LAS VIRGENES - TRIUNFO
JOINT POWERS AUTHORITY
AGENDA

4232 Las Virgenes Road, Calabasas, CA 91302

April 6, 2020, 5:00 PM

Public Participation for Meetings of Las Virgenes - Triunfo Joint Powers Authority in Response to COVID-19

On March 4, 2020, Governor Newsom proclaimed a State of Emergency in California as a result of the threat of COVID-19. On March 17, 2020, Governor Newsom issued Executive Order N-29-20 (superseding the Brown Act-related provisions of Executive Order N-25-20 issued on March 12, 2020), which allows a local legislative body to hold public meetings via teleconferencing and to make public meetings accessible telephonically or otherwise electronically to all members of the public seeking to observe and to address the local legislative body. Pursuant to Executive Order N-29-20, please be advised that members of the Las Virgenes - Triunfo Joint Powers Authority will participate in meetings telephonically.

PUBLIC PARTICIPATION: Pursuant to Executive N-29-20 and given the current health concerns, members of the public can access meetings live on-line, with audio and limited video, at www.LVMWD.com/JPALiveStream. In addition, members of the public can submit comments electronically for consideration by sending them to www.LVMWD.com/JPALiveStream. To ensure distribution to the members of the Las Virgenes - Triunfo Joint Powers Authority prior to consideration of the agenda, please submit comments 24 hours prior to the day of the meeting. Those comments, as well as any comments received after 5:00 P.M., will be distributed to the members of the Board of Directors and will be made part of the official public record of the meeting. Contact Josie Guzman, Executive Assistant/ Clerk of the Board at (818) 251-2123 or jguzman@lvmwd.com with any questions.

ACCESSIBILITY: If requested, the agenda and backup materials will be made available in appropriate alternative formats to persons with a disability, as required by Section 202 of the Americans with Disabilities Act of 1990 (42 U.S.C. Sec. 12132), and the federal rules and regulations adopted in implementation thereof. Any person who requires a disability-related modification or accommodation, in order to observe and/or offer public comment may request such reasonable modification, accommodation, aid, or service by contacting the Executive Assistant/Clerk of the Board by telephone at (818) 251-2123 or via email to jguzman@lvmwd.com no later than 8:00 AM on the day of the scheduled meeting.

Members of the public wishing to address the Las Virgenes-Triunfo Joint Powers Authority (JPA) Board of Directors are advised that a statement of Public Comment Protocols is available from the Clerk of the Board. Prior to speaking, each speaker is asked to review these protocols, complete a speakers' card, and hand it to the Clerk of the Board. Speakers will be recognized in the order the cards are received.

The Public Comments agenda item is presented to allow the public to address the Board on matters not on the agenda. The public may also present comments on matters on the agenda; speakers for agendized items will be recognized at the time the item is called up for discussion.

Materials prepared by the JPA in connection with the subject matter on the agenda are available for public inspection at 4232 Las Virgenes Road, Calabasas, CA 91302. Materials prepared by the JPA and distributed to the Board during this meeting are available for public inspection at the meeting or as soon thereafter as possible. Materials presented to the Board by the public will be maintained as part of the records of these proceedings and are available upon request to the Clerk of the Board.

PLEDGE OF ALLEGIANCE

1 CALL TO ORDER AND ROLL CALL

2 APPROVAL OF AGENDA

3 PUBLIC COMMENTS

Members of the public may now address the Board of Directors **ON MATTERS NOT APPEARING ON THE AGENDA**, but within the jurisdiction of the Board. No action shall be taken on any matter not appearing on the agenda unless authorized by Subdivision (b) of Government Code Section 54954.2

4 CONSENT CALENDAR

Matters listed under the Consent Calendar are considered to be routine, non-controversial and normally approved with one motion. If discussion is requested by a member of the Board on any Consent Calendar item, or if a member of the public wishes to comment on an item, that item will be removed from the Consent Calendar for separate action.

A Minutes: Regular Meeting of March 2, 2020 (Pg. 4)

Approve.

5 ILLUSTRATIVE AND/OR VERBAL PRESENTATION AGENDA ITEMS

A Pure Water Project Las Virgenes-Triunfo: Update

6 ACTION ITEMS

A Las Virgenes-Triunfo Joint Powers Authority Conflict of Interest Code: Amendment (Pg. 9)

Pass, approve, and adopt proposed Resolution No. 12, adopting the Conflict of Interest Code of the Las Virgenes-Triunfo Joint Powers Authority.

RESOLUTION NO. 12

A RESOLUTION OF THE GOVERNING BODY OF THE LAS VIRGENES-TRIUNFO JOINT POWERS AUTHORITY REPEALING RESOLUTION NO. 5 DEALING WITH THE CONFLICT OF INTEREST CODE AND ADOPTING IN LIEU THEREOF A NEW CONFLICT OF INTEREST CODE

(Reference is hereby made to Resolution No. 12 on file in the JPA's Resolution Book and by this reference the same is incorporated herein.)

B Biosolids Transportation and Disposal: Amendment to Agreement (Pg. 18)

Authorize the Administering Agent/General Manager to amend the agreement with New Earth USA, in the amount of $194,600, for seven additional months of biosolids transportation and disposal services.

7 BOARD COMMENTS

8 ADMINISTERING AGENT/GENERAL MANAGER REPORT

9 FUTURE AGENDA ITEMS

10 INFORMATION ITEMS

A State and Federal Legislative Update

B Bioassessment Monitoring Report: Approval of Purchase Order (Pg. 20)

11 PUBLIC COMMENTS

Members of the public may now address the Board of Directors **ON MATTERS NOT APPEARING ON THE AGENDA**, but within the jurisdiction of the Board. No action shall be taken on any matter not appearing on the agenda unless authorized by Subdivision (b) of Government Code Section 54954.2

12 CLOSED SESSION

A Conference with Legal Counsel – Existing Litigation (Government Code Section 54956.9(a)):

Zusser Company, Inc. v. Las Virgenes Municipal Water District

13 ADJOURNMENT

Pursuant to Section 202 of the Americans with Disabilities Act of 1990 (42 U.S.C. Sec. 12132), and applicable federal rules and regulations, requests for a disability-related modification or accommodation, including auxiliary aids or services, in order to attend or participate in a meeting, should be made to the Executive Assistant/Clerk of the Board in advance of the meeting to ensure availability of the requested service or accommodation. Notices, agendas, and public documents related to the Board meetings can be made available in appropriate alternative format upon request.

LAS VIRGENES – TRIUNFO JOINT POWERS AUTHORITY MINUTES

REGULAR MEETING

5:00 PM March 2, 2020

PLEDGE OF ALLEGIANCE

The Pledge of Allegiance to the Flag was led by James Wall.

1. CALL TO ORDER AND ROLL CALL

The meeting was called to order at **5:00 p.m.** by Vice Chair Wall in the Conference Room at Oak Park Library at 899 N. Kanan Road, in Oak Park, California. Josie Guzman, Clerk of the Board, conducted the roll call.

Present: Directors Caspary, Lo-Hill, Nye, Orkney, Polan, Renger, Shapiro, Tjulander, and Wall.
Absent: Director Lewitt

2. APPROVAL OF AGENDA

Administering Agent/General Manager David Pedersen requested that Item 12A be removed from the agenda as there was no update.

Director Caspary moved to approve the agenda as amended with the removal of Item 12A. Motion seconded by Director Orkney. Motion carried by the following vote:

AYES: Caspary, Lo-Hill, Nye, Orkney, Polan, Renger, Shapiro, Tjulander, Wall
NOES: None
ABSTAIN: None
ABSENT: Lewitt

3. PUBLIC COMMENTS

None.

4. CONSENT CALENDAR

A Minutes: Regular Meeting of February 2, 2020: Approve

Director Renger moved to approve the Consent Calendar. Motion seconded by Director Tjulander. Motion carried by the following vote:

AYES: Caspary, Lo-Hill, Nye, Orkney, Polan, Renger, Shapiro, Tjulander, Wall
NOES: None
ABSTAIN: None
ABSENT: Lewitt

5. ILLUSTRATIVE AND/OR VERBAL PRESENTATION AGENDA ITEMS

A Welcome TWSD Director Jane Nye to JPA Board of Directors

Vice Chair Wall and the JPA Board welcomed Triunfo Water & Sanitation District Director Jane Nye to the JPA Board of Directors.

B Pure Water Project Las Virgenes-Triunfo: Update

Joe McDermott, Director of Engineering and External Affairs, reported that construction of the Pure Water Demonstration Project would be completed within two weeks. He noted that outstanding items included installation of the electrical connection by Southern California Edison, installation of the storefront, and installation of drywall, painting, and floor epoxy. He also noted that Astound would install the graphics for the visitor experience during the third or fourth week of March. He also reported that the shade structure canopy for the Demonstration Garden was installed. He stated that staff would be able to start up and test the equipment once the electrical connection was installed, and a soft start and tours would begin in early June.

6. ACTION ITEMS

A Pure Water Project Las Virgenes-Triunfo: Public Outreach Plan Update

Receive and file the Public Outreach Plan Update for the Pure Water Project Las Virgenes-Triunfo and provide feedback on any additional outreach activities that should be considered.

Joe McDermott, Director of Engineering and External Affairs, presented the report and reviewed the Outreach Plan, Project Engagement Tracking Sheet, and Water Quality Attitudes Survey.

Director Renger moved to approve Item 6A. Motion seconded by Director Polan.

Director Polan noted a typographical error in the Outreach Plan Update, Item 2.14, the word “pale” should be “pail.”

Motion carried by the following vote:

AYES: Caspary, Lo-Hill, Nye, Orkney, Polan, Renger, Shapiro, Tjulander, Wall
NOES: None
ABSTAIN: None
ABSENT: Lewitt

7. BOARD COMMENTS

Director Orkney expressed concern with people purchasing large volumes of bottled water due to concerns with the coronavirus when tap water was currently available. Administering Agent/General Manager David Pedersen responded that there was much public concern due to the coronavirus and people were purchasing large volumes of bottled water, canned goods, medicines, hand sanitizers, etc. He stated that there were also concerns with whether upcoming conferences would be canceled; however, there were no recommendations to cancel conferences or travel. Director Lo-Hill suggested making a statement on the webpage regarding the safety of the water. Director Renger suggested sending a letter to *The Acorn*. Director Polan suggested making a statement that the National Institutes of Health reported there were visible pieces of plastic floating inside plastic water bottles.

Director Lo-Hill reported that she attended the California Association of Sanitation Agencies (CASA) Washington D.C. Forum, where she joined a group to visit staff from Congressman Ted Lieu, Congresswoman Grace Napolitano, Congressman Brad Sherman, and Congresswoman Laura Sanchez's offices. She stated that the group addressed concerns related to extending the NPDES permit terms from five years to ten years, perfluoroalkyl and polyfluoroalkyl substances (PFAS), infrastructure financing, and flushable wipes.

Director Shapiro reported that he hosted the Quarterly Tour held on February 8th, which was attended by approximately 25 people. He noted that staff discussed the Tapia Water Reclamation Facility, Rancho Las Virgenes Composting Facility, and Pure Water Project Las Virgenes-Triunfo, and provided a video presentation.

8. ADMINISTERING AGENT/GENERAL MANAGER REPORT

Administering Agent/General Manager David Pedersen provided an update regarding the Willow Incident. He noted that the Bark Park was reopened; however, the trailhead would remain closed until further notice. He stated that site remediation would continue for six to eight weeks. He also reported that the annual Washington D.C. Lobbying Trip would take place April 1st and 2nd. He referred to Item 10C, Rancho Las Virgenes Composting Facility Repairs: Approval of Change Order, and stated that the contractor had begun work to restore the biofilter, and composting operations would commence in the summer and run for three months before compost would be made available to the public.

9. FUTURE AGENDA ITEMS

None.

10. INFORMATION ITEMS

A State and Federal Legislative Update

A discussion ensued regarding proposed water bond measures and Governor Gavin Newsom's budget trailer bill.

B Tapia Water Reclamation Facility: Flood Protection Update

John Zhao, Director of Facilities and Operations, responded to questions regarding the materials used when the floodwall was constructed and its current condition.

Director Caspary suggested that staff follow-up with representatives of the California State Parks and Los Angeles County Flood Control District to ask that the District be allowed to clear vegetation that may impede flow near the floodwall.

Administering Agent/General Manager David Pedersen stated that staff would follow-up with the California State Parks regarding concerns with debris removal following storm events and the Los Angeles County Flood Control District regarding monitoring for debris build-up during storm events.

C Rancho Las Virgenes Composting Facility Repairs: Approval of Change Order

11. PUBLIC COMMENTS

None.

12. CLOSED SESSION – (This item was removed from the agenda)

A Conference with Legal Counsel – Existing Litigation (Government Code Section 54956.9(a)):

Zusser Company, Inc. v. Las Virgenes Municipal Water District

13. ADJOURNMENT

Seeing no further business to come before the Board, the meeting was duly adjourned at **5:55 p.m**.

____
Jay Lewitt, Chair

ATTEST:

____
James Wall, Vice Chair

April 6, 2020 JPA Board Meeting

TO: JPA Board of Directors

FROM: General Manager

Subject : Las Virgenes-Triunfo Joint Powers Authority Conflict of Interest Code: Amendment

SUMMARY:

The Political Reform Act requires all public agencies, including the Las Virgenes-Triunfo Joint Powers Authority (JPA), to adopt a conflict of interest code. The code designates positions required to file Statements of Economic Interests (Form 700) and assigns disclosure categories specifying the types of interests to be reported. Public agencies are required to conduct reviews of their conflict of interest codes and process any necessary amendments in accordance with Fair Political Practices Commission (FPPC) regulations.

Staff reviewed the JPA's Conflict of Interest Code and identified a change in the position title for *Director of Resource Conservation and Public Outreach* to *Director of Engineering and External Affairs*. Staff submitted the proposed amendment to the FPPC for review. On March 12, 2020, the FPPC approved the code amendment, which would become effective April 11, 2020. Staff recommends adoption of the amended conflict of interest code.

RECOMMENDATION(S):

Pass, approve, and adopt proposed Resolution No. 12, adopting the Conflict of Interest Code of the Las Virgenes-Triunfo Joint Powers Authority.

RESOLUTION NO. 12

A RESOLUTION OF THE GOVERNING BODY OF THE LAS VIRGENES-TRIUNFO JOINT POWERS AUTHORITY REPEALING RESOLUTION NO. 5 DEALING WITH THE CONFLICT OF INTEREST CODE AND ADOPTING IN LIEU THEREOF A NEW CONFLICT OF INTEREST CODE

(Reference is hereby made to Resolution No. 12 on file in the JPA's Resolution Book and by this reference the same is incorporated herein.)

FISCAL IMPACT:

No

ITEM BUDGETED:

No

FINANCIAL IMPACT:

There is no financial impact associated with this action.

DISCUSSION:

The JPA adopted its current Conflict of Interest Code on May 11, 2016. In 2019, Las Virgenes Municipal Water District changed the position title of the *Director of Resource Conservation and Public Outreach* to *Director of Engineering and External Affairs*. This change in position title required an amendment to the JPA's Conflict of Interest Code. Staff submitted the proposed amendment to the FPPC for review.

On January 15, 2020, the FPPC deemed that the proposed code amendment was a non-substantive amendment and that a 45-day public notice was not required. The FPPC requested that the Administering Agent/General Manager sign the Declaration of the Chief Executive Officer, declaring that the JPA had satisfied all of the requirements for approval of the proposed code amendment.

On March 16, 2020, the FPPC informed staff that the amended Conflict of Interest Code was approved and would become effective April 11, 2020. Proposed Resolution No. 12 would repeal Resolution No. 5 and adopt the amended Conflict of Interest Code.

