Written Comments and Submittals

Part I. Written Comments Received in Response to February 10, 2006 Documents

Part II. Materials Received During April 12, 2006 Board Hearing

Part III. Peer Review Comments

Part I. Written Comments Received in Response to February 10, 2006 Documents

COUNTY OF SONOMA
PERMIT AND RESOURCE MANAGEMENT DEPARTMENT

2550 Ventura Avenue, Santa Rosa, CA 95403-2829
(707) 565-1900 FAX (707) 565-1103

Fax Transmittal Sheet

To: Tina Low - Water Quality Control Board

Fax #: 510-622-2460

From: Randy Leach - County of Sonoma

Telephone Number: 707-565-3636

Date: 3/27/06 Time: ≈12:00 noon

Number of Pages: 4
(Including this page)

MESSAGE: Some Comments - Also in mail today

If you do not receive all pages numbered above, call _____.

COUNTY OF SONOMA
PERMIT AND RESOURCE MANAGEMENT DEPARTMENT
2550 Ventura Avenue, Santa Rosa, CA 95403-2829
(707) 565-1900 FAX (707) 565-1103

March 27, 2006

Tina J. Low, PE
Water Resource Control Engineer
Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, Ca. 94612

RE: Comments Regarding the Content of the Staff Report and Proposed Basin Plan Amendment - "Pathogens in Sonoma Creek Total Maximum Daily Load (TMDL)" as Proposed by The California Regional Water Quality Control Board San Francisco Bay Region (dated February 10, 2006).

Dear Ms. Low:

The Sonoma County Permit and Resource Management Department (PRMD) appreciates this opportunity to provide the Regional Water Quality Control Board with comments regarding the proposed Basin Plan Amendment. We have provided a summary listing of key issues that we feel should be more thoroughly addressed. We would welcome the opportunity to discuss these issues with appropriate Regional Board staff prior to consideration of adoption. Ultimately, we feel that the Regional Board must address these issues in order to provide the reviewing public with a complete understanding of what is being proposed and to satisfy the requirements of the California Environmental Quality Act (CEQA).

Key Issues:

1. <u>Lack of Scientific Justification for Key Elements of the Proposed Regulations.</u>

While we believe that there is clearly a need to improve water quality in Sonoma Creek, we also know that individual property owners and local regulatory agencies have limited resources to devote to this effort. Thus, we believe that both public and private efforts must be focused in areas that will achieve the greatest result. For this reason, we believe that the Regional Board should conduct a more critical analysis of the contamination of Sonoma Creek before asking local government and individual home owners to devote financial resources and staff to what appears to be a very broad and expensive program. Specifically, Microbial Source Tracking (MST), including host specific genetic finger printing, should be used to determine the likely source of the E. coli contamination. MST is more expensive and time consuming but it would allow for efforts to be focused on the area that will yield the greatest benefit. A more comprehensive investigation and sampling protocol needs to be done to conclusively determine that elevated E. coli contamination in Sonoma Creek is a result of septic system discharge rather

than naturally occurring contamination from wild life or other sources. Costs for MST are much lower today and more accurate then it was when the original sampling was completed.

2. Financial Impacts to Existing Homeowners and New Statewide Septic System Standards (AB 885).

The Regional Board should more thoroughly investigate the costs that will need to be borne by homeowners that are adjacent to 303(d) listed water bodies, specifically Sonoma Creek. The number of impacted homeowners needs to be more accurately estimated and the locations of impacted areas need to be more clearly described. The staff report must discuss the anticipated consequences if homeowners are unable to afford the requisite costs for compliance. Will noncompliant systems have to be abated with the consequent abandonment of homes? Providing grant application assistance to local government agencies and limited financial assistance to homeowners through loan programs is not a sufficient financial impact analysis, particularly given the increasing scarcity of state funds for such purposes.

General estimates for repair of septic systems based on personal conversations are presented in the staff report for the "typical" costs of installing/repairing conventional septic systems. Estimates were not included for repair and replacement of nonstandard systems with supplemental treatment, which are considerably more expensive then what is presented in the report. The staff report states that the cost estimates for repair and replacement are based on personal communication with two individuals without further substantiation.

The staff report must also address the relationship and mandates of the pending statewide standards for septic systems (AB 885) as they would relate to the new proposed basin plan amendment. We are concerned the new statewide septic regulations and the Basin Plan amendment will cause duplication of effort and be at cross purposes in terms of parcels adjacent to 303 (d) impacted waterways and repair and replacement of septic systems. It would seem to make sense to wait for the adoption and approval of the statewide septic regulations before adoption of the Basin Plan amendment.

3. Impacts on Local Government Resources.

Prior to adoption of the Basin Plan amendment PRMD staff would like to work closely with the Regional Board to better define local government responsibility. The staff report is unclear regarding the specific tasks required in development of an implementation plan and management plan. As you probably know, PRMD already administers a very comprehensive program for the regulation of septic systems. This not only includes permitting for new systems and upgrades to existing systems, but also an annual operational permit program for non-standard systems. We are very concerned about adding a significant new regulatory and/or monitoring component to this program.

The staff report needs to include a more complete and comprehensive assessment of the costs to local government to implement the proposed Basin Plan Amendment. This needs to include analysis of the resources needed to carry out all proposed implementation plans, management plans, sanitary surveys, and enforcement provisions. This assessment should also identify options for funding the increased costs that local governments will incur with the proposed project.

Sonoma County is highly supportive of improving the water quality in the Sonoma Creek

watershed and in all of our 303 (d) impacted streams. We look forward to working collaboratively with the Regional Board in establishing a reasonable science based Basin Plan Amendment and TMDL for the Sonoma Creek water shed.

Thank you for the opportunity to comment,

Randy Leach, REHS
Division Manager
Well and Septic Division
Sonoma County Permit and Resource Management Department

cc: Board of Supervisors
County Administrator

DRAFT

March 26, 2006

Tina Low
California Regional Water Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

RE: Proposed Amendments to the Water Quality Control Plan for the San Francisco Bay Basin, Establishing a Total Maximum Daily Load (TMDL) for Pathogens in the Sonoma Creek Watershed

Dear Ms. Low

The Sonoma County Water Agency (SCWA) has prepared this letter in response to the proposed amendments to the Water Quality Control Plan for the San Francisco Bay Basin, Establishing a Total Maximum Daily Load (TMDL) for pathogens in the Sonoma Creek Watershed. SCWA understands that public comment is due to the Regional Water Quality Control Board, San Francisco Region (Water Board) by March 27, 2006 and the Water Board will receive testimony regarding the proposed amendment at a public hearing scheduled for April 12, 2006.

