Pesticide-induced Sediment Toxicity from Stonefruit Orchards in the Mill Creek Watershed*

<b>Project Goals</b>	<b>Desired Outcomes</b>	<b>Output Indicators</b>	<b>Outcome Indicators</b>	<b>Measurement Tools and Methods</b>	<b>Targets</b>
1. Demonstrate the environmental response to pesticide use reductions of 20%.	1. Increase in contiguous acreage in the "Going Organic" Program. 2. Large-scale enrollment of Dry Creek farms in BMP testing program. 3. Pesticide use reduction 4. Reduction of sediment toxicity 5. Increase in benthic macroinvertebrate diversity	1. No. of landowners granting access permission; 2. No. of contiguous acres enrolled in "Going Organic" 3. Number of Dry Creek landowners participating in monitoring plan workshop 4. Number of Dry Creek landowners following implementation schedule	1. Percent reduction of sediment toxicity hits 2. Percent increase in aquatic macroinvertebrate diversity 3. Percent reduction in pesticide use 4. Percent reduction in pyrethroid concentrations in orchard drain water	1. Sed. tox. Bioassay standard procedures; 2. Hayworth, J.D. and G. Siemering. July 2003. Aquatic Pesticide Monitoring Program Phase 2 Monitoring Plan. San Francisco Estuary Institute, Oakland, CA. 3. DFG, Rancho Cordova, GC-ECD or GCMS methods.	1. Enrollment of an additional 1,000 contiguous acres in the "Going Organic" Program. 2. Enrollment of 90% of Dry Creek farms in BMP testing program. 3. Statistically significant increase in benthic macroinvertebrate diversity. 4. Pesticide use reduction of 20%.
2. Contribute to achievement of TMDL target of zero sediment toxicity	Reduction of sediment toxicity	1. No. of landowners granting access permission; 2. No. of contiguous acres enrolled in "Going Organic" 3. Number of Dry Creek landowners participating in monitoring plan workshop. 4. Number of Dry Creek landowners following implementation schedule	1. Percent reduction of sediment toxicity hits 2. Percent increase in aquatic macroinvertebrate diversity 3. Percent reduction in pyrethroid concentrations in orchard drain water	Same as above	Reduction of toxic "hits" between pre-project conditions and project implementation by 75%.