Prepared by: Josie Guzman, CMC, Executive Assistant/Clerk of the Board

ATTACHMENTS:

CEO Declaration

Proposed Resolution No. 12

Conflict of Interest Code

DECLARATION OF CHIEF EXECUTIVE OFFICER

Multi-County Agency Conflict of Interest Code for

Las Virgenes - Triunfo Joint Powers Authority

Name of Agency

The proposed conflict of interest code specifically includes each agency position that involves the making or participation in the making of decisions which may foreseeably have a material financial effect on an economic interest. Positions that do not make or participate in decisions are not included.

The disclosure categories are written to address the agency's current programs and require disclosure of only foreseeable interests that may create a conflict of interest.

The agency has satisfied all of the requirements of Title 2, Division 6 of the California Code of Regulations Section 18750 preliminary to approval of the proposed code, including providing a comment period for both employees and the public.

David W. Pedersen (signature)

Signature

01/15/2020

Date

David W. Pedersen

Printed Name

Administering Agent/General Manager

Title

FPPC: CEO Declaration
NFD
June, 2016

RESOLUTION NO. 12

A RESOLUTION OF THE GOVERNING BODY OF THE LAS VIRGENES-TRIUNFO JOINT POWERS AUTHORITY REPEALING RESOLUTION NO. 5 DEALING WITH THE CONFLICT OF INTEREST CODE AND ADOPTING IN LIEU THEREOF A NEW CONFLICT OF INTEREST CODE

WHEREAS, Las Virgenes – Triunfo Joint Powers authority previously adopted a Conflict of Interest Code in accordance with the requirements of the Political Reform Act;

WHEREAS, the Governing board of Las Virgenes – Triunfo Joint Powers Authority desires to adopt in lieu thereof the attached Conflict of Interest Code;

NOW, THEREFORE, BE IT RESOLVED BY THE GOVERNONG BOARD OF LAS VIRGENES – TRIUNFO JOINT POWER AUTHORITY that Resolution No. 5 adopting Conflict of Interest Code of Las Virgenes – Triunfo Joint Powers Authority is hereby repealed.

BE IT FURTHER RESOLVED, that Las Virgenes – Triunfo Joint Powers Authority does hereby adopt by reference Fair Political Practices Commission ("FPPC") Regulation 18730 (2. California Code of Regulations Section 18730), and any amendments thereto, as the Authority's Conflict of Interest Code, including the attached Appendix A, setting for the designated positions within the Authority and their disclosure obligations, and Appendix B, setting forth the disclosure categories.

BE IT FURTHER RESOLVED, that individuals holding designated positions shall file Statement of Economic Interests with the Administering Agent/General Manager. Within five days of receipt of the filed statements, the Authority shall make and retain copies and forward the original statements to the FPPC.

BE IT FURTHER RESOLVED, that a certified copy of this Resolution, including the attached Conflict of Interest Code of Las Virgenes – Triunfo Joint Powers Authority, shall be forwarded to the FPPC.

PASS, APPROVED, AND ADOPTED this 6th day of April 2020.

____

Jay Lewitt, Chair

ATTEST:

____
James Wall, Vice Chair

APPROVED AS TO FORM:

____
Legal Counsel

LAS VIRGENES-TRIUNFO JOINT POWERS AUTHORITY

CONFLICT OF INTEREST CODE

The Political Reform Act (Government Code Section 81000, et seq.) requires state and local government agencies to adopt and promulgate conflict of interest codes. The Fair Political Practices Commission has adopted a regulation (2 Cal. Code of Regs. Sec. 18730) that contains the terms of a standard conflict of interest code, which can be incorporated by reference in an agency's code. After public notice and hearing, the standard code may be amended by the Fair Political Practices Commission to conform to amendments in the Political Reform Act. Therefore, the terms of 2 California Code of Regulations Section 18730 and any amendments to it duly adopted by the Fair Political Practices Commission are hereby incorporated by reference. This regulation and the attached Appendices designating positions and establishing disclosure categories, shall constitute the conflict of interest code of the **Las Virgenes-Triunfo Joint Powers Authority** ("**Authority**").

Individuals holding designated positions shall file their statements of economic interests with the **Authority**, which will make the statements available for public inspection and reproduction. (Gov. Code Sec. 81008.) Upon receipt of the statements, the **Authority** shall make and retain copies and forward the originals to the **Fair Political Practices Commission.** All statements will be retained by the **Fair Political Practices Commission**.

APPENDIX "A"

The following positions are NOT covered by the code because they must file under section 87200 and, therefore, are listed for informational purposes only:

Board of Directors
Administering Agent/General Manager
Director of Finance and Administration
Finance Manager

An individual holding one of the above-listed positions may contact the Fair Political Practices Commission for assistance or written advice regarding their filing obligations if they believe their position has been categorized incorrectly. The Fair Political Practices Commission makes the final determination whether a position is covered by section 87200.

DESIGNATED POSITION AND ASSIGNED CATEGORIES OF DISCLOSURE

Designated Position	Assigned Disclosure Category
Authority Counsel	1, 2, 3
Director of Engineering and External Affairs	1, 2, 3
Director of Facilities and Operations	1, 2, 3
Executive Assistant/Clerk of the Board	1
Purchasing Supervisor	1
Consultants/New Positions	*

*Consultants/new positions shall be included in the list of designated positions and shall disclose pursuant to the broadest disclosure category in the code subject to the following limitation:

> The Administering Agent/General Manager of the Authority may determine in writing that a particular consultant or new position, although a "designated position," is hired to perform a range of duties that is limited in scope and thus, is not required to comply fully with the disclosure requirements described in this section. Such a determination shall include a description of the consultant's or new position's duties and based upon that description, a statement of the extent of disclosure requirements.
>
> The Administering Agent/General Manager's determination is a public record and shall be retained for public inspection in the same manner and location as this conflict of interest code. (Government Code Section 81008.)

Note: The positions of Administering Agent/General Manager, Director of Finance and Administration, Director of Resource Conservation & Public Outreach, Director of Facilities and Operation, Executive Assistant/Clerk of the Board, Finance Manager, and Purchasing Supervisor are filled by Las Virgenes Municipal Water District staff members, but act in a staff capacity for the Authority.

APPENDIX "B"
DISCLOSURE CATEGORIES

Category 1: Investments and business positions in business entities, and income, including loans, gifts, and travel payments, from sources that provide supplies, materials, machinery, or equipment of the type utilized by the Authority as well as all services including, but not limited to, real estate development and consulting firms.

Category 2: Interests in real property located within the jurisdiction or within two miles of the boundaries of the jurisdiction or within two miles of any land owned or used by the Authority.

Category 3: Investments and business positions in business entities, and income, including loans, gifts, and travel payments, from sources, that filed a claim against the Authority during the previous two years, or have a claim pending against the Authority.

This is the last page of the conflict of interest code for the **Las Virgenes-Triunfo Joint Powers Authority.**

CERTIFICATION OF FPPC APPROVAL

Pursuant to Government Code Section 87303, the conflict of interest code for the **Las Virgenes-Triunfo Joint Powers Authority** was approved on 3/12/ 2020. This code will become effective on 4/11/ 2020.

John M. Feser, Jr.
Senior Commission Counsel
Fair Political Practices Commission

April 6, 2020 JPA Board Meeting

TO: JPA Board of Directors

FROM: Facilities & Operations

Subject : Biosolids Transportation and Disposal: Amendment to Agreement

SUMMARY:

On August 6, 2018, the JPA Board authorized the Administering Agent/General Manager to execute an agreement with New Earth USA, in the amount of $175,000, for biosolids transportation and disposal during construction of the Rancho Amendment Bin and Conveyance Modifications Project. An amendment to the original agreement was executed on June 3, 2019, in the additional amount of $234,061, for hauling and disposal services during the construction activities and as a result of damages sustained during the Woolsey Fire. With the longer than anticipated construction duration including the repair of damages from the Woolsey Fire, funding is required for seven additional months of biosolids hauling and disposal, in the amount of $194,600, pending the restart of composting operations in summer 2020.

RECOMMENDATION(S):

Authorize the Administering Agent/General Manager to amend the agreement with New Earth USA, in the amount of $194,600, for seven additional months of biosolids transportation and disposal services.

FISCAL IMPACT:

Yes

ITEM BUDGETED:

Yes

FINANCIAL IMPACT:

Sufficient funds are available in the adopted Fiscal Year 2019-20 and proposed Fiscal Year 2020-21 JPA Budgets for this purpose. The cost of the work is expected to be reimbursed by the JPA's insurance carrier or the Federal Emergency Management Agency because its stems from damages associated with the Woolsey Fire. In the meantime, the cost will be allocated 70.6% to LVMWD and 29.4% to Triunfo Water & Sanitation District.

DISCUSSION:

The JPA Board authorized the Administering Agent/General Manager to enter into an agreement with New Earth USA, for biosolids transportation and disposal during construction on the Rancho Amendment Bin and Conveyance Modifications Project on August 6, 2018. The original agreement provided for services with an estimated six-month project duration. However, due to the Woolsey Fire and its impact on the amendment conveyance facilities, the agreement with New Earth USA was amended on June 3, 2019. The amendment increased funding to provide hauling and disposal services for approximately eight additional months. At this time, staff recommends a second amendment to continue the hauling and disposal services until composting operations resume in full, which is projected to occur in summer 2020.

The Rancho Las Virgenes Composting Facility is currently being prepared to commence operations at partial capacity using manual loading of amendment and should be operating at full capacity by the middle of summer 2020. The average monthly cost under the agreement with New Earth USA is $27,800. Staff recommends seven months of additional funding, in an additional amount of $194,600, to continue the hauling and disposal services until the restart of composting operations in summer 2020.

Prepared by: Doug Anders, Administrative Services Coordinator

ITEM 10B

INFORMATION ONLY

April 6, 2020 JPA Board Meeting

TO: JPA Board of Directors

FROM: Facilities & Operations

Subject : Bioassessment Monitoring Report: Approval of Purchase Order

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The Las Virgenes-Triunfo Joint Powers Authority (JPA) approved funding for this matter in the JPA Budget. On March 24, 2020, the LVMWD Board, acting as Administering Agent of the JPA, authorized the General Manager to approve a purchase order to Aquatic Bioassay Consulting Laboratories, Inc., in the amount of $48,866, for the 2019 bioassessment monitoring.

SUMMARY:

Since 2006, the JPA has submitted an annual bioassessment monitoring report as required by Tapia's NPDES Permit. The report is intended to assess the "eco-health of the stream" by measuring the physical condition of the receiving waters and their biological communities. The work involves sampling and characterizing the habitat potential of the creek, as well as identifying and quantifying the species of benthic macroinvertebrates at eight receiving water stations.

In 2010, new requirements were established for the JPA to conduct sampling and taxonomic identification of algal biomass taken from the substrate. This task is labor intensive and requires the use of specialized consultants and laboratories. As a result, the overall cost of the bioassessment monitoring has increased.

The 2019 bioassessment monitoring report cost is $48,866, which exceeds the $35,000 limit on purchase orders that can be approved by the Administering Agent/General Manager. Therefore, the issuance of a purchase order needed to be approved by the Board.

FISCAL IMPACT:

Yes

ITEM BUDGETED:

Yes

FINANCIAL IMPACT:

Sufficient funds are available for this work in the adopted Fiscal Year 2019-20 JPA Budget. The cost of the work is allocated 70.6% to LVMWD and 29.4% to Triunfo Water & Sanitation District.

DISCUSSION:

Bioassessment monitoring for Malibu Creek sampling sites is required by Tapia's NPDES Permit. The monitoring consists of creek site sampling and observations, together with laboratory and data analysis for each site under protocols established by the Surface Water Ambient Monitoring Program (SWAMP) and the U.S. EPA estuarine sampling guidance documents for RSW-MC011D (Malibu Lagoon).

Site observations include stream flow measurements and a physical habitat assessment, which evaluates stream bank conditions, potential sediment impairment and canopy cover. Unlike previous years when some receiving water sites were dry and not sampled, all sites had water and were evaluated. Physical habitat assessments for most sites were suboptimal with RSW-001U having the lowest (marginal) score due to sediment deposition and a lack of instream cover. Station RSW-003D was scored as optimal due to increased cover and less channel alteration.

The laboratory analyses of the site samples identified 5,024 benthic macroinvertebrates from 47 different taxa. The majority of the samples were seed shrimp from the Malibu Lagoon (RSW-011D). The upstream sample sites included disturbance tolerant species including clams, amphipods, midges, nemertean worms, mayflies and New Zealand mudsnails. New Zealand mudsnails were found at sites RSW-003D, RSW-013D, RSW-001U, and RSW-007U. It was noted that stations downstream from Tapia had fewer numbers of New Zealand mudsnails than previous bioassessments.

Results from the sampling and the laboratory analyses were used to determine scores using the California Stream Condition Index (CSCI) and the Southern California Algae Index of Biological Integrity (SoCA Algae IBI). CSCI scores are determined by the composition of the benthic macroinvertebrate community, while SoCA Algae IBI scores are determined by the abundances and composition of diatom and soft-bodied algae communities. CSCI scores were "possibly altered" for RSW-001U, RSW-002D, and RSW-004D, which is a relatively good score. Since RSW-001U is directly upstream of Tapia and RSW-002D is directly downstream, it indicates that Tapia's discharge is not affecting the BMI communities. Other sites had scores from "likely altered" to "very likely altered." The SoCA Algae IBI scores for the receiving water stations were all low, as they were categorized as "non-reference."

One of the potential reasons given for low scores in the bioassessment report was the water quality in Malibu Creek. Because of high sulfate and phosphate concentrations in the water due to the influence of the Monterey Formation, there is a detrimental effect on benthic macroinvertebrates.

The Bioassessment Report evaluates the ecological health of Malibu Creek.

Prepared by: Brett Dingman, Water Reclamation Manager

ATTACHMENTS:

Bioassessment Invoice

aquatic bioassay & consulting laboratories, inc

March 6th, 2020

Brett Dingman, P.E.
Water Reclamation Manager
Las Virgenes Municipal Water District
4232 Las Virgenes Rd.
Calabasas, CA 91302

Dear Mr. Dingman:

In accordance with the agreement between the Las Virgenes Municipal Water District and Aquatic Bioassay and Consulting Laboratories, Inc., we are pleased to present the 2019 Bioassessment Monitoring Report for the Tapia Water Reclamation Facility (MRP No. CI-4760). The enclosed report includes the results for the summer 2019 annual requirements set forth by the California Regional Water Quality Control Board, Los Angeles Region.

Yours very truly,

aquatic bioassay & consulting laboratories, inc

Scott Johnson
Laboratory Director, Senior Scientist
scott@aquaticbioassay.com · (805) 643-5621 x11
29 north olive · ventura · ca 93001
www.aquaticbioassay.com

Las Virgenes Municipal Water District
Tapia Water Reclamation Facility
2019 Bioassessment Monitoring Report
(NPDES CA0056014)

Submitted to:

Las Virgenes Municipal Water District
731 Malibu Canyon Rd.
Calabasas, CA 91302

Submitted by:

Aquatic Bioassay and Consulting Laboratories
29 N Olive Street
Ventura, CA 93001

March 2020

Table of Contents

List of Tables

List of Figures

Introduction

Watershed Background

The Malibu Creek watershed is located about 30 miles west of Los Angeles, California and drains an area of 109 square miles. The watershed extends from the Santa Monica Mountains and adjacent Simi Hills to the Santa Monica Bay at Malibu State Beach. Malibu Lagoon, currently about 31 acres in size, occupies the area behind the beach at the mouth of Malibu Creek. The entire watershed lies within Level 3 sub-ecoregion 6 (Southern and Central California Chaparral) within aggregate nutrient ecoregion 3 (USEPA, 2000a). The watershed is a predominately chaparral ecosystem with a Mediterranean climate that includes mild, wet winters and hot, dry summers. Annual precipitation ranges from an average of 13.2 inches near the coast to 25.4 inches in the mountains.