SCWA is a Special District that provides wholesale water supply to approximately 570,000 people in Marin and Sonoma Counties. In addition, SCWA is responsible for operating the Sonoma Valley Wastewater Treatment Plant and collection system on behalf of the Sonoma Valley County Sanitation District. In cooperation with the City of Sonoma, SCWA participates with the County of Sonoma, as co-permittees under the Phase II General Permit for Small Municipal Separate Storm Sewer Systems (Small MS4s), to implement a Storm Water Management Plan (SWMP). SCWA is also a member of Bay Area Clean Water Agencies (BACWA). Participation in BACWA allows SCWA to stay engaged and inform on decisions affecting Publicly Owned Treatment Works and water quality.

Based on staffs review of the proposed basin plan amendment, SCWA would like to provide the following general comments:

- The proposed TMDL does not allocate loads. Load allocations and target concentrations appear to be the same. If calculated, load allocation should be the density of the pathogen multiplied by the volume of water released into a given volume of receiving water;

DRAFT

- SCWA is unclear why separate TMDLs are being proposed for the Sonoma Valley Treatment Plant and the collection system. Pathogen loading resulting from untreated waste does not result in a greater health risk than pathogen loading resulting from the release of adequately treated effluent;

- More rigorous sampling and analysis is required to evaluate source identification. For example, the staff report prepared by the Water Board appears to assume that wildlife is not a significant source of pathogen loading to the watershed based on the limited data set. As stakeholders in the watershed, SCWA and the Sonoma Valley County Sanitation District would be willing to participate in additional studies that would better assess: (1) pathogen identification; (2) background pathogen levels in the watershed; and (3) the watersheds ability to assimilate pathogen loading. Additional information provided by these additional studies is essential for developing a realistic and scientifically based TMDL.

- In the section summarizing the Pollutant Source Assessment, homeless encampments have been associated with municipal runoff. While likely a significant source of waterborne pathogens, SCWA has no legal authority to address or mitigate this possible source;

- It would be helpful if the sampling procedures used during the study conducted cooperatively by the Water Board and San Francisco Estuary Institute were described in the staff report prepared by the Water Board;

- There is little or no data collected from the Sonoma Creek Watershed to support the validity of the Water Boards assumptions regarding pathogen die-off; and

- The Water Board's staff report assumes that during the dry season, pathogen transport is dominated by groundwater inflow. Although limited sections of creeks in the watershed may be gaining, seepage runs conducted as part of a multi-year hydrogeologic study of the Sonoma Valley performed cooperatively by the United States Geological Survey and SCWA indicates that Sonoma Creek is characterized by many loosing reaches during the dry season.

We appreciate the opportunity to review and comment on the Water Board's proposed pathogen TMDL for the Sonoma Creek watershed. We will continue to review the proposed TMDL and will likely provide additional comments at the Board hearing scheduled for April 12. We look forward to cooperating with the Water Board to develop approaches that would result in reduced pathogen loading to the Sonoma Creek watershed.

Sincerely,

Don Seymour, P.E.

DRAFT

Water Agency Principal Engineer

Cc: Pam Jeane, Kevin Booker, Randy Cullen, Jeff Church - SCWA

Tina Low - Pathogen TMDL for Sonoma Creek

From: "Becca Lawton" <becca@sonomaecologycenter.org>
To: "Tina Low" <tlow@waterboards.ca.gov>
Date: 3/27/2006 12:54 PM
Subject: Pathogen TMDL for Sonoma Creek
CC: "Richard Dale" <richard@sonomaecologycenter.org>

Dear Tina,
Thanks for making the project report for the Total Maximum Daily Load for Pathogens in the Sonoma Creek Watershed (dated December 1, 2005) available for review. We at the Sonoma Ecology Center have had the opportunity to attend your presentation of preliminary results, as well as to read the report. These issues caught our attention.

1. Hotspots identified in the 2002-2003 study were confirmed by supplemental monitoring in 2004-2005 (page 18). This confirmation presents a strong case that the elevated E. coli densities found downstream of Kenwood are not anomalous and need to be addressed. Also, should a treatment facility be required for Kenwood, which could encourage growth in the area, associated impacts to the marsh, groundwater supply, and environmental quality (such as air pollution) would need to be addressed as well.
2. The source assessment summary on page 20 gives sound reasons, supported by detailed information throughout the report, that the sources most important to address first if Sonoma Creek is to become less pathogen impaired are septic systems, sanitary sewer system failures, municipal runoff, cattle grazing, and improperly managed dairies.
3. The implementation action tables that begin on page 34 seem reasonable and are thoughtfully presented. The actions spread the responsibility among the agencies best suited to address pathogen loading.

We're often asked by Sonoma Valley residents whether it's okay for their kids to swim in the creek. We'd like to be able to answer with a resounding "yes," but at the moment we feel we must qualify any response with the knowledge that we've gained through the pathogen TMDL. We also know first-hand how diligent the RWQCB and SFEI staff have been in gathering the data and analyzing the meaning of their findings; Sonoma Valley residents are extremely fortunate to have had such a well-qualified, committed team working on this study. The Sonoma Ecology Center would like to add its voice to the chorus of support for implementing the proposed actions.

Sincerely,

Rebecca Lawton
Geologist, Research Program Manager
Sonoma Ecology Center
20 East Spain Street
Sonoma, CA 95476
707-996-0712, x116
mailto:becca@sonomaecologycenter.org
Act locally! Join us at http://www.sonomaecologycenter.org.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

February 27, 2006

CALIFORNIA REGIONAL WATER
FEB 28 2006
QUALITY CONTROL BOARD

Ms. Tina Low
Mr. Peter Krottje
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Ste. 1400
Oakland, CA 94612

Dear Ms. Low and Mr. Krottje:

Thank you for the opportunity to comment on the proposed Staff Report and Basin Plan Amendment for the Napa River Watershed Pathogens TMDL and the proposed Staff Report and Basin Plan Amendment for the Sonoma Creek Watershed Pathogens TMDL. We appreciate your hard work to develop these TMDLs. We have reviewed both proposed Staff Reports and Basin Plan Amendments, and our comments are below.