Malibu Creek runs 10 miles from Malibu Lake to Malibu Lagoon. The predominant land cover in the Malibu Creek sub-watershed is open land. The Tapia Water Reclamation Facility (TWRF) is in this sub-watershed and contributes significant flow to the Creek in the winter months. Malibu Creek receives flow from Las Virgenes Creek, which runs eleven miles and drains an area of 12,456-acres. Land cover in the Las Virgenes Creek sub-watershed is predominantly open, with some residential and commercial/industrial land. Malibu Lagoon is located at the mouth of Malibu Creek before its discharge to the Pacific Ocean. The wetland acreage includes 2/3 mile of the creek corridor east of the Pacific Coast Highway and 92 acres of wetland habitat. The Lagoon has been the focus of a remediation effort aimed at returning it to a more naturally functioning wetland.

Bioassessments

Major issues facing streams and rivers in California include modification of in-stream and riparian structure (hydromodification), contaminated water, and increases in impervious surfaces that has led to the increased runoff to local creeks, streams and rivers. There have been many studies and reports showing the deleterious effects of land-use activities to macroinvertebrate and fish communities (Jones and Clark 1987; Lenat and Crawford 1994; Weaver and Garman 1994; and Karr 1998). A major focus of freshwater scientists has been the prevention of further degradation and restoration of streams to their more pristine conditions (Karr et al. 2000).

Biological communities act to integrate the effects of water quality conditions in a stream by responding with changes in their population abundances and species composition over time. These populations are sensitive to multiple aspects of water and habitat quality, and provide the public with more familiar expressions of ecological health than the results of chemical and toxicity tests (Gibson 1996). Furthermore, biological assessments, when integrated with physical and chemical assessments, better define the effects of point-source discharges of contaminates and provide a more appropriate means for evaluating discharges of non-chemical substances (e.g. nutrients and sediment).

Water resource monitoring using benthic macroinvertebrates (BMI) is by far the most popular method used throughout the world. BMIs are ubiquitous, relatively stationary, and their large species diversity provides a spectrum of responses to environmental stresses (Rosenberg and Resh 1993). Individual species of BMIs reside in the aquatic environment for a period of months to several years and are sensitive, in varying degrees, to temperature, dissolved oxygen, sedimentation, scouring, nutrient enrichment, and chemical and organic pollution (Resh and Jackson 1993). BMIs represent a significant food source for aquatic and terrestrial animals and provide a wealth of ecological and bio-geographical information (Erman 1996).

Attached algae have also been used as indicators of biological condition extensively in Europe and United States (Komulaynen 2002; Perrin and Richardson 1997; Cascallar, et al. 2003). As indicators, algae tend to respond to different stressors than BMIs, especially nutrients (Marinelarena and Di Giorgi 2001). In addition, the growth and maturation of algal communities is more rapid than BMIs making their assemblages more representative of recent water quality conditions (Nelson and Lieberman 2002; Robinson and Minshall 1998; Suren et al. 2003).

Program Objectives

This report includes the results of bioassessment monitoring (including both benthic macroinvertebrates (BMIs) and attached algae) conducted for the Las Virgenes Municipal Water District (LVMWD) at eight sampling locations in the Malibu Creek Watershed during the summer of 2019. This monitoring program was initiated, at the request of the Los Angeles Regional Water Quality Control Board (LARWQCB), in compliance with the Tapia Water Reclamation Facilities (TWRF) NPDES permit CA0056014 (MRP No. CI-4760).

Bioassessment monitoring followed the protocols established by the State of California's, Surface Water Ambient Monitoring Program (Ode et al. 2016).

In response to this requirement, Aquatic Bioassay and Consulting Laboratories, Inc. (Aquatic Bioassay) was contracted to conduct sampling in the Malibu Creek Watershed. On July 18th through the 29th, 2019, Aquatic Bioassay scientists conducted the fourteenth year of bioassessment sampling.

The goal of this program is to:

1. Provide a comparison of the macroinvertebrate and attached algae assemblages on the Malibu Creek to assess the aquatic health of locations both upstream and downstream of the TWRF outfall; and,

2. Evaluate the physical/habitat condition of these sampling sites.

This report includes all the physical, chemical, and biological data collected during the summer survey, photographic documentation of each site, QA/QC procedures and documentation followed by biological metrics and the California Stream Condition Index (CSCI), along with interpretation of these results with comparisons between sample locations, and across years. In addition, the most recent update of the TWRF NPDES permit (2017) included a provision that required the collection and analysis of attached algae from each of the sites in conjunction with the macroinvertebrate samples. These data were evaluated using the Southern California Algae Index of Biological Integrity (SoCA Algae IBI).

Materials and Methods

Sampling Site Descriptions

Eight sampling locations were visited in the Malibu Creek Watershed from July 18th through the 29th, 2019 (Table 1, Figure 1). Station identifiers, as specified in the NPDES permit, are presented in all tables and figures, but are abbreviated in the text to improve readability. Photographs of each site are displayed in Appendix B, Figure 7. Of the eight sites sampled, six are located in Malibu Creek, one is located in Las Virgenes Creek (station R-7), and one is located in Malibu Lagoon (station R-11). When the berm separating Malibu Lagoon from the ocean is breached, station R-11 is subject to tidal flushing and therefore, higher salinities. Stations R-3 and R-4 are located above the Lagoon and below Rindge Dam. Stations R-2 and R-13 are located on Malibu Creek downstream of the TWRF outfall, and stations R-1 and R-9 are located just upstream of the discharge. Station R-7 is located on Las Virgenes Creek in the upper portion of the watershed.

Table 1. Sampling location descriptions in the Malibu Creek Watershed.

Station ID	Sample Date	Name	Watershed	Position From TWRF Outfall	Distance (m) from TWRF Outfall	Latitude (N)	Longitude (W)	Elev. (m)
RSW-MC011D	7/29/2019	Malibu Lagoon	Malibu	Downstream	7470	34.03380	-118.68292	1
RSW-MC004D	7/29/2019	Malibu Creek	Malibu	Downstream	6290	34.04372	-118.68500	8
RSW-MC003D	7/29/2019	Malibu Creek	Malibu	Downstream	5860	34.04540	-118.68781	13
RSW-MC013D	7/19/2019	Malibu Creek	Malibu	Downstream	930	34.07606	-118.70277	140
RSW-MC002D	7/19/2019	Malibu Creek	Malibu	Downstream	150	34.08122	-118.70440	143
RSW-MC001U	7/18/2019	Malibu Creek	Malibu	Upstream	560	34.08390	-118.71152	146
RSW-MC009U	7/18/2019	Malibu Creek	Malibu	Upstream	2500	34.09969	-118.72204	151
RSW-MC007D	7/18/2019	Las Virgenes Creek	Malibu	Upper Watershed	7650	34.13354	-118.70636	220

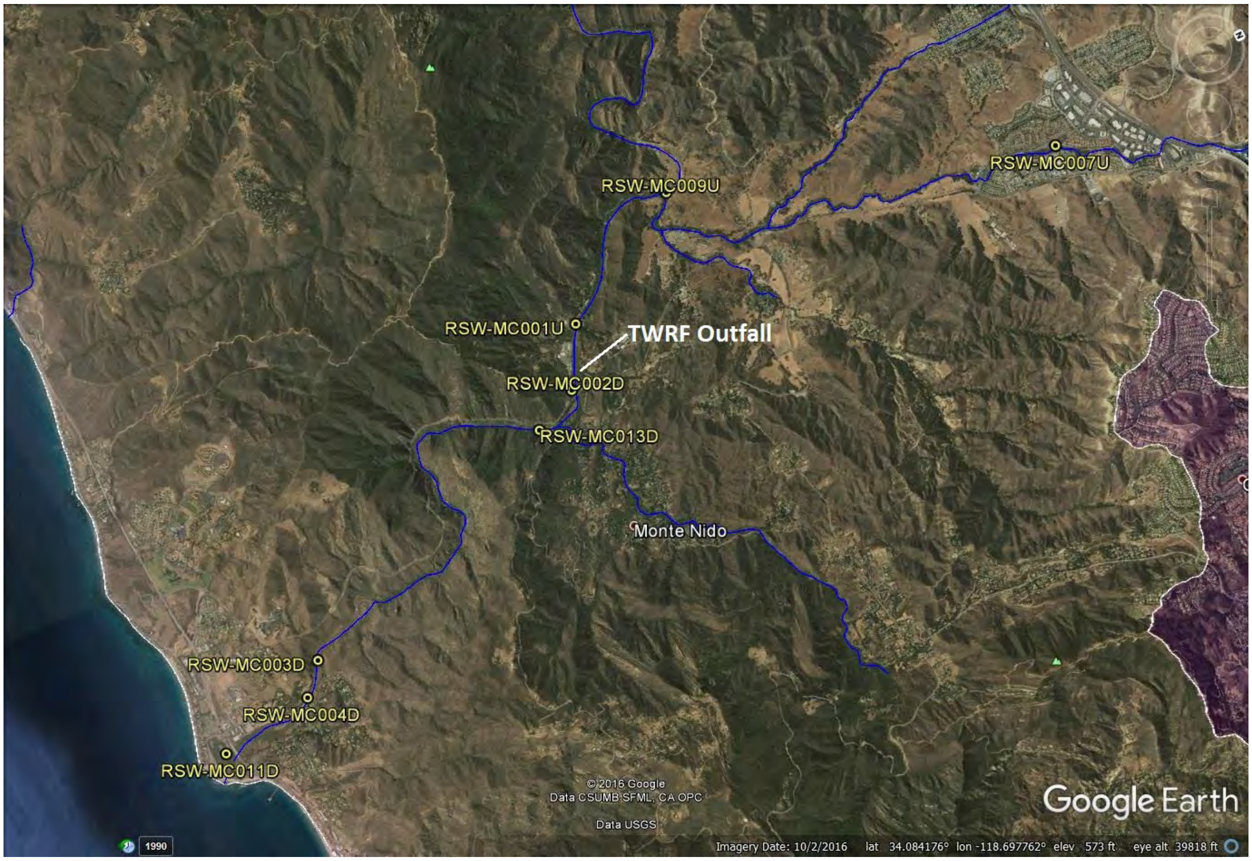


Figure 1. BMI sampling locations in the Malibu Creek Watershed in the vicinity of the Las Virgenes Municipal Water District Tapia Water Reclamation Facilities (LVMWD TWRF) discharge.

Collection of Benthic Macroinvertebrates

Wadeable Streams Protocols:

The field protocols and assessment procedures for collection of BMIs and attached algae followed the Surface Water Ambient Monitoring Program protocols (Ode et al. 2016). Samples were collected in strict adherence to the SWAMP protocols in terms of both sampling methodology and QC procedures. At each station, a 150-meter (m) reach was measured and 11 transects were established equidistance apart from the downstream to upstream end of the reach. If access to the full 150 m reach was not possible due to obstacles (i.e. bridges, or abutments), the total reach length was divided by 11 and transects were established as above. At each site the SWAMP Worksheet was used to collect all of the necessary station information and physical habitat data.

BMI samples were collected, starting with the downstream transect and working upstream, following the Reach Wide Benthos (RWB) sampling protocol:

1. At the most downstream transect, a single location was sampled 25% of the distance from the right wetted width. On the second upstream transect, a sample was collected 50% of the distance from the right wetted width and, on the third transect, 75% of the distance from the right wetted width. This process was repeated until each of the 11 transects had been sampled.

   a) All samples of the benthos were collected within a 0.09 m^2 area upstream of a 0.03 m wide, 0.5 mm mesh D-frame kick-net.

   b) Sampling of the benthos was performed manually by rubbing cobble and boulder substrates in front of the net, followed by disturbing the upper layers of substrate to dislodge any remaining invertebrates.

   c) The duration of sampling ranged from 60-120 seconds, depending on the amount of boulder and cobble-sized substrate that required rubbing by hand; complex substrates require a greater amount of time to process.

2. The 11 samples (per station) were combined into a single composite sample that represented a 0.99 m^2 area of the total reach sampled. The composited samples were transferred into separate two liter wide-mouth plastic jars containing approximately 300 ml of 95% ethanol.

3. Chain of Custody (COC) sheets were completed for samples as each station was completed.

Malibu Lagoon Sampling Protocol (Station R-11):

Station R-11 was located at the lower end of Malibu Creek in the Lagoon. This site is within the tidal prism and is therefore subject to brackish water conditions. As a result, sampling was conducted in adherence to protocols more specific to estuaries (USEPA 2000b). Triplicate benthic samples were collected at station R-11 using a 0.05 m^2 Petite Ponar Grab. Each sample was sieved through a 0.5 mm mesh screen and composited into a two-liter wide-mouth plastic jar containing approximately 300 ml of 95% ethanol.

Collection of Attached Algae

Stream attached algae collection was conducted in strict accordance with SWAMP sampling procedures (Ode et al. 2016) at all stations except R-11 which was in the Malibu Lagoon. Attached algae samples were collected at the same time as the BMI samples. Algae quantitative samples are collected a meter directly above where the BMIs were collected. The collection procedure is variable depending on the substrate found at the collection point but all samples are composited together into a wash bucket for further processing.

1. If the substrate type is removable and is in a depositional habitat (e.g. fine gravel, silt or sand) and has an exposed area of less than 12.6 cm^2, then a PVC delimiter, which is plastic coring device with an internal diameter of 4 cm, is used to collect the loose substrate up to 1 cm deep. Then a metal spatula is placed directly underneath the PVC delimiter to collect the loose material.

2. If the habitat type is erosional (e.g. cobble or a piece of wood) and removable then a rubber delimiter, which is comprised of bicycle tire with a reinforced hole of the desired area, is used to isolate a 12.6 cm^2 area of algae. The delimiter is wrapped around the object collected and a toothbrush is used to scrub the algae from the surface.

3. If the surface substrate cannot be removed (e.g. concrete, bedrock or large boulder), then a “syringe scrubber” is used to collect the algae from the surface underwater. Once the collection area has been scrubbed clean, the syringe plunger is retracted and the scrubber is removed and rinsed into the wash bucket.

Once algae samples from all 11 transects are collected and composited into the wash bucket, they are processed in the field. There are four different indicators targeted at each site, chlorophyll a (Chl-a), ash free dry weight (AFDW), diatoms and soft-bodied algae. For Chl-a and AFDW a 25 mL of composite sample are filtered through glass fiber pre-filters using a hand pump. The filter is placed in a petri dish, covered in aluminum foil and placed on dry ice until analyzed.

Diatom samples were prepared by combining 40 mL of composite water and 10 mL of 10% neutral buffered formalin preservative to a 50 mL centrifuge tube. The tube was covered in foil and placed on wet ice for future identification. Soft-bodied algae samples were prepared by adding 45 mL of composite water and 5 mL of 5% glutaraldehyde solution to a 50 mL centrifuge tube, covered in foil and placed on wet ice for identification.

Diatoms and soft-bodied algae samples were then sent to Rhithron Associates, Inc. in Missoula, MT for identification and enumeration. AFDM and Chl-a were sent to Sierra Environmental in Reno, NV for analysis.

Physical/Habitat Quality Assessment and Water Chemistry

Bioassessment sampling included a measure of the instream physical habitat conditions using a method originally developed by the USEPA and modified by SWAMP (Ode et al. 2016) for use in California. This method focuses on the habitat conditions found in the streambed and banks. The team collected the physical habitat measurements at each station, according to the full method outlined in the SWAMP manual and recorded the information on the SWAMP worksheets.

Assessment of the P-Hab conditions of a stream reach is necessary to determine the quality of the stream reach as a habitat for BMIs. In many cases, organisms might not be exposed to chemical contaminants, yet their populations indicate that impairment has occurred. These population shifts can be the result of degraded stream bed and/or a degraded riparian habitat. Excess sediment is the leading pollutant in streams and rivers of the United States (Harrington and Born 2000). Sediments fill pools and interstitial areas of the stream substrate, where invertebrates live, and cause invertebrate populations to decline and/or community compositions to be altered. Three important measures of physical habitat quality include epifaunal substrate cover, sediment deposition and channel alteration. A streambed with good epifaunal cover is characterized by a highly irregular and complex habitat composed of cobble, gravel, organic debris, etc. These conditions provide optimum conditions for BMI organisms. Conversely, when a streambed has little epifaunal cover, a large amount of sediment deposition, or its banks have been altered, conditions for BMIs are generally not as good.

Techniques for measuring physical habitat were as follows:

1. Water temperature, specific conductance, pH, and dissolved oxygen were measured using a handheld YSI 556 MPS water quality meter that was pre-calibrated in the laboratory. A water sample was collected for alkalinity and analyzed using the USEPA's Titrimetric (pH 4.5) 3101 method in the lab.

2. Wetted width, and depth were measured in meters using a stadia rod or measuring tape at each transect.

3. The total length of the stream reach was measured in meters.

4. Substrate size class was measured at five evenly spaced points along each transect to the nearest millimeter.

5. Discharge was measured on a single transect, using a hand held flow meter, following the velocity area method specified in the SWAMP bioassessment protocol.

6. A handheld densitometer was used to measure percent canopy cover.

7. Flow habitat regimes were visually estimated.

8. Stream gradient was measured using either an auto level or clinometer.

Aquatic Bioassay field teams are audited each year for proficiency using the SWAMP protocols by the Southern California Coastal Research Project (SCCWRP) and for the Southern California Stormwater Monitoring Coalition's (SMC) Regional Monitoring Program.

Sample Analysis/Taxonomic Identification of Benthic Macroinvertebrates (BMIs)

Sample sorting and taxonomy were conducted by Aquatic Bioassay in Ventura, California. Identifications were made using standard taxonomic keys (Literature Cited, Taxonomic References) and in most cases, taxa for this study were identified to the species level in adherence with the Standard Taxonomic Effort (STE) Level 2a, specified by the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT). Chironomids were identified to subfamily. Identifications were rolled up to the appropriate taxonomic level for the calculation of biological metrics used in the CSCI. Samples entering the lab were processed as follows:

600 organisms were sub-sampled from the composite sample using a Katon tray, and then sorted into major taxonomic groups. All remnants were stored for future reference. The 600 organisms were identified to the genus level for most insects, and order or class for non-insects. As new species to the survey area were identified, examples of each were added to the voucher collection. The voucher collection includes at least one individual of each species collected and ensures that naming conventions can be maintained and changed as necessary into the future.

The taxonomic QA/QC procedures followed for this survey included:

1. Sorting efficiencies were checked on all samples and a minimum required sorting efficiency was 95% (i.e. no more than 5% of the total number of organisms sorted from the grids could be left in the sub-sample) was maintained. At least 10% of all processed material from each sample was inspected by the laboratory supervisor for the aforementioned efficiency. Sorting efficiency results were documented on each station's sample tracking sheet.

2. Once identification work was completed, Aquatic Bioassay taxonomists conduct QC as follows:

    a. Ten percent of all stations sampled were randomly selected for internal QC by another Aquatic Bioassay taxonomist. Samples were checked for both enumeration and identification accuracy, which must both pass a 95% efficiency criterion. Discrepancies were resolved and the database was updated.

    b. Ten percent of all samples (n = 15 QC samples) collected each season in the southern California region (n = ~150 samples) by Aquatic Bioassay are sent to the California Department of Fish and Game (CDFG) offices in Chico California for an external QA/QC check. Samples were sorted by species into individual vials that included an internal label. Any discrepancies in counts or identification found by the CDFG taxonomists were discussed, and then resolved. All data sheets were corrected and, when necessary, bioassessment metrics were updated.

3. It is a requisite of our QC program that all staff members involved in taxonomy belong to SAFIT, an organization dedicated to the standardization of freshwater organism naming conventions.

Sample Analysis/Taxonomic Identification of Attached Algae

Samples for algal analysis were conducted by the Rhithron Associates, Inc. located in Missoula, MT. Laboratory identification procedures for soft algae and diatoms followed SWAMP protocols (Kociolek *et. al* 2011; Stancheva and Sheath, 2011) and are summarized as follows:

Qualitative Soft Algae Analysis

Using a dissecting scope, analysts performed a qualitative scan to identify as many microalga taxa as possible. Specimens were identified to species or lowest practical taxonomic level, and then photos were taken for all determined taxa.

Quantitative Soft Macroalgae Analysis

Using a dissecting scope, analysts processed samples to determine the representative portion of macroalgae (and mosses, vascular plant tissues or roots if present). Bio-volumes were determined by original water displacement. Specimens were identified to species or lowest practical taxonomic resolution.

Quantitative Soft Microalgae Analysis

Using a compound microscope, analysts enumerated 300-500 natural units of soft microalgae. Specimens were identified to species or lowest practical taxonomic resolution. The total bio-volumes of microalgae were calculated using appropriate literature (ie. Hillebrand *et al*. 1999) for measurement designations. Photos were taken of all taxa to compile a synoptic reference collection.

Diatom Analysis

Samples were prepared using the Nitric Acid diatom cleaning method. Cleaned diatom material was diluted to acceptable counting ranges and mounted onto slides. Completed slides were delivered to the processing analyst. Samples were enumerated to 600 valves and identified to the species, or lowest practical taxonomic resolution. Photos were taken of all taxa and a synoptic reference collection was made.

Identification Quality Control

Internal QC protocols included re-identification of the digital synoptic reference collection.

Chlorophyll a and Ash Free Dry Mass of Attached Algae

Chlorophyll a (chl-a) and ash free dry mass (AFDM) analysis was conducted by Sierra Environmental (Reno, NV).

Laboratory	AFDM	Chl a
Silver State Analytical Laboratories	SM 2540	SM 10200

Data Development and Analysis

Benthic Macroinvertebrate Biological Metrics:

As species were identified and counted, they were included in an Excel data sheet, checked for errors, and then imported into the Aquatic Bioassay BMI database system. The California Stream Condition Index (CSCI) and metrics were calculated using GIS and the CSCI package 1.1.2 R script (Mazor et al., 2015). The following metrics were calculated and their responses to impaired conditions are listed in Table 2:

- Percent Clinger Taxa is the percent of taxa in a sample that are adapted for attachment to plants or other hard surfaces in flowing water. A higher number of clinger taxa is indicative of a healthier community than if absent.
- Percent Coleoptera Taxa is the percent of taxa in a sample comprised of beetles (Coleoptera). This order is generally sensitive to impairment and when present, are usually indicative of a healthier community than if absent.
- Taxonomic Richness is a measure of the total number of species found at a site. This relatively simple index can provide much information about the integrity of the community. Few taxa at a site indicate that some species are being excluded, while a large number of taxa indicate a healthier community.
- Percent EPT Taxa is the percent of taxa in sample comprised of mayflies (Ephemeroptera), stoneflies (Plecoptera) and caddisflies (Trichoptera). These orders are generally sensitive to impairment and when present, are usually indicative of a healthier community than if any or all are absent.
- Shredder Taxa is the percent of taxa that shreds coarse particulate matter. Functional Feeding Group (FFG) indices provide information regarding the balance of feeding strategies represented in an aquatic assemblage. Shredder taxa are

generally sensitive to disturbance and increased number of taxa generally indicate a healthier community.

- <u>Percent Intolerant Individuals</u> is the percent of organisms in the sample that are highly intolerant to impairment. BMI species are assigned a literature cited tolerance value ranging from 0 (highly intolerant) to 10 (highly tolerant). The percent intolerant individuals have tolerance values ranging from 0 to 2. A site with many intolerant organisms is considered more pristine and indicate a healthier community.

Table 2. Bioassessment metrics used to describe characteristics of the BMI community.

MMI Metric	Description	Response to Impairment
% Clinger Taxa	Percent of taxa that are adapted for attachment to surfaces in flowing water.	Decrease
% Coleoptera Taxa	Percent taxa from the insect order coleoptera.	Decrease
Taxonomic Richness	Total number of individual taxa.	Decrease
% EPT Taxa	Percent taxa in the orders Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly).	Decrease
Shredder Taxa	Number of taxa that shreds coarse particulate matter.	Decrease
% Intolerant Individuals	Percent of organisms in the sample that are highly intolerant to impairment as indicated by a tolerance value of 0, 1, or 2.	Decrease

California Stream Condition Index (CSCI)

The California Stream Condition Index (CSCI) is a new statewide biological scoring tool that translates complex data about benthic macroinvertebrates (BMIs) found living in a stream into an overall measure of stream health (Mazor et al. 2016). The CSCI combines two separate types of indices, each of which provides unique information about the biological condition at a stream: a multi-metric index (MMI) that measures ecological structure and function, and an observed-to-expected (O/E) index that measures taxonomic completeness. Unlike previous MMI or O/E indices that were applicable only on a regional basis or under-represented large portions of the state, the CSCI was built with a statewide dataset (n = 1,985 sites) that represents the broad range of environmental conditions across California.

The CSCI was calibrated during its development so that the mean score of reference sites is 1. Scores that approach 0 indicate great departure from reference condition and degradation of biological condition. Scores > 1 can be interpreted to indicate greater taxonomic richness and more complex ecological function than predicted for a site given its natural environmental setting. In practice, CSCI scores observed from nearly 2000 study reaches sampled across California range from about 0.1 to 1.4. Mazor (et al. 2016) and Rhen (2015) suggested that for the purposes of making statewide assessments, three thresholds be established based on the 30th; 10th; and 1st percentiles of CSCI scores at reference sites. These three thresholds divide the CSCI scoring range into 4 categories of biological condition as follows: ≥0.92 = likely intact condition; 0.91 to 0.80 = possibly altered condition; 0.79 to 0.63 = likely altered condition; ≤0.62 = very likely altered condition. While these ranges do not represent regulatory threshold, they provide a useful method for interpreting CSCI results.

Historical Southern California CSCI scores:

To assess the condition of BMI communities at all stations over time, CSCI scores were averaged (± 95% CI) by station for surveys conducted between the 2015 through 2019. This historical data is presented in Figure 5.

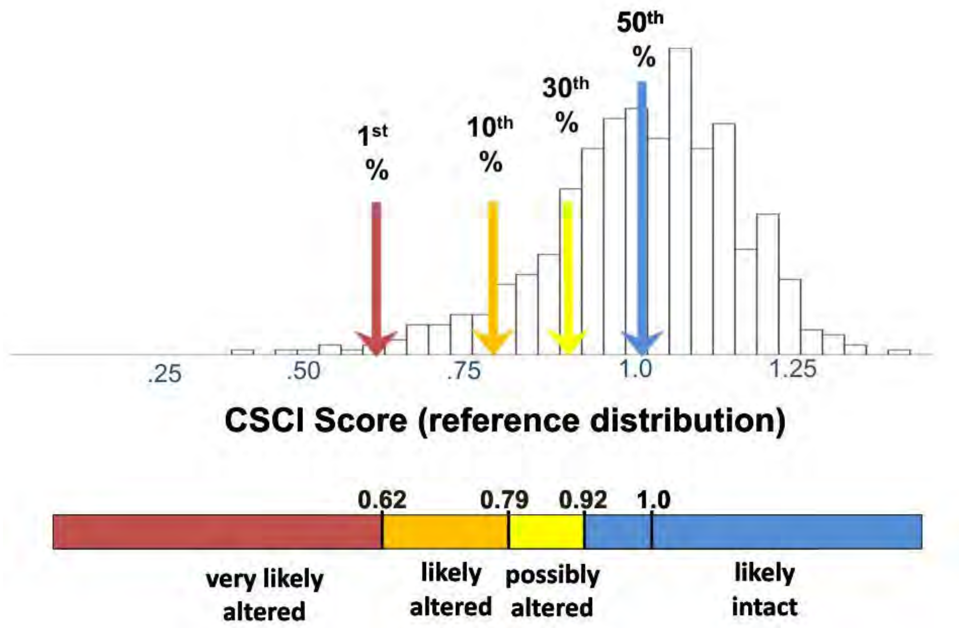


Figure 2. Distribution of CSCI scores at CA reference sites with thresholds and condition categories (Rhen et al., 2015).

Southern California Algae IBI (SoCA Algae IBI)

Soft-bodied algae and diatom community structure can be used to assess many aspects of stream water quality including the effects of nutrient loading and other contaminants (e.g. dissolved metals and organics). The Southern California Coastal Water Research Project (SCCWRP) scientists recently created the Southern California Algae IBI which is similar to the one used for BMIs to assess anthropogenic impacts (Fetscher et al. 2013). Algae samples were collected from 2007 thru 2010 at a total of 451 distinct southern California stream reaches were used to develop the IBI scoring system. The SoCA Algal IBI is composed of three indices; a diatom IBI (D18) is based solely on diatom metrics, a soft algae IBI (S2) is based solely on non-diatom (soft) algae metrics, and a hybrid (H20) of both diatom and soft bodied algae metrics. IBIs are composed of metrics chosen for their ability to differentiate between reference and non-reference stream conditions. Table 3 shows the metrics that were used to calculate the SoCA Algae IBI and their responses to human disturbance.

The boundary chosen to delineate between reference and non-reference condition (57 on a scale from 0 to 100) was based purely on statistical grounds, and was calculated as two standard deviations below the mean distribution of reference sites. As a result, it does not represent an ecologically meaningful change point in community composition and cannot be used in a regulatory framework (e.g. to evaluate attainment of water body “aquatic life” goals; Fetscher et al. 2013).

Table 3. Diatom and soft bodied algae metrics used in the SoCA Algae IBI (grayed) and their responses to human disturbance.

Metric Category	Metric Theme	Metric	Data Type	Description	Response to Human Disturbance
Diatom					
Autecological Guild	Dissolved Oxygen	Proportion Requiring Nearly 100% DO	Proportion of Valves	Proportion of valves that require nearly 100% DO saturation	Decrease
		Proportion Requiring >50 % DO	Proportion of Valves	Proportion of valves that require at least 50 % DO saturation (sum 50+75+100)	Decrease
	Ionic Strength/Salinity	Proportion Halobiontic	Proportion of Valves	Proportion of valves that are brackish-fresh + brackish (i.e., they have a tolerance of, or requirements for, dissolved salt)	Increase
	Nutrients	Proportion Poly- & Eutrophic	Proportion of Valves	Proportion of valves that are polytrophic + eutrophic	Increase
	Organic Pollution	Proportion Nitrogen Heterotrophs	Proportion of Valves	Proportion of valves that are heterotrophs (includes both obligate and facultative heterotrophs)	Increase
		Proportion Oligo- & Beta-mesosaprobic	Proportion of Valves	Proportion of valves that are oligosaprobous + (beta-mesosapprobus)	Decrease
Morphologic Guild	Sedimentation	Proportion of Highly Motile	Proportion of Valves	Proportion of valves that are highly motile	increase
		Proportion of Sediment Tolerant (highly motile)	Proportion of Valves	Proportion of valves for which there is information that are highly motile (NOT moderately) + all planktonic	increase
Taxonomic Group	A. minutissimum	Proportion A. minutissimum	Proportion of Valves	Proportion of the valves that are Achnanthidium minutissimum	Decrease
Tolerance/Sensitivity	Nitrogen	Proportion of Low TN Indicators	Proportion of Valves	Proportion of valves that are indicators for high TN levels (>3 mg/L)	Decrease
	Phosphorous	Proportion of Low TP Indicators	Proportion of Valves	Portion of valves that are indicators for high TP levels (>0.1 mg/L)	Decrease
Soft Algae					
Relationship to Reference	Reference	Proportion of "non-reference" Indicators (Biovolume)	Relative Biovolumes	Proportion of total micro + macro biovolume composed of indicators of "non-reference" sites	Increase
		Proportion "non-reference" Indicators (Species)	Relative Species Numbers	Proportion of total species richness composed of indicators of "non-reference" sites	Increase
Taxonomic Group	Chlorphyta	Proportion Chlorophyta	Relative Biovolumes	Proportion of total micro + macro biovolume composed of Chlorophyta	Increase
		Proportion of green algae belonging to CRUS	Relative Biovolumes	Proportion of green algae (Chlorophyta + Charophyta) micro + macro biovolume composed of Cladophora golmerata, Rhizoclonium hieroglyphicum, Ulva flexosa, and Stigeoclonium sp.	Increase
	ZygnHeteroRhod	Proportion ZHR (Mean)	Relative Species Number and Biovolumes	Mean of scores for the corresponding species number and biovolume metrics	Decrease
		Proportion ZHR (Biovolume)	Relative Biovolumes	Zygnemataceae + Heterocystous Cyanobacteria + Rhodopyta	Decrease
Tolerance/Sensitivity	Copper	Proportion of High Cu Indicators	Relative Species Numbers	Proportion of total species richness composed of high copper (dissolved) indicators	Increase
	Organic Pollution	Proportion High DOC Indicators (Biovolume)	Relative Biovolumes	Proportion of total micro + macro biovolume composed of indicators of high DOC	Increase
		Proportion High DOC Indicators (Species)	Relative Species Numbers	Proportion of total species richness composed of high DOC indicators	Increase
	Phosphorous	Proportion of Low TP Indicators	Relative Species Numbers	Proportion of total species richness composed of low TP indicators	Decrease

Results

Physical Habitat Characteristics and Water Chemistry

Malibu Creek Watershed above Malibu Lagoon

General Physical Habitat Characteristics

The physical characteristics of the reaches sampled in Malibu Creek during the summer 2019 survey are presented in Table 5.