1) The proposed Staff Report and Basin Plan Amendment for the Napa River Watershed TMDLs, and the proposed Staff Report and Basin Plan Amendment for the Sonoma Creek Watershed TMDLs state that Napa River and its tributaries and Sonoma Creek and its tributaries, respectively, are listed on the 303(d) list as impaired for pathogens, and that these documents address those listings. However, a specific list of the water bodies that are on the 303(d) list and that are addressed by the documents is not included. Please include a list of the specific listed impaired water bodies for which TMDLs are to be adopted.

2) Since the Basin Plan objectives are in fecal and total coliform, we recommend for each set of documents that the numeric targets, TMDLs, load allocations, and waste load allocations be presented in terms of fecal coliform and/or total coliform, as well as E. coli. This makes the TMDLs straightforward and reduces uncertainty concerning whether or not the TMDLs will achieve water quality standards.

We appreciate your recognition that EPA currently recommends that states use E. coli as a preferred bacterial indicator. Your analysis suggests EPA guidance values for E. coli are at least as protective as the Basin Plan's fecal coliform objectives. Although there is significant uncertainty regarding the actual ratio of E. coli to fecal coliform in streams, the analysis provides a plausible rationale to support the conclusion that attainment of < 126 CFU/100 mL E. coli as a monthly geometric mean would also result in attainment of the Basin Plan objective of <200 MPN/100mL fecal coliform (log mean).

However, it is not clear that the target of < 320 CFU/100 ml E. coli (90th percentile) will be protective of the Basin Plan objectives and the (revised) EPA guidance values cited in the Basin Plan. The revised EPA guidance values for E. coli reflect a human health risk value associated with a single sample E. coli value. A value of 320 CFU/100 mL E. coli reflects the risk associated with water bodies designated for between moderately used areas (298 CFU/100 mL E. coli) and lightly used areas (406 CFU/100 mL E. coli). We recommend you either clearly designate the water bodies as moderately to lightly used areas (limited REC-1 uses), or use a target of 235 CFU/100 mL as a 90th percentile single sample value, EPA's default criteria recommendation, reflecting an appropriate risk for designated beaches (full REC-1 uses).

No discussion is provided to show that the proposed targets for E. coli will be result in a TMDL that will attain the Total Coliform Basin Plan water quality objectives. This analysis should be included in each Staff Report.

5) The proposed Staff Reports and Basin Plan Amendments state that an implicit margin of safety exists that includes conservatively established targets. Based on the discussion concerning use of E. coli as

surrogates for fecal coliform, it is not clear that the targets are conservatively established. However, if the approach of expressing the TMDLs and allocations specifically in terms of the applicable standards is used, there will be little uncertainty regarding the relationship between the TMDL and the associated standards of concern. This would be sufficient to address margin of safety requirements.

6) In each of the proposed Basin Plan Amendments, at page 4, the sources of pathogens are listed, then discussed. Although the discussion includes wildlife, the list does not. For clarity and completeness, please add wildlife to the list of sources in each proposed assessment.

7) In each of the proposed Staff Reports, the source assessments qualitatively estimate loads for some of the source categories within the watershed, while other categories are not clearly defined. Some source categories are described as "significant," "potentially significant", or "not significant", while other categories are not qualitatively described. Source estimates should be quantified, if at all possible; if this is not possible, then all sources should be qualitatively assessed.

8) In the proposed Basin Plan Amendment for the Sonoma Creek Watershed, it is not clear in the Table of Allocations, which are load allocations and which are waste load allocations. Please clarify this.

Thank you for this opportunity to comment on the proposed Staff Reports and proposed Basin Plan Amendments. Please call me at 415 972-3480 if you have any questions or would like to discuss these comments further.

Sincerely,

Diane E. Fleck, P.E., Esq.
Water Division

Part II. Materials Received During April 12, 2006 Board Hearing

COUNTY OF SONOMA
PERMIT AND RESOURCE MANAGEMENT DEPARTMENT
2550 Ventura Avenue, Santa Rosa, CA 95403-2829
(707) 565-1900 FAX (707) 565-1103

ORAL TESTIMONY SONOMA CREEK PATHOGEN TMDL
April 12, 2006
SFBRWQCB

The Sonoma County Permit and Resource Management Department appreciates this opportunity to provide the Regional Water Quality Control Board with comments regarding the proposed Basin Plan Amendment. We have provided a summary listing of key issues that we feel should be more thoroughly addressed in our written comments submitted on March 27, 2006. We would welcome the opportunity to discuss these issues with appropriate Regional Board staff prior to consideration of adoption. Ultimately, we feel that the Regional Board must address these issues in order to provide the reviewing public with a complete understanding of what is being proposed and to satisfy the requirements of the California Environmental Quality Act (CEQA).

While we believe that there is clearly a need to improve water quality in Sonoma Creek, we also know that individual property owners and local regulatory agencies have limited resources to devote to this effort. Thus, we believe that both public and private efforts must be focused in areas that will achieve the greatest result.

For this reason, we believe that the Regional Board should conduct a more critical analysis of the contamination of Sonoma Creek before asking local government and individual home owners to devote financial resources and staff to what appears to be a very broad and expensive program.

In other words a more comprehensive investigation and sampling protocol needs to be done to conclusively determine that elevated E. coli contamination in Sonoma Creek is a result of septic system discharge or other human sources rather than naturally occurring contamination from wild life or other sources.

This can be accomplished by utilizing microbial source testing or genetic fingerprinting to more conclusively determine the source of the elevated E. coli counts.

To illustrate the importance of identifying the source of the E. coli contamination I obtained a copy of the Final Interim Report for the Bodega Bay-Campbell Cove Tidal Circulation Study and Water Quality Testing and Source Abatement Measures Project that was completed on June 30, 2004. The lead agency for this study was the Sonoma County Department of Health Services Division of Environmental Health with cooperating agencies of the Bodega Marine Laboratory, the North Coast Regional Water Quality Control Board, and the State of California Department of Parks and Beaches. I will provide a copy of this study for your consideration.

One purpose of this study was to determine the source of E. coli contamination of a tidal beach in Sonoma County and we believe illustrates the importance of identifying the source of the contamination before time, effort, and expense is incurred in abating sources of contamination that may not be contributing to the problem. The study identified through Ribo-typing , avian and marine mammals as the source of the E. coli. bacteria contamination and was not of human origin

Again we believe it is critical that microbial source testing and a more complete, detailed, and comprehensive study of the Sonoma Creek watershed be conducted before you consider setting a TMDL for pathogens for Sonoma Creek.