- The reach length was a maximum 150 m at each site, except at R-9 where the reach length was reduced to 110 m due to drying. The average wetted width was greatest at R-2 (7.3 m) and was least at R-7 (3.0 m). Average depth was greatest at R-1 (37.5 cm) and was least at R-3 (8.2 cm). Stream discharge was low at all sites ranging from < 0.01 m^3/s (R-13 and R-9) to 0.10 m^3/s at R-4. The slope of all stations ranged from 0.02% (R-1) to 1.73% (R-3).
- Vegetative canopy cover ranged from 76% at R-7 on Las Virgenes Creek, to 0% at R-9. The average thickness of microalgae was low across sites, ranging from 0.00 to 0.13 mm. The presence of macroalgae was greatest at R-9 (55%) and least at R-1 (0%). The presence of macrophytes ranged from 0% at R-3 to 19% at R-1.
- Bank stability is the observed potential of a bank to erode. All the stations sampled were considered at least vulnerable to erosion (14% to 100%). Stations R-1 and R-7 were not stable (0%), while all other stations were partially or highly stable (range = 27% to 77%). Station R-7 had banks that were 86% eroded, while erosion ranged from 0% to 18% at all other stations.
- Flow habitats were represented by combinations of riffles, glides and pools. Glides (15% to 73%) were the most predominant flow habitats. Riffle habitats ranged from 0% at station R-9 to 53% at R-3. Pool habitat dominated at R-1 and R-9 (56% and 20%, respectively) and was much lower at all other stations (range = 0% to 7%).
- The substrate class size is another indicator of available benthic invertebrate habitat. Mixtures of gravel, sand and fines were prevalent at each of the seven stations. Cobbles and boulders were more prevalent at the downstream stations (R-4, R-3 and R-13). Bedrock was found at R-13 and R-9 only. Roots (‘Other’) were present across all stations.

Water Quality Measures

Water quality measures were within ranges typical of southern California streams (Table 5).

- Water temperatures ranged from 20.2 °C at R-3 to 24.7 °C at R-9.
- pH was similar across sites ranging from 7.8 to 8.1
- Alkalinity ranged from 214 mg/L at R-2 to 410 mg/L at R-7, the most upstream site.
- Dissolved oxygen concentrations ranged from 5.6 mg/L at R-9 to 7.9 mg/L at R-4.
- Specific conductance ranged from 2,115 µS/cm, at station R-4, to 3,625 µS/cm at station R-7 on Las Virgenes Creek.
- Salinities were elevated compared to most freshwater stream systems (≤ 0.5 ppt) and ranged from 1.10 ppt at R-3 to 1.91 ppt at R-7.

Algal Biomass

- Ash free dry mass (AFDM) and chlorophyll-a were also measured at all freshwater stations to estimate algal biomass. The AFDM ranged from 1.7 mg/cm² at R-3 to 13.0 mg/cm² at R-9. Chlorophyll-a was least at R-13 (2.2 µg/cm²) and greatest at R-7 (27.0 µg/cm²).

Physical/Habitat (P-Hab) Scores

Out of a total possible score of 60, the physical habitat scores for most stations were in the suboptimal range. Station R-1 was in the marginal range (28) mostly due to the lack of instream cover and sediment deposition (Table 5 and Figure 3). Station R-3 was in the optimal range (51) due to increased instream cover and less channel alteration.

<u>Malibu Lagoon (Station R-11)</u>

General Physical Habitat Characteristics

Malibu Lagoon Station R-11 represents an estuary habitat that cannot be directly compared to the riparian habitats found at the upstream stations. This site is subject to highly variable conditions including freshwater inundation periods when the berm at the mouth of Lagoon is closed, shallow brackish water periods when the berm is open and large shifts in salinity depending on the status of the berm in conjunction with tidal fluctuations. The organisms that reside under these conditions are different than those found in freshwater stream systems and are generally adapted to these rapidly changing conditions.

Water Chemistry

The water level during the sampling event was relatively shallow (1.2 m) and had elevated water temperature (26.5 °C) (Table 4). Water quality conditions were typical of estuary conditions, with the salinity (8.52 ppt) indicating some tidal influence at the time of the sampling event. The dissolved oxygen was normal during sampling (7.48 mg/L).

Table 4. Physical habitat scores and characteristics for reaches in the Malibu Creek Watershed.

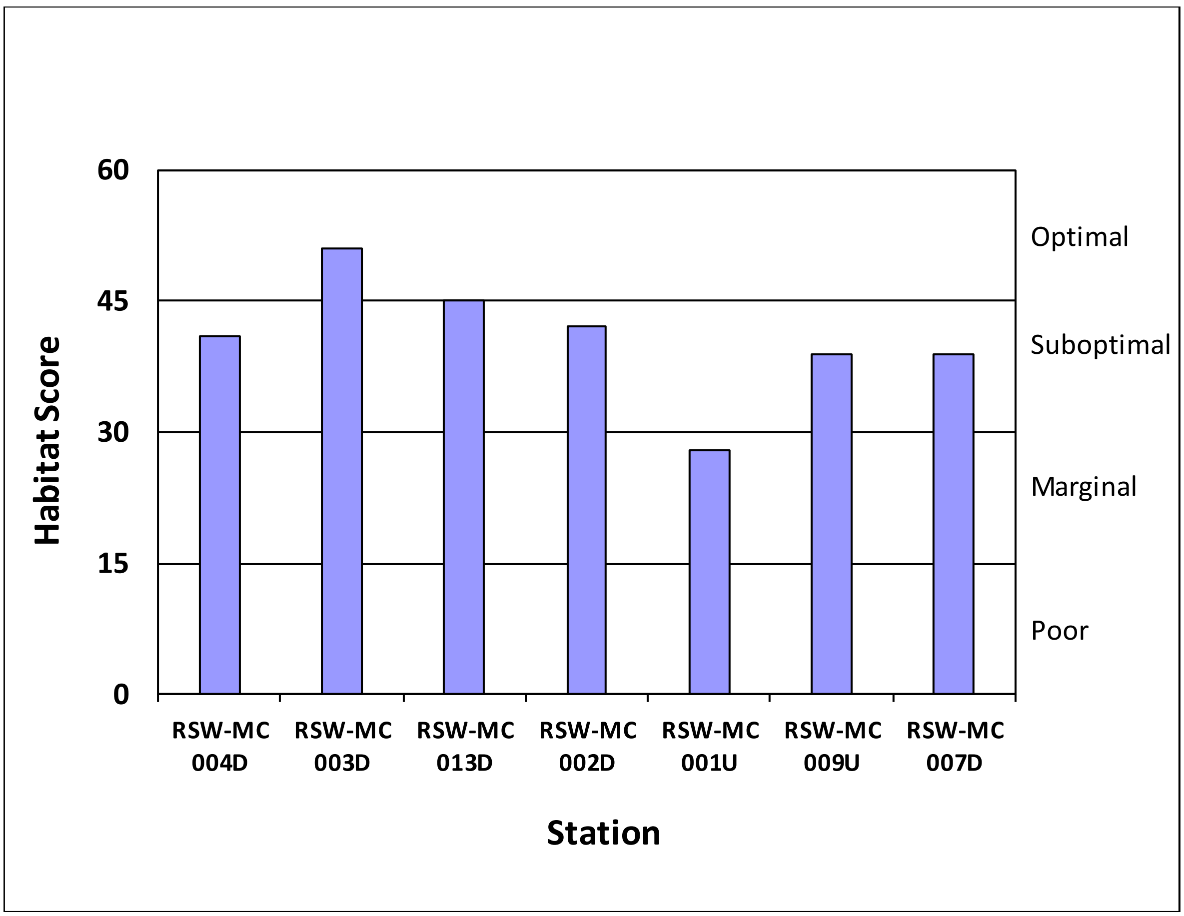
Station	RSW-MC 011D	RSW-MC 004D	RSW-MC 003D	RSW-MC 013D	RSW-MC 002D	RSW-MC 001U	RSW-MC 009U	RSW-MC 007D
Physical Habitat Characteristics								
Reach Length (m)	NA	150	150	150	150	150	110	150
Average Wetted Width (m)	NA	6.0	5.9	6.6	7.3	6.4	4.8	3.0
Average Depth (cm)	1.2	13.7	8.2	16.1	20.9	37.5	15.7	9.7
Average Velocity (ft/s)	NA	0.74[1.]	0.82[1.]	<0.01	0.14	0.68	<0.01	0.27
Discharge (m^3/s)	NA	0.10[1.]	0.07[1.]	<0.01	0.03	0.05	<0.01	0.02
Slope (%)	NA	1.55	1.73	1.20	0.60	0.02	1.20	0.80
Vegetative Canopy Cover (%)	NA	3	55	35	65	59	0	76
Microalgae Mean Thickness (mm)	NA	0.03	0.02	0.13	0.02	0.03	0.00	0.10
Macroalgae Presence (%)	NA	6	1	11	1	0	55	24
Macrophyte Presence (%)	NA	4	0	3	2	19	1	4
Bank Stability (%):								
Stable	NA	41	77	73	55	0	27	0
Vulnerable	NA	41	23	14	41	100	73	14
Eroded	NA	18	0	14	5	0	0	86
Flow Habitats (%):								
Cascade/Fall	NA	0	0	0	0	0	0	0
Rapid	NA	0	0	0	0	0	0	0
Riffle	NA	27	53	42	23	19	0	50
Run	NA	0	0	0	0	10	0	0
Glide	NA	67	46	51	70	15	73	50
Pool	NA	5	1	7	7	56	20	0
Dry	NA	1	0	0	0	0	7	0
Substrate Size (%):								
Bedrock	NA	0	0	3	0	0	10	0
Boulder	NA	5	17	25	8	1	1	0
Cobble	NA	21	17	6	4	7	3	4
Gravel	NA	37	31	11	13	11	44	54
Sand	NA	11	2	11	31	11	9	10
Fines	NA	20	22	30	30	60	32	17
Hardpan	NA	0	0	0	0	0	0	0
Wood	NA	0	0	0	1	0	0	3
Other	NA	6	11	14	13	10	1	12
Water Quality Measures[2.]								
Water Temperature (C°)	26/26.5	20.8	20.2	19.4	21.4	21.5	24.7	21.1
pH	8.5/8.55	8.1	7.9	7.8	7.9	8.0	7.9	7.8
Alkalinity	NA	281	296	350	214	310	258	410
DO	7.48/6.27	7.9	6.8	7.7	7.5	5.7	5.6	7.2
Specific Conductance (µS/cm)	805/14703	2115	2147	2392	2654	2746	2201	3625
Salinity (ppt)	0.39/8.52	1.09	1.1	1.24	1.37	1.43	1.13	1.91
Ash Free Dry Mass (mg/cm^2)	NA	5.2	1.7	7.4	11.0	5.0	13.0	6.3
Chlorophyll a ($\mu g/cm^2$)	NA	19.0	4.6	2.2	19.0	7.1	8.4	27.0

1. Calculated using buoyant object method (Ode *et al.,* 2016)
2. Surface/Bottom depths

Table 5. Physical habitat assessment for the Malibu Creek Watershed above Malibu Lagoon.

Habitat Parameter	RSW-MC 004D	RSW-MC 003D	RSW-MC 013D	RSW-MC 002D	RSW-MC 001U	RSW-MC 009U	RSW-MC 007D
1. Instream Cover	12	17	14	14	7	12	15
2. Sediment Deposition	14	16	15	13	6	8	13
3. Channel Alteration	15	18	16	15	15	19	11
Reach Total	**41**	**51**	**45**	**42**	**28**	**39**	**39**
Condition Category	**Suboptimal**	**Optimal**	**Suboptimal**	**Suboptimal**	**Marginal**	**Suboptimal**	**Suboptimal**

Figure 3. Physical habitat assessment scores for the Malibu Creek Watershed above Malibu Lagoon.



Biological Condition

<u>*Benthic Macroinvertebrate (BMI) Community Condition*</u>

A complete BMI taxa list including raw abundances, tolerance values, and functional feeding groups are presented by site for the summer 2019 survey in Appendix A, Table 12. The ranked abundances of all taxa at each site are presented in Table 6. New Zealand mud snail abundances from 2007 to 2019 are presented in Table 7. The CSCI scores, including their derivative metrics, are presented in Table 8 and Figure 4.

Community Composition

A combined total of 5,024 BMIs was identified from 47 different taxa at the eight stations sampled during the summer 2019 survey. Ninety seven percent of the organisms collected at station R-11 in Malibu Lagoon were seed shrimp (Ostracoda) (Table 6). At the upstream stations, combinations of disturbance tolerant organisms represented the majority of the abundances with three to ten taxa representing 80% the total abundance. Some of the most abundant taxa across all stations included clams (*Corbicula sp*.), amphipods (*Hyalella sp.)*, midges (Chironominae), nemertean worms (*Prostoma sp*.), mayflies (*Baetis sp*.) and New Zealand mud snails (NZMS, *Potamopyrgus antipodarum*).

In 2019, the NZMS were found at R-3 (n = 24), R-13 (n = 30), R-1 (n=238), and R-7 (n = 19) (Table 7). Stations downstream of the discharge had on average, fewer NZMS over the thirteen-year period since 2007 (average range = 20 to 43). Average NZMS abundances since 2007 were greatest at R-1 (n = 114) and R-7 (n = 151). NZMS were not collected at R-9, which was similar to past years.

CSCI Score

The CSCI scores, along with its component MMI and O/E scores are presented in Table 8 and Figure 4. CSCI scores at R-4, R-2, and R-1 indicated a relatively good biotic condition category ranking of “possibly altered” (> 0.79) putting them within the 10th percentile of the reference distribution of stations. Since R-1 and R-2 are located above and below the TWRP discharge point, it indicates the discharge was not affecting the BMI communities. Stations R-3, R-13 and R-7 had CSCI scores with category scores in the “likely altered” ranking. Station R-9 had the poorest CSCI score indicating a biotic condition of “very likely altered”.

The two component indices of the CSCI are the MMI and O/E scores (Table 8 and Figure 4). The MMI scores across sites were low (range = 0.53 to 0.65) and were not similar to the reference pool (MMI percentiles = 0.00 to 0.02). This is indicative of streams where the ecological structure of the system has been disturbed. In contrast, the O/E scores ranged from lowest at R-9 (0.65) to greatest at R-2 and R-1 (1.16 each). These results indicate that while taxonomic completeness at some of the sites is relatively good, the ecological structure and function of the sites is disturbed.

2015 to 2019 (Historical Data)

CSCI results from 2015 to 2019 for the Malibu Creek Watershed are presented in Figure 5. During the five years, the average score across sites fell below 0.79 indicating they are “likely altered”. On average the CSCI scores during the period were slightly better at stations near the TWRP outfall.

Malibu Creek Lagoon (R-11)

Only six taxa, were collected at R-11 in the Malibu Creek Lagoon (Table 9). The most abundant (87%) was represented by seed shrimp (Ostracoda).

<u>Attached Algae Community Condition</u>

Below we present the results for the attached algae community analysis for each site. Each of the metrics used to calculate the diatom (D18), soft bodied algae (S2) and hybrid (H2O) IBI scores are presented in Table 10 (Fetscher et al. 2013). Table 11 shows the rank scores and adjusted IBI score for each metric by station, while Figure 6 graphically depicts the SoCA Algae IBI (H2O) and its component scores for soft algae (S2) and diatoms (D18).

Diatom (D18) and Soft Bodied (S2) Algae Metrics and IBI Scores

Diatoms include mostly unicellular species that are housed in a silica frustule and live as phytoplankton or as a film on the surface of rocks and other hard substrates. A total of 110 diatom taxa were collected from the survey area in 2019 (Appendix A, Table 13). Of these, three classes were represented; 93 taxa in the class Bacillariophyceae, 7 in the class Coscinodiscophyceae, and 10 in the Fragilariophyceae. The diatom IBI (D18) was low at all eight stations (Table 10 and Table 11). The highest scores were measured at R-7 (54) and lowest at R-1 (8) above the outfall (Figure 6).

The soft-bodied algae (macroalgae) are composed of filamentous forms that make up large volumes of a sample and are those species that are generally easily seen as filamentous mats in the streambed. In 2019 a total of 44 taxa from 15 different classes were enumerated (Appendix A, Table 14). Similar to the D18 index, the adjusted soft bodied algae IBI (S2) was low at all sites (range = 15 to 47) (Table 10 and Table 11). The highest score was measured at R-1 (47), just above the outfall and the lowest score was at R-4 and R-9 (15 each) (Figure 6).

SoCA Algae IBI

The SoCA Algae IBI scores for each site were low and well below the reference threshold (>57) (Table 11 and Figure 6). The greatest IBI scores were at station R-7 (34), and R-4 and R-3 (33 each). The other stations scores ranged from 14 to 21. Scores above (R-1 = 19) and below (R-2 = 21) the TWRF outfall were similar. The biological condition of the algae communities in this reach of Malibu Creek was poor with no clear evidence that the TWRP outfall is contributing to this condition.

Table 6. Ranked taxonomic abundance of organisms collected during BMI surveys at each station within the Malibu Creek watershed.

RSW-MC011D

Species	% of Total Abund	Cumulative % Abund
Ostracoda	97.5	97.5
Oligochaeta	1.7	99.2
Orthocladiinae	0.3	99.5
Prostoma	0.2	99.7
Corixidae	0.2	99.9
Chironominae	0.2	100.0
TOTAL	100	

RSW-MC004D

Species	% of Total Abund	Cumulative % Abund
Ostracoda	31.5	31.5
Chironominae	21.1	52.6
Corbicula	12.0	64.6
Baetis	6.6	71.2
Oligochaeta	6.3	77.5
Hydropsyche	4.2	81.6
Sperchon	2.8	84.4
Hydroptila	1.9	86.3
Prostoma	1.8	88.1
Tanypodinae	1.6	89.7
Atrichopogon	1.2	90.9
Caloparyphus/Euparyphus	1.1	92.0
Callibaetis	0.9	92.9
Anopheles	0.9	93.8
Hydrobiidae	0.9	94.7
Turbellaria	0.9	95.5
Physa	0.9	96.4
Tinodes	0.7	97.1
Ochrotrichia	0.5	97.6
Hemerodromia	0.4	98.0
Simulium	0.4	98.4
Hyalella	0.4	98.8
Dasyhelea	0.2	99.0
Culicidae	0.2	99.1
Coenagrionidae	0.2	99.3
Orthocladiinae	0.2	99.5
Ceratopogonidae	0.2	99.7
Pericoma/Telmatoscopus	0.2	99.9
Bezzia/Palpomyia	0.2	100.0
	100	

RSW-MC003D

Species	% of Total Abund	Cumulative % Abund
Baetis	19.7	19.7
Hydropsyche	18.0	37.7
Fallceon	7.8	45.5
Oligochaeta	6.6	52.1
Caloparyphus/Euparyphus	6.4	58.4
Corbicula	6.1	64.5
Sperchon	4.9	69.4
Hydroptila	4.5	73.9
Prostoma	3.9	77.8
Potamopyrgus antipodarum	3.8	81.6
Tinodes	3.4	84.9
Ochrotrichia	3.0	87.9
Atrichopogon	1.6	89.5
Chironominae	1.6	91.1
Ostracoda	1.6	92.7
Baetis adonis	1.3	94.0
Pericoma/Telmatoscopus	1.3	95.3
Turbellaria	0.8	96.1
Hyalella	0.6	96.7
Argia	0.5	97.2
Hemerodromia	0.5	97.7
Orthocladiinae	0.5	98.1
Psychodidae	0.5	98.6
Hydropsychidae	0.3	98.9
Tricorythodes explicatus	0.3	99.2
Ephydridae	0.2	99.3
Hydroptilidae	0.2	99.5
Petrophila	0.2	99.7
Tanypodinae	0.2	99.9
Tipulidae	0.2	100.0
	100	

RSW-MC013D

Species	% of Total Abund	Cumulative % Abund
Chironominae	36.7	36.7
Hyalella	19.6	56.3
Ostracoda	13.0	69.3
Hydroptila	9.4	78.7
Corbicula	5.1	83.8
Potamopyrgus antipodarum	4.3	88.1
Simulium	2.8	90.9
Baetis	2.1	93.0
Tanypodinae	1.8	94.8
Caloparyphus/Euparyphus	0.9	95.7
Hydropsyche	0.7	96.4
Hydroptilidae	0.7	97.1
Orthocladiinae	0.7	97.8
Bezzia/Palpomyia	0.6	98.4
Fallceon	0.4	98.8
Atrichopogon	0.3	99.1
Physa	0.3	99.4
Prostoma	0.3	99.7
Hemerodromia	0.1	99.8
Turbellaria	0.1	100.0
	100	

RSW-MC002D

Species	% of Total Abund	Cumulative % Abund
Chironominae	21.6	21.6
Simulium	12.2	33.8
Prostoma	11.2	45.0
Hydropsyche	11.1	56.1
Corbicula	10.7	66.8
Tanypodinae	8.9	75.7
Hyalella	8.2	83.9
Bezzia/Palpomyia	3.7	87.6
Sperchon	3.4	91.0
Oligochaeta	2.0	93.0
Mideopsis	1.8	94.8
Hydroptila	1.5	96.3
Ostracoda	1.0	97.3
Baetis	0.8	98.1
Hemerodromia	0.5	98.6
Orthocladiinae	0.5	99.1
Physa	0.3	99.4
Atrichopogon	0.2	99.6
Caloparyphus/Euparyphus	0.2	99.8
Ochrotrichia	0.2	100.0
TOTAL	100	

RSW-MC001U

Species	% of Total Abund	Cumulative % Abund
Potamopyrgus antipodarum	33.1	33.1
Corbicula	11.4	44.5
Coenagrionidae	8.3	52.8
Prostoma	8.2	61.0
Hydropsyche	7.4	68.4
Chironominae	6.4	74.8
Oligochaeta	5.6	80.4
Baetis	2.5	82.9
Sperchon	2.2	85.1
Ostracoda	2.1	87.2
Tanypodinae	2.1	89.3
Hydroptila	1.9	91.2
Bezzia/Palpomyia	1.5	92.7
Hyalella	1.5	94.2
Physa	1.5	95.7
Turbellaria	1.5	97.2
Mideopsis	0.7	97.9
Simulium	0.6	98.5
Fallceon	0.4	98.9
Hemerodromia	0.4	99.3
Atrichopogon	0.3	99.6
Orthocladiinae	0.3	99.9
Anax	0.1	100.0
	100	

RSW-MC009U

Species	% of Total Abund	Cumulative % Abund
Hyalella	54.7	54.7
Chironominae	14.0	68.7
Oligochaeta	6.8	75.5
Bezzia/Palpomyia	6.2	81.7
Physa	4.5	86.2
Ostracoda	3.3	89.5
Tanypodinae	2.2	91.7
Caloparyphus/Euparyphus	1.7	93.4
Piona	1.7	95.1
Coenagrionidae	1.0	96.1
Callibaetis	0.8	96.9
Limnesia	0.8	97.7
Hydroptila	0.7	98.4
Anopheles	0.5	98.8
Hydroptilidae	0.3	99.1
Ceratopogonidae	0.2	99.3
Mideopsis	0.2	99.5
Paltothemis lineatipes	0.2	99.7
Sanfilippodytes	0.2	99.8
Tricorythodes explicatus	0.2	100.0
	100	

RSW-MC007D

Species	% of Total Abund	Cumulative % Abund
Hyalella	69.5	69.5
Oligochaeta	8.9	78.4
Chironominae	4.5	82.9
Potamopyrgus antipodarum	3.1	86.0
Physa	2.6	88.6
Tanypodinae	2.2	90.8
Simulium	1.7	92.5
Ostracoda	1.2	93.7
Prostoma	1.0	94.7
Baetis	0.8	95.5
Sperchon	0.8	96.3
Turbellaria	0.8	97.1
Argia	0.7	97.8
Bezzia/Palpomyia	0.7	98.5
Hydroptilidae	0.5	99.0
Coenagrionidae	0.3	99.3
Hydropsyche	0.3	99.6
Hydropsychidae	0.3	100.0
	100	

Table 7. Abundances of New Zealand mud snails at sites in the Malibu Creek Watershed from 2007 to 2019.

Year	Station							Combined Annual Total
	RSW-MC 004D	RSW-MC 003D	RSW-MC 013D	RSW-MC 002D	RSW-MC 001U	RSW-MC 009U	RSW-MC 007D	
2007	52	15	196	138	122	0	157	680
2008	4	0	0	7	0	0	2	13
2009	42	69	73	201	37	0	23	445
2010	37	18	190	62	371	0	273	951
2011	5	13	12	77	86	6	112	311
2012	110	4	2	57	22	0	110	305
2013	0	0	13	4	7	DRY	346	370
2014	0	0	0	2	5	0	176	183
2015	Dry	3	2	5	20	DRY	394	424
2016	76	77	0	0	193	DRY	177	523
2017	0	2	2	6	65	0	171	246
2018	8	38	0	0	313	Dry	0	359
2019	0	24	30	0	238	0	19	311
average =	**28**	**20**	**40**	**43**	**114**	**1**	**151**	**394**

Table 8. The CSCI scores and categories for each site in the Malibu watershed, including scores for the sub-indices (MMI and O/E) which are averaged to generate the CSCI. CSCI, MMI and O/E percentiles show how a site compares with the reference pool of sites. A site with a low percentile score (e.g. 0.03) has a biological condition that compares with very few sites in the reference pool.

	Malibu Creek						Las Virgenes Creek
CSCI	**RSW-MC 004D**	**RSW-MC 003D**	**RSW-MC 013D**	**RSW-MC 002D**	**RSW-MC 001U**	**RSW-MC 009U**	**RSW-MC 007D**
CSCI							
CSCI Score	**0.87**	**0.76**	**0.74**	**0.86**	**0.85**	**0.60**	**0.75**
CSCI Percentile	**0.20**	**0.07**	**0.05**	**0.20**	**0.17**	**0.01**	**0.06**
CSCI Category	**Possibly Altered**	**Likely Altered**	**Likely Altered**	**Possibly Altered**	**Possibly Altered**	**Very Likely Altered**	**Likely Altered**
MMI Metric							
% Clinger Taxa	32	28	31	41	28	11	29
% Coleoptera Taxa	0	0	0	0	0	6	0
Taxonomic Richness	25	23	16	17	21	16	15
% EPT Taxa	24	30	25	22	19	17	20
Shredder Taxa	0	1	0	0	0	0	0
% Intolerant	1	3	0	0	0	0	0
MMI Score	**0.65**	**0.64**	**0.57**	**0.57**	**0.53**	**0.55**	**0.61**
MMI Percentile	**0.02**	**0.02**	**0.01**	**0.01**	**0.00**	**0.01**	**0.01**
O/E							
Mean Observed Taxa	8.4	6.7	7.0	9.0	8.9	5.0	8.0
Expected Taxa	7.7	7.6	7.8	7.7	7.6		8.9
O/E	**1.09**	**0.88**	**0.90**	**1.16**	**1.16**	**0.65**	**0.90**
O/E Percentile	**0.68**	**0.26**	**0.30**	**0.80**	**0.80**	**0.03**	**0.29**

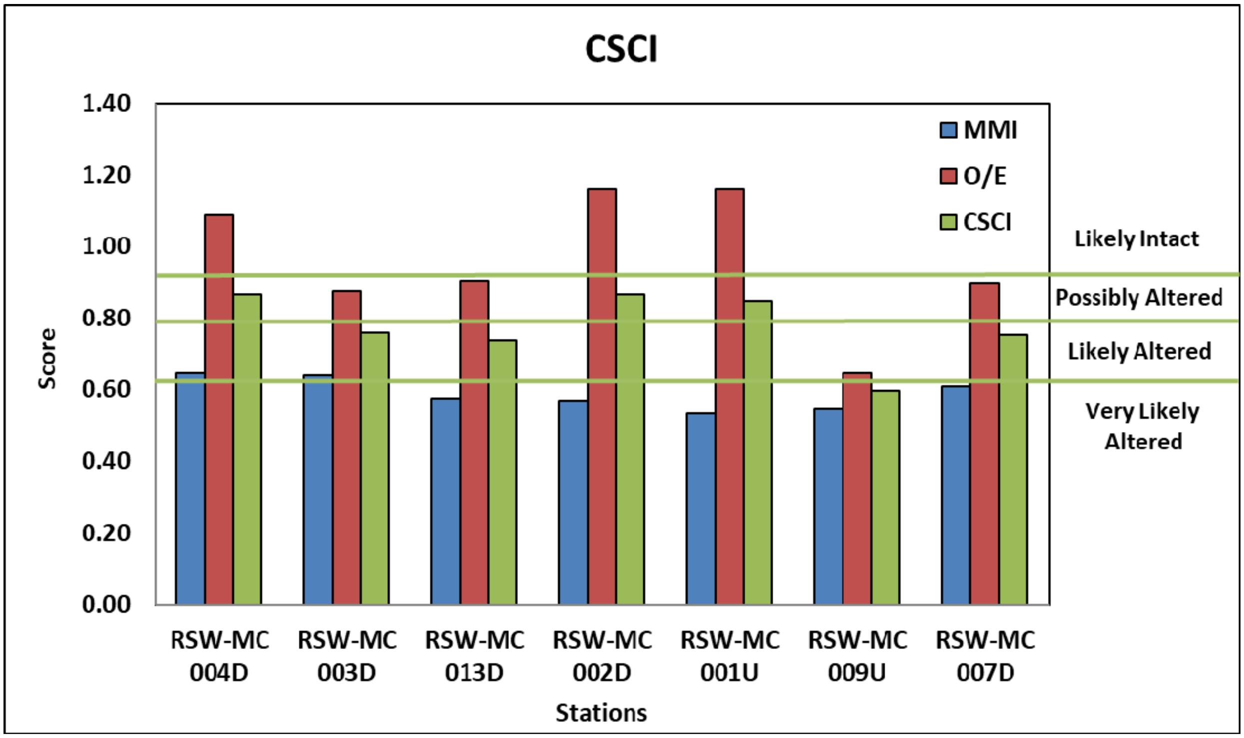


Figure 4. CSCI scores including the MMI and O/E for sites in the Malibu Creek watershed. Horizontal green lines represent the 1st (Very Likely Altered), 10th (Likely Altered), 30th (Likely Intact), and 50th (Likely Intact) percentiles of the reference site distribution for the CSCI scores.