Sonoma County remains committed to assisting the Regional Board in any way we can to establish a science based TMDL with goals that are effective, comprehensive, and achievable.

Respectfully yours,

Randy Leach, REHS
County of Sonoma
Permit and Resource Management Department
Division Manager Well and Septic Division

FINAL INTERIM REPORT
FOR
BODEGA BAY-CAMPBELL COVE
TIDAL CIRCULATION STUDY,
WATER QUALITY TESTING AND
AND SOURCE ABATEMENT MEASURES PROJECT

Proposition 13 Clean Beaches Initiative Program
Clean Beaches Initiative Grant No. 36
Grant Agreement No. 01-078-550-1

June 30, 2004

LEAD AGENCY

County of Sonoma Department of Health Services
Division of Environmental Health
475 Aviation Blvd., Suite 220
Santa Rosa, CA 95403

COOPERATING AGENCIES

Bodega Marine Laboratory
2099 Westside Road
Bodega Bay, CA 94923

North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

State of California Department of Parks and Recreation
The Russian River-Mendocino District Headquarters
25381 Steelhead Blvd.
Duncans Mills, CA 95430

INTRODUCTION

STATEMENT OF PURPOSE

The mission is to produce environmental information to assess source(s) of fecal bacteria contamination and to implement source abatement measures as deemed appropriate in order to reduce the number of beach closures at Campbell Cove State Beach.

SCOPE OF PROJECT GOALS

Since 1999 the County of Sonoma Department of Health Services (SCDHS) has worked to develop an approach for identifying the physical source(s) of fecal bacteria contamination at Campbell Cove State Beach, Bodega Bay. These efforts had been conducted in conjunction with the North Coast Regional Water Quality Control Board (NCRWQCB) and the Bodega Marine Laboratory (BML), a Regents of the University of California Davis affiliate. Preliminary ocean water sampling and assessment during several tidal cycles showed no clear trends that would identify the origins of the intermittently persistent high fecal bacteria readings that occur typically in the fall.

In order to determine the source(s) of the fecal bacteria contamination and solve the problem, the project had these general goals:

- Tidal circulation studies for identifying physical watershed characteristics influencing pollutant inputs, transport and fate utilizing Acoustic Doppler Current Profilers, dye studies with aerial photography, temperature and conductivity measurements.

- Fecal bacteria source identification by: pit privy leakage tests; animal use in the area; and screening for ocean water quality problems utilizing fecal bacteria indicator organisms, and ribotyping fingerprinting analyses to determine specific sources of fecal bacteria contamination.

- Gain an understanding of what processes would ameliorate the source of fecal bacteria contamination in order to reduce the number of beach closures. If non-human source(s) of fecal bacteria were found to be the cause, determine the relative risk to human health in order to assess the criteria for closing the beach.

APPROACH AND TECHNIQUES

PROJECT MANAGEMENT AND ADMINISTRATION

A list of Contract Task deliverables is included in the Appendix. A one-page contract summary form was completed and submitted to the State Water Resources Control Board (SWRCB). Contracts and contract modifications were awarded with the BML for tidal circulation studies, with the Institute for Environmental Health for ribotyping and with the State of California Department of Parks and Recreation (CDPR) for assessment report of animal species at Campbell Cove.

A project survey form has been completed and a copy is in the Appendix. Quarterly progress reports were submitted with the exception of the period of February 1, 2004 through April 30, 2004 where approval received from SWRCB staff to waive this quarterly report and prepare the draft final report instead.

PERMITS

SCDHS and NCRWQCB staff applied for a Notice of Categorical Exemption for the dye utilized in the tidal circulation studies (Copies in Appendix).

QUALITY ASSURANCE PROJECT PLAN

SCDHS and NCRWQCB prepared and obtained approval from the SWRCB for a Quality Assurance Project Plan (QAPP).

TIDAL CIRCULATION, OCEAN WATER SAMPLING AND SOURCE IDENTIFICATION STUDY

Tidal circulation study

SCDHS, NCRWQCB and BML staff conducted an investigation into tidal circulation patterns at Bodega Harbor/Bay, California and a copy of this report is in the Appendix.

Two Acoustic Doppler Current Profilers (ADCP) were purchased and used by BML to study circulation and exchange patterns within Bodega Harbor/Bay. Temperature and conductivity (salinity) measurements were collected during the current studies that enabled research personnel to understand the exchange of water between the ocean and the harbor and how this exchange varies on an hourly and weekly basis (Copy in Appendix).

BML coordinated with the NCRWQCB to deploy patches of dye at microbiological "hot spots" within the harbor to examine advection and dispersion rates from these points. These dye patches were followed over the

course of a tidal cycle with dye concentrations monitored with aerial photography and fluorometry. In addition, BML coordinated with the NCRWQCB to deploy dye during a flood tide to examine the near surface transport and dispersion of water coming into the harbor from the coastal ocean.

Several major features of circulation within Bodega Harbor were found that can influence contaminant transport and retention:

- Current data from ADCPs in both the front and rear of the harbor show velocities that are constant throughout the water column, enabling a large amount of exchange between the bay and the harbor water. The flow velocities are about two times greater near Campbell Cove than at the rear of the harbor.

- Temperature surveys of the harbor by CTD casts during different tidal phases showed a large intrusion of cold bay water during flood tides that affected water properties all the way to the rear of the harbor. Likewise, during ebb tides, surface-warmed rear harbor water was able to flow out to the mouth of the channel within one ebb tide. This suggests that there is a very large degree of flushing of the harbor by bay water during each tidal circulation.

- Tidal flushing is particularly important in the vicinity of Campbell Cove where consistent, vertically uniform tidal flows have the effect of near total replacement of water in that basin each tidal cycle.

- Drifters released in the harbor corroborated the CTD and ADCP data, and showed currents transporting surface water in the channel the entire length of the harbor within one tidal cycle.

- Drifters released more than a couple hundred meters outside the harbor were not entrained into the flood tide current entering the harbor.

- Dye release experiments also showed that advective transport within the harbor is quite rapid, particularly within the main channel. Water in the rear marinas and over the tidal flats did not have such high velocity, but drainage did occur over the tidal flats, primarily into the main channel, and dispersion in regions of low current velocity was still significant enough to dilute dye patches to non-visible levels over a tidal cycle. No dye tracers were ever detected more than a single tidal period from their release time.

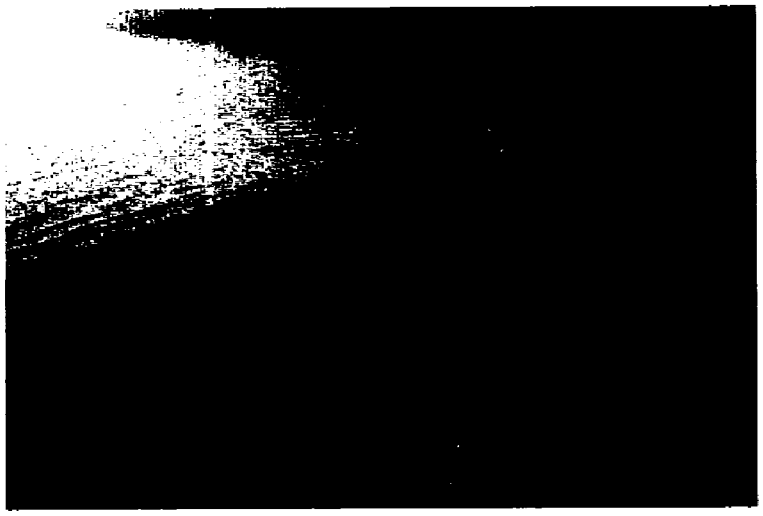
Source Identification

Water quality sampling for indicator bacteria occurred during the dye releases to indicate patterns in the fecal pollution signal that will help identify potential sources. On October 2, 7, 9, 14, and 16, 2003, SCDHS staff collected five-ocean water and one-sediment samples at six sampling locations on the NCRWQCB's

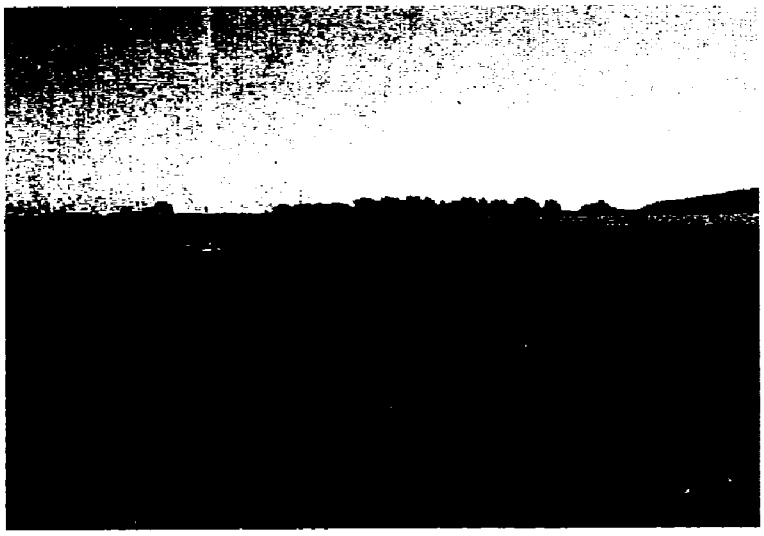
boat where NCRWQCB staff also performed conductivity, salinity and temperature readings of ocean water at Campbell Cove, Bodega Harbor and Bodega Bay (Seal Rock). The ocean and sediment samples were submitted to the County of Sonoma Public Health Laboratory who performed indicator bacteria and membrane filtration on the samples that were later submitted to the Institute for Environmental Health for ribotyping.

The six sampling locations were selected based on the tidal circulation study conducted in May 2003, and are illustrated as follows:

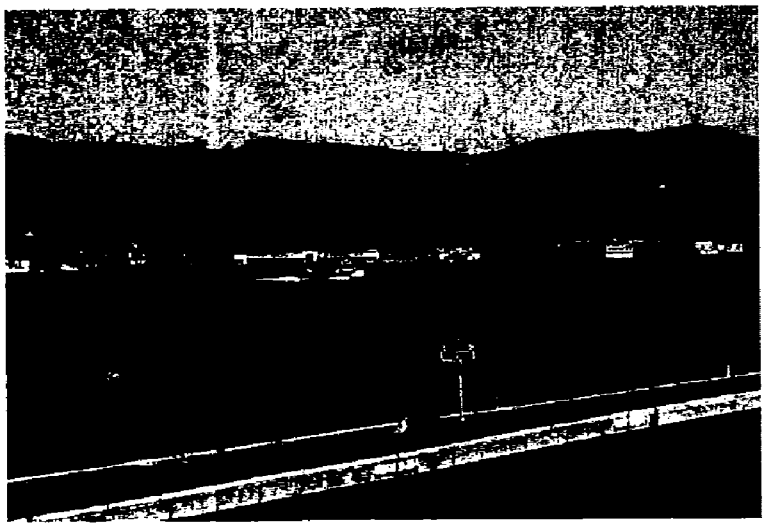
1. Campbell Cove Sediment and 2. Campbell Cove ocean water knee deep samples



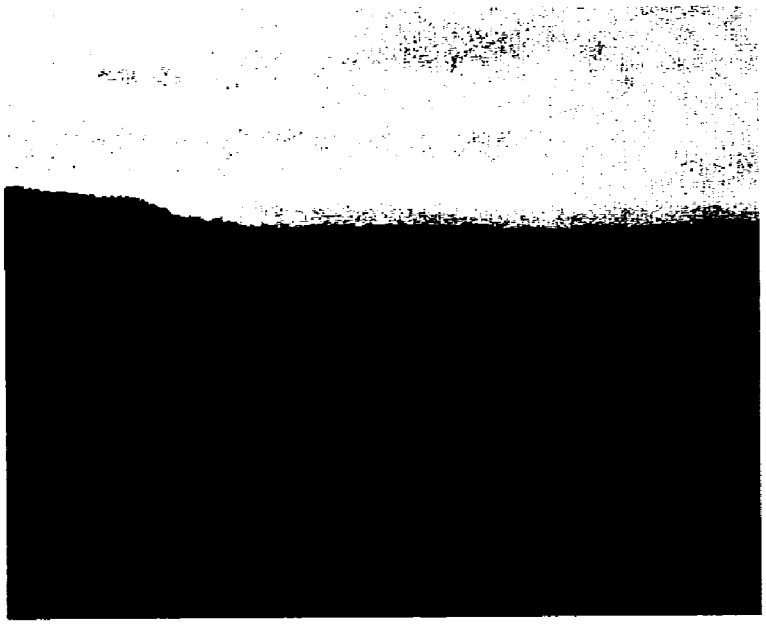
3. Gaffney Point ocean water knee deep samples