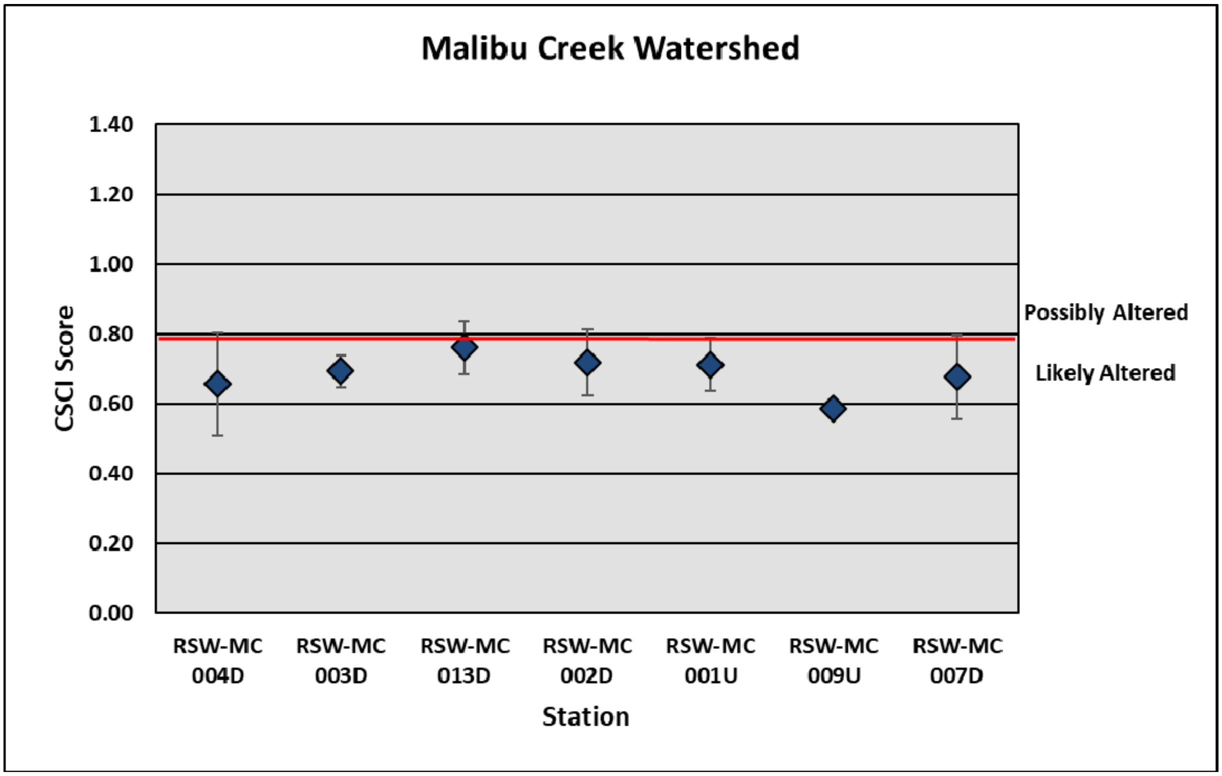


Figure 5. Average (± 95% CI) CSCI scores for stations sampled within the Malibu Creek watershed from 2015 to 2019. Sites are sorted from most downstream (left) to most upstream (right). The red line denotes the 10th percentile threshold limit (0.79) for the CSCI.

Table 9. Biological metrics measured at station RSW-MC011D in Malibu Lagoon.

Biological Metric	RSW-MC 011D
Total Abundance	590
Taxonomic Richness	6
Shannon Diversity	0.2

Table 10. Diatom and soft bodied algae metrics used to calculate the D18, S2 and H2O index for each of the sample locations in the Malibu watershed. Response to human disturbance indicates whether a metric increases or decreases with anthropogenic stress.

Metric Category/Theme	Metric	RSW-MC 004D	RSW-MC 003D	RSW-MC 013D	RSW-MC 002D	RSW-MC 001U	RSW-MC 009U	RSW-MC 007D	Response to Human Disturbance
Diatom									
Autecological Guild									
Dissolved Oxygen	Proportion Requiring >50 % DO	0.9359	0.933	0.744	0.710	0.643	0.7895	0.921	Decrease
	Proportion Requiring 100% DO	0.37544	0.309	0.064	0.068	0.096	0.0902	0.018	Decrease
Ionic Strength/Salinity	Proportion Halobiontic	0.3880	0.358	0.630	0.637	0.623	0.6673	0.262	Increase
Nutrients	Proportion Poly- & Eutrophic	0.6135	0.667	0.936	0.907	0.872	0.9056	0.978	Increase
Organic Pollution	Proportion Nitrogen Heterotrophs	0.3174	0.178	0.212	0.251	0.394	0.1673	0.077	Increase
	Proportion Oligo- & Beta-mesosaprobic	0.6099	0.617	0.429	0.294	0.238	0.1626	0.593	Decrease
Morphologic Guild									
Sedimentation	Proportion of Highly Motile	0.2974	0.298	0.192	0.186	0.270	0.4958	0.173	Increase
	Proportion of Sediment Tolerant (highly motile)	0.3453	0.364	0.350	0.395	0.447	0.6650	0.194	Increase
Taxonomic Group									
A. minutissium	Proportion A. minutissimum	0.0068	0.002	0.003	0.002	0.000	0.0068	0.000	Decrease
Tolerance/Sensitivity									
Nitrogen	Proportion of Low TN Indicators	0.1175	0.109	0.009	0.016	0.007	0.0110	0.002	Decrease
Phosphorous	Proportion of Low TP Indicators	0.0311	0.008	0.008	0.017	0.008	0.0093	0.002	Decrease
Soft									
Relationship to Reference									
Reference	Proportion "non-reference" Indicators (sp)	0.4000	0.333	0.500	0.286	0.167	0.5000	0.667	Increase
	Proportion of "non-reference" Indicators (b) [1.]	0.9735	0.002	1.000	0.000	0.000	0.9959	1.000	Increase
Taxonomic Group									
Chlorphyta	Proportion Chlorophyta (b)	0.9735	0.006	1.000	0.000	0.274	0.9998	1.000	Increase
	Proportion of Green Algae Belonging to CRUS (b)	1.0000	0.000	0.000	0.000	0.000	0.0136	0.000	Increase
ZygnHeteroRhod	Proportion ZHR (b)	0.0000	0.000	0.000	0.000	0.000	0.0000	0.000	Decrease
	Proportion ZHR (m)	0.0000	0.042	0.000	0.063	0.000	0.0000	0.000	Decrease
Tolerance/Sensitivity									
Copper	Proportion of High Cu Indicators (sp)	0.2000	0.375	1.000	0.286	0.167	0.6250	0.667	Increase
Organic Pollution	Proportion High DOC Indicators (b)	0.9735	0.038	1.000	0.306	0.033	0.9961	1.000	Increase
	Proportion High DOC Indicators (sp)	0.6000	0.556	1.000	0.429	0.333	0.7500	1.000	Increase
Phosphorous	Proportion of Low TP Indicators (sp)	0.0000	0.000	0.000	0.000	0.000	0.0000	0.000	Decrease

1. Abbreviations are as follows: b- metric based on biovolume; sp- metric based on species presence; m- metric is an average of the "b" and "sp" counterpart metric values; CRUS- Cladophora glomerata + Rhizoclonium hieroglyphicum + Ulva flexuosa + Stigeoclonium sp. ZHR - Zygnemataceae + hetrocystous cyanobacteria + Rhodophyta; Green algae- Taxa within Chlorophyta + Charophyta

Table 11. The SoCA Algae IBI scores for sample locations in the Malibu Creek Watershed. Individual sub-indices for both diatoms (D18) and soft bodied algae (S2) are presented along with the hybrid SoCA Algae IBI score (H2O). Rank scores (0 to 10) are presented for each metric. Each index summation is adjusted to fit on a scale of 0 to 100.

SoCA Algae IBI Metric Score	Stations						
	RSW-MC 004D	RSW-MC 003D	RSW-MC 013D	RSW-MC 002D	RSW-MC 001U	RSW-MC 009U	RSW-MC 007D
Diatoms (D18)							
Proportion Requiring >50 % DO (d)	8	8	3	2	1	**4**	8
Proportion Halobiontic (d)	3	4	0	0	0	0	5
Proportion N Heterotrophs (d)	4	6	6	5	2	6	8
Proportion of Sediment Tolerant (highly motile; d)	3	3	3	2	1	0	6
Proportion of Low P Indicators (d)	1	0	0	1	0	1	0
D18 IBI Total	19	21	12	10	4	11	27
D18 IBI Adjusted (2.0)	**38**	**42**	**24**	**20**	**8**	**22**	**54**
Soft Bodied Algae (S2)							
Proportion "non-reference" Indicators (sp)	2	3	0	5	7	**0**	0
Proportion of green algae belonging to CRUS (b)	1	10	10	10	10	9	10
Proportion ZHR (m)	0	1	0	1	0	0	0
Proportion of High Cu Indicators (s, sp)	4	0	0	2	5	**0**	0
Proportion High DOC Indicators (s, sp)	2	3	0	5	6	0	0
Proportion of Low TP Indicators (s, sp)	0	0	0	0	0	0	0
S2 IBI Total	9	17	10	23	28	9	10
S2 IBI Adjusted (1.66667)	**15**	**28**	**17**	**38**	**47**	**15**	**17**
SoCA Algae IBI							
Proportion of High Cu Indicators (s, sp)	4	0	0	2	5	0	0
Proportion High DOC Indicators (s, sp)	2	3	0	5	6	0	0
Proportion of Low TP Indicators (s, sp)	0	0	0	0	0	0	0
Proportion Requiring >50 % DO (d)	8	8	3	2	1	4	8
Proportion Halobiontic (d)	3	4	0	0	0	0	5
Proportion N Heterotrophs (d)	4	6	6	5	2	6	8
Proportion of Sediment Tolerant (highly motile; d)	3	3	3	2	1	0	6
Proportion of Low TN Indicators (d)	2	2	0	1	0	1	0
SoCA Algae IBI Total	26	26	12	17	15	11	27
SoCA Algae IBI Adjusted Total (1.25)	**33**	**33**	**15**	**21**	**19**	**14**	**34**
SoCA Algae IBI Category	**Non-Ref**	**Non-Ref**	**Non-Ref**	**Non-Ref**	**Non-Ref**	**Non-Ref**	**Non-Ref**

1. Abbreviations are as follows: d- diatom metric; s- soft algae metric; sp- metric based on species presence

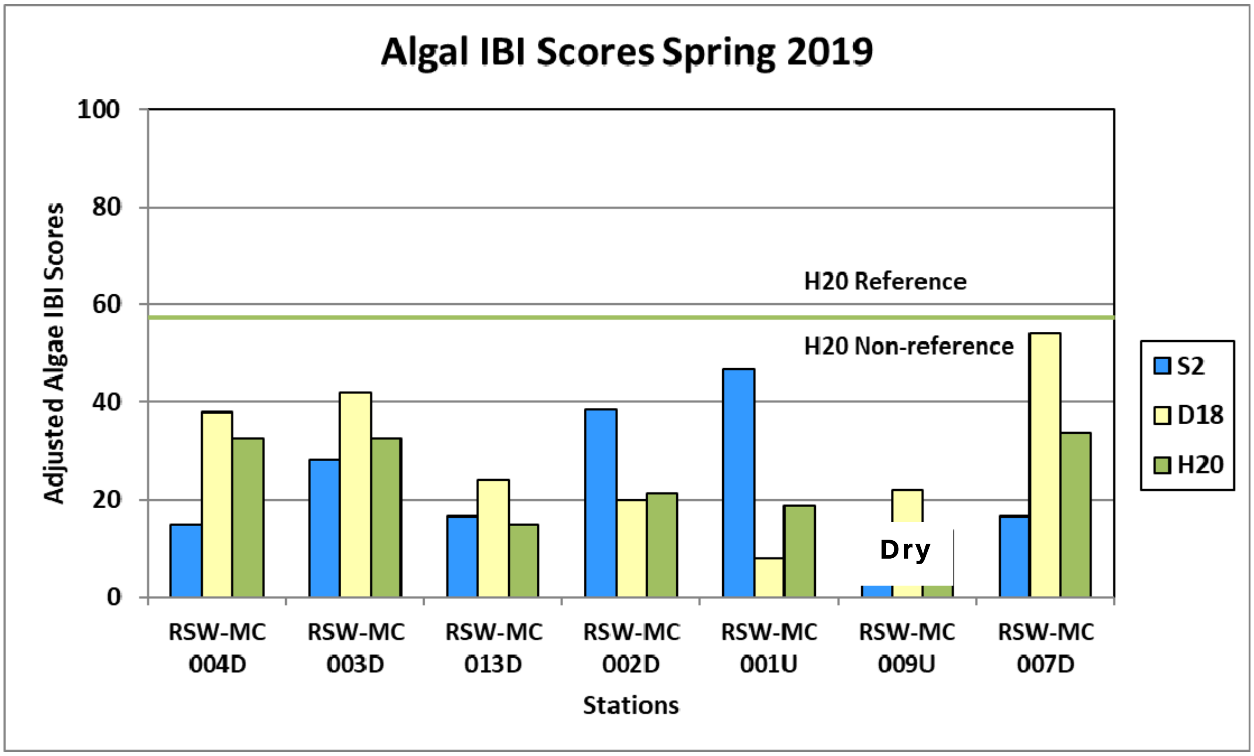


Figure 6. SoCA Algae IBI scores for sites in the Malibu Creek watershed. The S2 and D18 index is composed of soft body algae metrics and diatom metrics respectively. The H20 is a hybrid of soft body algae and diatom metrics. The green horizontal bar represents the boundary between algae communities in reference vs. non-reference condition for the H20 index.

Summary and Conclusions

A total of eight bioassessment sampling locations were visited in the Malibu Creek Watershed from July 18th through the 29th, 2019 by Aquatic Bioassay and Consulting Laboratory biologists. All sampling, laboratory analysis, and data analysis were conducted according to SWAMP protocols with the exception of the Malibu Lagoon Station RSW-MC011, which was sampled according to USEPA's estuarine sampling guidance (2000).

The habitat conditions in a stream reach play a key role in the development of a healthy aquatic community. In many cases organisms may not be exposed to chemical contaminants, yet their populations indicate that impairment has occurred. These population shifts can be due to degradation of the streambed and bank habitats. For example, excess sediment caused by bank erosion due to human activities can fill pools and interstitial areas of the stream substrate where fish spawn and invertebrates live, causing their populations to decline or to be altered. Also, loss of vegetative canopy cover and reduced width of the riparian zone can have similar effects on the BMI communities.

P-Hab scores for stations sampled within the Malibu Watershed above Malibu Lagoon were suboptimal at sites above and below the TWRP outfall, except for station R-3 which was optimal and R-1 above the discharge which was marginal. The poorer conditions at R-1 were due to sediment deposition, in combination with a high degree of channel alteration, and lack of instream cover. In contrast, R-3 had better conditions due to good instream cover, low sediment deposition and lack of channel alteration. Most sites had embankments that were vulnerable to erosion, but with relatively good vegetative protection and surrounding riparian habitats.