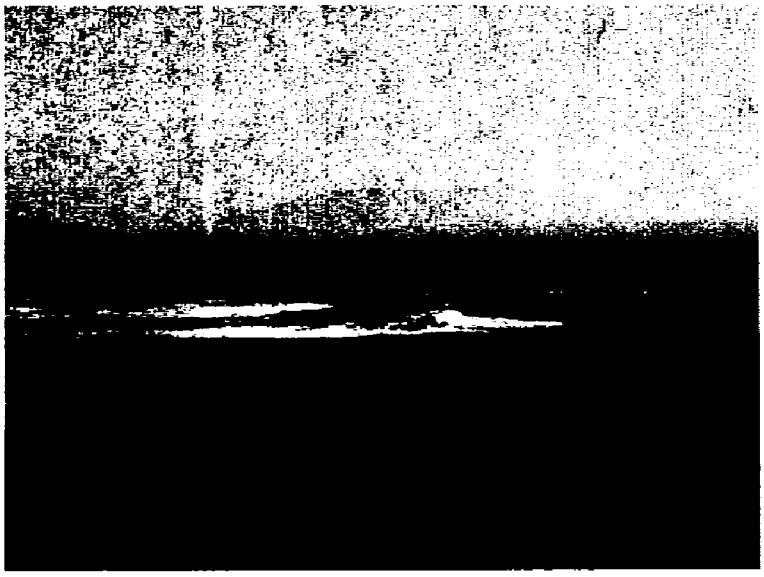
4. Westside Regional Park, Bodega Harbor ocean water deep channel samples



5. Campbell Cove, deep channel samples



6. Bodega Bay-Seal Rock ocean water samples



Results of indicator bacteria were mostly non-detect to low for Gaffney Point, Westside Regional Park and Campbell Cove deep channel, and varied from non-detect to moderate concentrations at Seal Rock.

Striking results were found in the Campbell Cove sediment concentrations that had significant concentrations of Total Coliform, E.coli and Enterococcus. Surf zone samples in knee-deep water at Campbell Cove varied from very low to exceeding State AB 411 standards. The results are illustrated in the Table below with bacteria readings per 100 ml:

Date	Total Coliform *Sediment*	Total Coliform *Ocean Water*	E. coli *Sediment*	E.coli *Ocean Water*	Enterococcus *Sediment*	Enterococcus *Ocean Water*
10/2/03	5,794-19,863	<10-86	4,884-17,329	<10-10	8,664->24,192	<10-65
10/7/03	2,755->24,192	86-3,255	2,613->24,192	74-2,755	Not reported	Not reported
10/9/03	3,255-11,199	<10-3,654	1,421-6,488	<10-1,722	6,131-14,136	<10-1,658
10/14/03	13,300->241,920	52-624	6,630->241,920	31-359	11,450-23,590	<10-189
10/16/03	1,000-17,100	30-41	1,000-14,800	20-41	3,100-13,400	41-158

For sediment background purposes, on October 27, 2003 SCDHS staff collected sediment samples during the last scheduled sampling event at the AB 411 beaches. All of the sediment samples came back mostly non-detect with the exception of Campbell Cove State Beach that were significantly elevated.

SCDHS staff conducted a spatial sampling of sediment at Campbell Cove State Beach on October 28, 2003 to determine if fecal contamination was limited to the immediate influence of the creek flow from the "Hole-in-the-Head" or if the entire stretch of beach was contaminated. Sediment samples were collected at the center of the creek in-flow to the ocean and at 10 yards and 20 yards on either side of the creek. Results indicated that all sediment samples were significantly contaminated.

A sample of the water from the culvert originating from the "Hole-in-the-Head" pond was analyzed for fecal bacteria contamination and for general mineral and nutrient concentrations to determine if the pond water is a potential source of contamination or source of nutrients that would promote bacterial growth. The bacteria results for the creek were low with 52 Total Coliform/100 ml, <10 E.coli/100 ml and 10 Enterococcus/100ml. Results for general mineral and nutrients indicate the freshwater flow is not contributing nutrients to the sand/sediment.

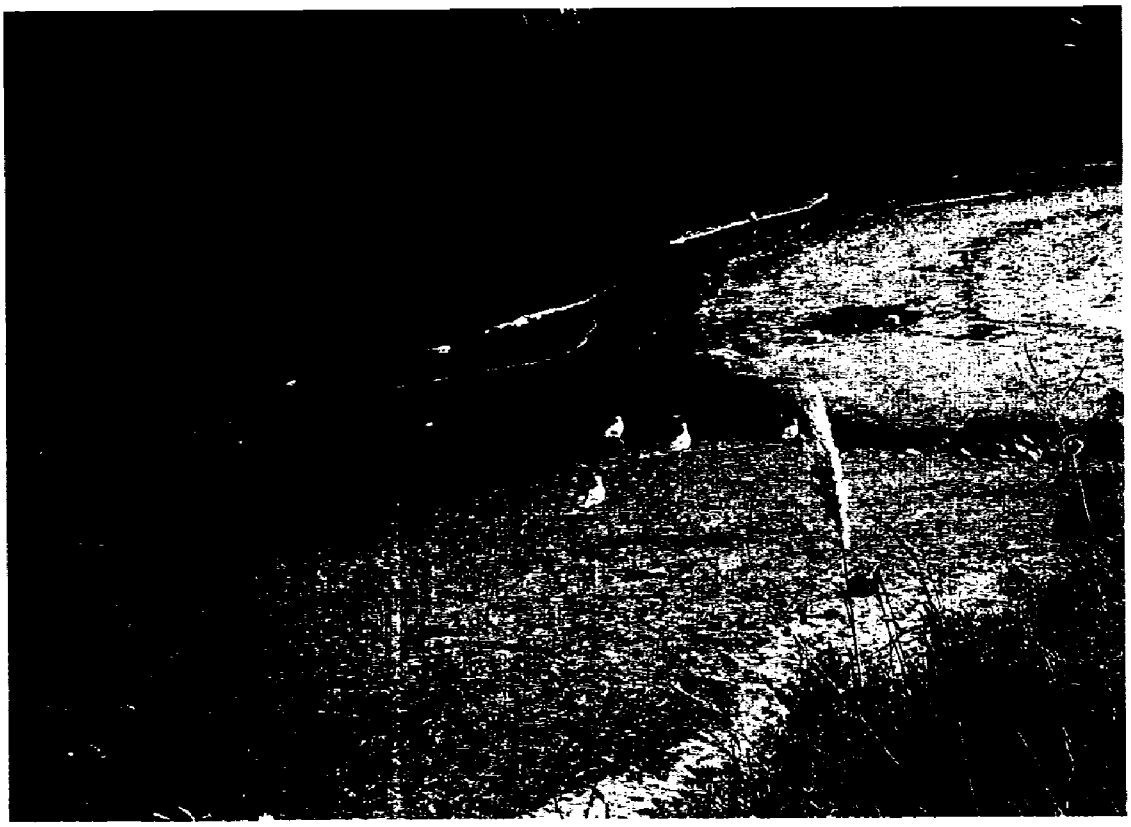
SCDHS staff collected animal fecal droppings that were submitted to the Institute for Environmental Health to add to their E. coli library for the following birds and animals:

- Sea lion
- Harbor seal
- Raccoon
- Dog
- Deer, black tail
- Western Sea Gull
- Godwitt
- Willit
- Cormorant
- White Pelican
- Brown Pelican

On December 16, 2003, SCDHS received the CDPR's Assessment Report on mammals and birds at Campbell Cove State Beach area to develop a database for possible subsequent sampling of unknown fecal material (Copy in Appendix).

Additional project sampling was conducted utilizing ribotyping fingerprinting analysis through the services of the Institute for Environmental Health. A report from the Institute for Environmental Health revealed avian, primarily sea gulls, and marine mammals, primarily California sea lions and harbor seals, as the

predominant source of fecal bacteria contamination at Campbell Cove (Copy in Appendix).



No students were hired or used during the project, so there are no timesheets to submit.

ABATEMENT MEASURES

Campbell Cove Vault Privy Dye Test

Fluorescein dye was added to the vault privy at Campbell Cove and monitored for several weeks in December 2002. A slight increase in fluorescence in one sample of the water from a culvert downslope of the privy prompted another test with more frequent sampling. The vault privy overlooking Campbell Cove beach was charged with 1 liter of 10% fluorescein dye again on April 1, 2003.

Staff from BML, SCDHS, and NCRWQCB collected water samples from the stream at the culvert from the "Hole-in-the-Head" pond located adjacent to Campbell Cove beach, and from the harbor at Campbell Cove Beach. Sample collections began on March 17, 2003 and continued on a daily basis through April 30, 2003, and on May 5 and 6, 2003. Water samples were stored in the dark and returned to NCRWQCB for fluorescence measurement with a Turner Model 10 ® fluorometer.

Fluorescence readings stayed relatively constant in the culvert water and fluctuated more widely in the harbor water. Two large peaks were observed in the harbor water samples on two separate occasions, both a result of high turbidity. The peaks were not characteristic of a dye leak from the vault. A dye leak from the vault would rise to a peak, then slowly taper off over a long period of time.

The data is summarized below:

- Fluorescence readings ranged from:
  - culvert – 67-82, with 90% less than 76
  - harbor – 56-430, with 90% less than 110
- Culvert readings varied without pattern over the six weeks

- Harbor readings fluctuated between 56 and 110 most of the time. Two large spikes, each on a single day were associated with elevated turbidity:
    - 270 on March 28
    - 430 on April 14

These observations do not support a hypothesis that the vault privy leaks and is contaminating either the stream that flows through the culvert or the harbor. The two spikes in fluorescence in the harbor were caused by elevated turbidity, and are not indicative of a vault leak. Therefore, staff has eliminated the vault privy as a source of bacterial contamination at Campbell Cove. Fluroescein dye was placed in the vault privies at Doran Park, the Jetty Privy and the Jetty Campground Privy. No dye releases were detected.

Based on the dye studies of these vault privies, no contracts were executed with the CDPR or with the County of Sonoma Parks and Recreation Department.

PROJECT ACCOMPLISHMENTS

The goals of the project as outlined in Contract 01-078-550-1 for tidal circulation study and identification of the source of the fecal bacteria contamination at Campbell Cove State Beach have been met, but not met for source abatement measures. Campbell Cove itself could be a source for contaminants found there. As with the tidal flats, dye released near shore had a tendency to hug the shoreline, dispersing alongshore but not offshore.

If there was a contaminant source at or near the shoreline it is possible that contaminants could persist in the boundary layer for longer than one tidal cycle. One scenario in which this could occur is if there were a persistent source along the shoreline that introduced fecal bacteria contaminants steadily, then, the slow flushing of these ankle-deep waters would allow them to persist or accumulate overt time.

The project included an investigation of tightness testing for vault privies in the vicinity of the beach utilizing a dye test that revealed they are not a source of fecal bacteria contamination, which was also corroborated by the ribotyping study. In addition, bacteria sampling on numerous occasions of the freshwater flow from the culvert draining onto the beach was always clean of fecal bacteria and a general mineral analysis of this culvert water revealed there were no nutrients (e.g., phosphorus and nitrogen) that would add to bacterial growth in the beach sediment.

The source abatement phase of the project is still a current need. Ribotyping identified avian and marine mammals as the source of fecal bacteria contamination. This raised the question of what is the relative risk to human health from these sources of fecal bacteria contamination.

The project group submitted a Project Questionnaire to utilize Prop 13 funds to conduct a pathogen study of ocean water/sediment at Campbell Cove to detect pathogenic viruses, bacteria and protozoa associated with avian and marine mammals. In addition, the group planned to study bird and marine mammal surveys of this beach to determine the effect the freshwater flow of water from the "Hole-in-the-Head" had on attracting these animals.

The end result would have been a project to construct a diversion of the freshwater source away from the beach so as to reduce the source of fecal bacteria residue. In their letter of April 15, 2004, the SWRCB mentioned this pathogen study did not qualify for funding because it is not a capital improvement project and did not meet the goals of the Clean Beaches Initiative program.

CONCLUSION

Whereas a lot was learned about tidal circulation and the specific source of bacterial contamination, the outcome of the project will not result in preventing or reducing non-point source pollution or reduction in beach closures. The SCDHS, NCRWQCB, BML and CDPR have determined two actions need to be taken as follows:

1. Notification to the public to advise sand/sediment is subject to periodic bacterial contamination due to bird and/or marine mammal waste where digging or disturbing sand/sediment may pose health risks (Copy in Appendix). This notice will be permanently posted at appropriate locations at the beach.

SCDHS will continue to monitor Campbell Cove State Beach as part of its AB 411 beach monitoring program and post the beach with warnings or closures based upon sampling results to advise the public to avoid contact with ocean water until water sampling meets State water quality standards.

2. A copy of this report will be sent to the State of California Department of Health Services with a request to determine the relative risk to human health from avian and marine mammal fecal bacteria contamination and report findings to SCDHS for further determination of risk assessment at Campbell Cove State Beach from birds and marine mammals.

Funding for this project has been provided in full or in part through a contract with the SWRCB pursuant to the Costa-Machado Water Act of 2000 (Proposition 13) and any amendments thereto for the implementation of California's Nonpoint Source Pollution Control Program. The contents of this document do not necessarily reflect the views and policies of the SWRCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use (Gov. Code 7550, 40 CFR 31.20.)

APPENDIX

List of Deliverables in Contract 01-078-550-1

Project Survey Form

Notice of Exemptions

Laboratory Invoice for Institute for Environmental Health

Study Reports

- Assessment Report of Animal Species at Campbell Cove
- General Mineral/Nutrient report for the "Hole-in-the-Head"
- Bodega Harbor Circulation Study
- Turbidity/Salinity/Tide Charts
- Microbiological Source Tracking Ribotyping Report

Notice for Sand/Sediment Bacteria Contamination

Part III. Peer Review Comments

Peer Review
Total Maximum Daily Load for Pathogens in the Sonoma Creek Watershed
By Saied Mostaghimi
Virginia Tech

1. **Problem Statement**
   The introduction presents an excellent description of the watershed. The percent land uses add up to 95% only; need to clarify what the rest of the land use is (5%). A general description of topography (land slopes) will also be very useful in interpretation of the results. The nature of impairments in the watershed is well-described and well-established. Use of E-coli and fecal coliform as indicated is quite appropriate. Table 2 indicates values are based on minimum of 5 consecutive data points, equally spaced, taken during a 30-day period. Data presented from the intensive study were taken in 5 weeks; need to explain the reason for differences in sampling scheme in the study. One question to raise is how did the rainfall amounts during the intensive study period (2002-2003) compare with long-term average rainfall for the region? Need to address the fact that many data points included in Table 5 are single-samples and not geometric mean. How could these data be used against the US-EPA guidance? Information on groundwater discharge as percent of total flow in the stream will also be helpful.

2. **Numeric Targets**
   Clarification is needed as to whether water quality "objectives" are the same as the water quality "standards". Data on exact percentage of fecal coliform as E-coli vary greatly, therefore, a MOS based on this argument might not be defensible. It is preferable to set an explicit MOS, of say 10%, and develop the TMDL based on that, although this is left to scientific judgment. In Section 4 (Page 11) there is also a need to define "Inadequately treated" human waste. Also there needs to be a period attached to calculation of geometric mean. Is it 30 days? Based on how many samples?

3. **Source Assessment**
   The monitoring program used in the study seems to be sufficient for evaluation of the potential sources of pathogens and their relative significance. I agree with the relative importance of sources identified in the report, however, experience with other TMDLs show that waterfowl, and wildlife, in general, could be a significant source. Depending on monitoring scheme, this may or may not be evident in the samples taken. It is suggested that the significance of wildlife contribution be clarified through further monitoring during the TMDL implementation phase. Authors need to indicate the sources of pathogens in "Municipal Runoff". In addition, it is not stated whether there are any management practices currently in place in the watershed. If no fencing is in place, direct deposit by animals and wildlife could be a significant source. In Table 6, are the E-coli values for cases where the number of samples are less than 5 (2 or 3) geometric mean values

or simple averages? Section 5.2 (Page 15) – Need to indicate rainfall amounts during the first two weeks of sampling compared with the last 3 weeks. If one period was drier than the other, then lack of sample representativeness in the assessment could be an issue. Could pets be a source of pathogens in the watershed? What is the population of cats and dogs? Other TMDLs have found pets to be significant sources of pathogens in urban areas. The report does not mention the pet's population.

4. **Total Maximum Daily Load and Allocations**
   Use of concentrations for TMDLs, as opposed to loads, is justified. Implicit MOS, based on not considering the die-off is reasonable. This approach, however, puts heavier responsibilities on monitoring and assessment during the implementation phase of the TMDL since these levels (or lower) should be achieved at <u>all</u> stations within the watershed. How would one separate and keep track of these densities in individual sources (wildlife, dairies, etc.) throughout the watershed? Sampling would give a cumulative effect of all sources on pathogen levels. Therefore, to say wildlife allocation is less than 126 implies that it can be measured by itself, with no interference from other sources! Are the data presented in Table 9, geometric mean based on 5 samples collected during a 30-day period? This needs to be clearly stated in a footnote. Was the public engaged during the source assessment part of the study? Otherwise, how is it ascertained that all potential sources are identified?

5. **Implementation**
   It is not clear how the stakeholders (particularly those contributing pathogens through nonpoint sources) are involved in the design and implementation of the plan. Will there be a local stakeholder advisory group? How would one know the level of implementation necessary to achieve the TMDL goal? What time frame is specified for achieving the goal? Who will pay for the installation of management practices? How is the implementation of BMPs prioritized in various areas of the watershed? How is the contribution from wildlife, pets, etc. measured and what actions will be undertaken to meet the attainment of the goal for pathogens from wildlife?

6. **Monitoring**
   The monitoring goals are stated clearly, however the monitoring system design is not explained well. How many stations will be established? How often will water quality samples be taken? QA/QC for water quality monitoring are not specified. How will the data be analyzed? How long will the data be collected? What determines TMDL attainment? If you reach the target water quality concentrations, do you keep monitoring or stop right away? Is monitoring to be conducted year-round or a specific time of year? If during parts of the year, how do you justify year-round compliance? Page 37, Bullet #3 refers to collecting "sufficient data". How is sufficient defined? What courses of action will be taken if monitoring proved that no real progress is

made? Need to be aware of and incorporate the effect of BMP lag time in the assessment procedures.

7. **Overarching Questions**
   a. Monitoring design and sampling should be clarified and clearly outlined. A QA/QC activity should be developed for monitoring program. Who will identify appropriate BMPs for various sources? How will the lag time for BMP impacts be incorporated in the monitoring program? Who will be responsible for data collection and analysis? How do you deal with changes in the land use and as such changes in source contributors during the assessment period? How will the future loads be dealt with as the watershed goes under more development?
   b. I believe the report is well-written, scientifically sound and that the procedures used are defensible.