Malibu Lagoon Station R-11 represents an estuary habitat that cannot be directly compared to the riparian habitats found at the upstream stations. This site is subject to highly variable conditions including inundation during periods when the berm at the mouth of Lagoon is closed, shallow brackish water periods when the berm is open and large shifts in salinity depending on the status of the berm in conjunction with tidal fluctuations. The organisms that reside under these conditions are different than those found in freshwater stream systems and are generally adapted to these rapidly changing conditions. Likewise, sampling techniques developed for both systems are not comparable.

A combined total of 5,024 BMIs was identified from 47 different taxa at the eight stations where sampling occurred during the summer 2019 survey. Only six taxa were collected at

R-11 in the Malibu Creek Lagoon. The most abundant (87%) was represented by seed shrimp (Ostracoda). At the upstream stations, combinations of disturbance tolerant organisms represented the majority of the abundances with three to ten taxa representing 80% the total abundance. Some of the most abundant taxa across all stations included clams (*Corbicula sp*.), amphipods (*Hyalella sp.)*, midges (Chironominae), nemertean worms (*Prostoma sp*.), mayflies (*Baetis sp*.) and New Zealand mud snails (NZMS, *Potamopyrgus antipodarum*).

The biotic condition of streams in this survey was assessed using two indexes of biological integrity: the California Stream Condition Index (CSCI) and the Southern California Algae Index of Biological Integrity (SoCA Algae IBI). The CSCI is based on the benthic macroinvertebrate community, while the SoCA Algae IBI is based on the abundances and composition of the diatom and soft bodied algae communities at a site. The inclusion of the SoCA Algae IBI provides a second indicator of stream condition. There have been no regulatory compliance thresholds established for these indexes in the state of California. The statistically derived thresholds presented for each of these indices are included to compare the biotic condition found at a specific site to the biotic condition found at the pool of reference sites used to develop each index. As a result, they do not necessarily represent an ecologically meaningful change point in community composition and should not be used in a regulatory framework.

These two indexes provided contrasting results and showed that the BMI community (CSCI) was in relatively good condition compared to reference conditions, while the SoCA Algae IBI indicated that algae populations were below reference site conditions:

1. The CSCI category rankings at stations R-4, R-2 and R-1 were “possibly altered” and similar to the 10th percentile of the reference site condition (>0.79). Since R-1 and R-2 are located above and below the discharge point, it indicates that the TWRF discharge was not negatively impacting the BMI community.

2. The SoCA Algal IBI scores for all sites in the survey were well below the reference threshold (57) with a range of 14 to 34. The IBI scores above the outfall (R-1 = 19) and below the outfall (R-2 = 21) were similar indicating there was no outfall related effect on the algae communities.

The strong association between physical habitat and biological condition (IBI scores) that are typical in southern California watersheds are not as clear cut in the Malibu Creek Watershed. Physical habitat conditions in most of the stream reaches where samples were collected were relatively decent with good instream cover, low to moderate sedimentation and little channel alteration. This indicates that degraded biological community conditions measured in past surveys may be linked more closely to poor water quality conditions (e.g. elevated nutrients or metals). Staff members of the Las Virgenes Municipal Water District have shown that a potential source of these poor water quality conditions may be the result of local geologic conditions. The terrain in the upper reaches of the watershed is dominated by the Monterey formation. Runoff from this area has very high conductivity (>3,000 uS) and elevated sulfate and phosphate concentrations. EPA sponsored research has shown that elevated background concentrations of these constituents has a detrimental effect on BMIs at levels known to occur naturally in Malibu Creek (Pond *et al.*, 2008).

Station R-11 located in Malibu Lagoon is inundated with brackish water during portions of the year when the berm is breached to the ocean. During this survey only six taxa were present. The lack of diversity found at this Lagoon site may be due to the ever-changing conditions found here. Sudden shifts in salinity and temperature make it difficult for stable benthic communities to become established and only those organisms capable of such extreme shifts in environmental conditions are able to dominate the benthic communities.

The collection of New Zealand mudsnails (NZMS, *Potamopyrgus antipodarum*) in the watershed is of ongoing environmental concern. The snail was first collected in the upper and lower Medea Creek in the spring of 2005. The NZMS were relatively abundant at four of the eight stations in 2019, ranging from zero to 238 at R-1 above the outfall.

Efforts to control NZMS populations are focused on ensuring they are not spread to other locations and there is presently no method available to remove them from a stream reach without damaging the indigenous populations. Aquatic Bioassay scientists and field crews have employed the strict control measures recommended by the State of California to reduce the chance that the NZMS is further spread in the watershed.

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Appendix A: BMI and Attached Algae Taxa Lists

Table 12. 2019 BMI raw taxa list for sites in the Malibu Creek Watershed.

Identified Taxa	Tol Val (TV)	Func Feed Grp	RSW-MC 011D	RSW-MC 004D	RSW-MC 003D	RSW-MC 013D	RSW-MC 002D	RSW-MC 001U	RSW-MC 009U	RSW-MC 007D
Insecta Taxa										
Ephemeroptera										
Baetis	5	cg		38	126	15	5	18		5
Baetis adonis	5	cg			8					
Callibaetis	9	cg		5					5	
Fallceon	4	cg			50	3		3		
Tricorythodes explicatus	4	cg			2				1	
Odonata										
Anax	8	p						1		
Argia	7	p			3					4
Coenagrionidae	9	p		1				60	6	2
Paltothemis lineatipes	9	p							1	
Hemiptera										
Corixidae	8	p	1							
Trichoptera										
Hydropsyche	4	cf		24	115	5	66	53		2
Hydropsychidae	4	cf			2					2
Hydroptila	6	ph		11	29	66	9	14	4	
Hydroptilidae	4	ph			1	5			2	3
Ochrotrichia	4	ph		3	19		1			
Tinodes	2	sc		4	22					
Coleoptera										
Sanfilippodytes	5	p							1	
Diptera										
Anopheles	8	cg		5					3	
Atrichopogon	6	cg		7	10	2	1	2		
Bezzia/Palpomyia	6	p		1		4	22	11	37	4
Caloparyphus/Euparyphus	8	cg		6	41	6	1		10	
Ceratopogonidae	6	p		1					1	
Chironominae	6	cg	1	120	10	259	129	46	84	27
Culicidae	8	cg		1						
Dasyhelea	6	cg		1						
Ephydridae	6				1					
Hemerodromia	6	p		2	3	1	3	3		
Orthocladiinae	5	cg	2	1	3	5	3	2		
Pericoma/Telmatoscopus	4	cg		1	8					
Psychodidae		cg			3					
Simulium	6	cf		2		20	73	4		10
Tanypodinae	7	p		9	1	13	53	15	13	13
Tipulidae	3				1					
Lepidoptera										
Petrophila	5	sc			1					
Non-Insecta Taxa										
Oligochaeta	5	cg	10	36	42		12	40	41	54
Ostracoda	8	cg	575	179	10	92	6	15	20	7
Turbellaria	4	p		5	5	1		11		5
Amphipoda										
Hyalella	8	cg		2	4	138	49	11	328	420
Basommatophora										
Physa	8	sc		5		2	2	11	27	16
Hoplonemertea										
Prostoma	8	p	1	10	25	2	67	59		6
Hypsogastropoda										
Hydrobiidae	8	sc		5						
Potamopyrgus antipodarum	8	sc			24	30		238		19
Trombidiformes										
Limnesia	5	p							5	
Mideopsis	5	p					11	5	1	
Piona		p							10	
Sperchon	8	p		16	31		20	16		5
Veneroida										
Corbicula	8	cf		68	39	36	64	82		
TOTAL			**590**	**569**	**639**	**705**	**597**	**720**	**600**	**604**

Table 13. Summer 2019 diatom taxa list for Malibu watershed.

			Station						
Phylum	**Class**	**Species**	**RSW-MC 004D**	**RSW-MC 003D**	**RSW-MC 013D**	**RSW-MC 002D**	**RSW-MC 001U**	**RSW-MC 009U**	**RSW-MC 007D**
Bacillariophyta		Bacillariophyta			10	8	15	4	13
	Bacillariophyceae	Achnanthidium minutissimum	4	1	2	1		4	
		Achnanthidium pyrenaicum					2		
		Adlafia minuscula			1	2			
		Amphora			18	20	18	12	5
		Amphora copulata		5	5	4	18		
		Amphora ovalis	1	1		2	2		
		Amphora pediculus	75	66					
		Bacillaria paxillifera	9	7	3	10	18	3	4
		Cocconeis pediculus	13	17	43	13	15	17	12
		Cocconeis placentula	15	17	80	62	25	6	86
		Cocconeis placentula var euglypta	17	39					
		Cocconeis placentula var lineata			20	8	14		152
		Craticula buderi						1	
		Entomoneis paludosa			4	2	3		
		Eolimna subminuscula				2			1
		Fallacia californica	12	19					
		Fallacia cryptolyra			11	36			
		Fallacia monoculata					2		
		Geissleria decussis	2						
		Gomphonema				2		1	
		Gomphonema micropus			1				
		Gomphonema parvulum			7	8	8	10	8
		Gyrosigma acuminatum							2
		Halamphora montana				2			
		Halamphora veneta	1		9	1	1	6	6
		Hippodonta capitata	1		1	7	12		
		Mayamaea atomus					1		
		Mayamaea permitis		3	4	5	3	3	4
		Navicula			1		3		
		Navicula aitchelbee			10	6	12	3	20
		Navicula antonii					2		
		Navicula caterva							6
		Navicula cryptotenella					1		
		Navicula erifuga		1	11	8	8	5	3
		Navicula genovefae				1	1		
		Navicula germainii			2	2	1		
		Navicula gregaria	11	6	59	80	94	57	17
		Navicula margalithii	3	4					
		Navicula recens				2		1	
		Navicula rostellata			1				
		Navicula tenelloides							2
		Navicula tripunctata				2			
		Navicula veneta		4					
		Nitzschia				4	5	9	6
		Nitzschia acicularis			1		1		
		Nitzschia acidoclinata			1			2	
		Nitzschia amphibia	4	5	1				1
		Nitzschia amphibioides					2	1	
		Nitzschia archibaldii	6		3	3	1		3
		Nitzschia capitellata						2	
		Nitzschia communis				1	2		
		Nitzschia desertorum	2						
		Nitzschia dissipata		2		1	3	3	
		Nitzschia dubia			1				1

Table 13. Continued

Phylum	Class	Species	Station RSW-MC 004D	RSW-MC 003D	RSW-MC 013D	RSW-MC 002D	RSW-MC 001U	RSW-MC 009U	RSW-MC 007D
		Nitzschia fonticola	4	12					2
		Nitzschia inconspicua	143	131	62	56	68	170	64
		Nitzschia lacuum					1		
		Nitzschia liebethruthii	7	2					1
		Nitzschia linearis				4			
		Nitzschia microcephala	7	9	10	22	32	52	
		Nitzschia palea var debilis			2	3	3		3
		Nitzschia paleacea		12	15	3	20	43	10
		Nitzschia perminuta					2		
		Nitzschia pusilla							2
		Nitzschia soratensis						1	1
		Nitzschia supralitorea				2			
		Parlibellus protracta					1		
		Planothidium					1		
		Planothidium delicatulum			2	1	1		
		Planothidium dubium			1				
		Planothidium frequentissimum	4	8	26	27	15	11	65
		Planothidium lanceolatum			9	5	2		65
		Planothidium minutissimum	2	3					
		Pleurosigma delicatulum			3	3			
		Psammothidium bioretii					2		
		Psammothidium subatomoides					19		4
		Pseudostaurosira brevistriata	36	43	1		1		
		Reimeria sinuata				4			
		Rhoicosphenia	3		3	1			7
		Rhoicosphenia abbreviata		15	1			13	
		Rhoicosphenia californica					4		
		Rhopalodia		3					
		Rhopalodia constricta						4	
		Rhopalodia operculata					1		
		Sellaphora nigri			7				4
		Surirella					2		
		Surirella brebissonii			1			1	
		Surirella brebissonii var kuetzingii					2	2	
		Tryblionella apiculata			2		2	8	2
		Tryblionella hungarica	1						
		Tryblionella levidensis			4	3			
		Ulnaria ulna				1			
	Coscinodiscophyceae	Coscinodiscophyceae				12			
		Cyclotella					2		
		Cyclotella atomus	4	11	39	78	33	55	2
		Cyclotella meneghiniana	24	27	49	37	60	45	10
		Melosira varians	1	5	3	1	4	2	1
		Pleurosira laevis		1	22	2	1		4
		Thalassiosira weissflogii			1	4	2		
	Fragilariophyceae	Fragilaria				2	1		
		Fragilaria microvaucheriae				1			
		Fragilaria vaucheriae						1	
		Fragilariforma virescens					1		
		Staurosira construens				2		4	
		Staurosira construens var binodis						15	
		Staurosira construens var venter	171	126	25	21	18	23	2
		Staurosirella lapponica					1		
		Synedra acus					1		
		Tabularia fasciculata	23	1	4	3	7	2	2

Table 14. Summer 2019 soft-algae taxa list for Malibu watershed.

Sample Type	Phylum	Class	Species	Unit	Station RSW-MC 004D	RSW-MC 003D	RSW-MC 013D	RSW-MC 002D	RSW-MC 001U	RSW-MC 009U	RSW-MC 007D
Epiphyte	Cyanobacteria	Cyanophyceae	Heteroleibleinia sp 1	count	**35**		100	100		100	100
			Leptolyngbya foveolarum	count						100	100
Macroalgae	Bacillariophyta	Coscinodiscophyceae	Pleurosira laevis	um3/cm2	43246753		2.386E+09	9.235E+09			
	Chlorophyta	Chlorophyceae	Oedogonium sp 2	um3/cm2						7215007	
		Ulvophyceae	Cladophora cf glomerata	um3/cm2			149114631			2.085E+09	2.886E+09
			Rhizoclonium hieroglyphicum	um3/cm2						28860028	
			Ulva flexuosa	um3/cm2	43246753						
Microalgae	Chlorophyta		Chlorophyta	um3/cm2		1013					1636
			Chlorophyta 1	um3/cm2						1622	
		Chlorophyceae	Gongrosira	um3/cm2		6485					
			Monoraphidium arcuatum	um3/cm2	79	64					
			Monoraphidium contortum	um3/cm2			40				
			Oedogonium sp 2	um3/cm2						1155486	
			Scenedesmus abundans	um3/cm2	1259	612				651	
			Scenedesmus acuminatus	um3/cm2		1751					
			Scenedesmus armatus	um3/cm2		1.87E+03					
			Scenedesmus communis	um3/cm2						7.56E+03	
			Scenedesmus ellipticus	um3/cm2		1.66E+03				4.65E+02	
			Scenedesmus flavescens	um3/cm2					3.48E+02		
			Scenedesmus microspina	um3/cm2					4.47E+02		
			Scenedesmus obliquus	um3/cm2					2.87E+03		
		Ulvophyceae	Cladophora cf glomerata	um3/cm2						6.24E+06	1.34E+06
	Cryptophyta	Cryptophyceae	Chroomonas	um3/cm2		7.88E+02					
			Cryptomonas anomala	um3/cm2				5.02E+02			
	Cyanobacteria	Cyanophyceae	Anabaena	um3/cm2		5.18E+02					
			Calothrix	um3/cm2		3.80E+04					
			Cyanophyceae	um3/cm2	1.35E+03	6.59E+03					
			Heteroleibleinia sp 1	um3/cm2	2.19E+05	2.10E+04	6.68E+04	2.59E+04	1.62E+04	4.53E+04	4.49E+04
			Leptolyngbya foveolarum	um3/cm2		3.66E+04		4.59E+04		3.34E+05	5.86E+04
			Leptolyngbya sp 1	um3/cm2	8.39E+03						
			Leptolyngbya tenuis	um3/cm2	1.17E+06	7.67E+05		1.03E+05	9.69E+03		
			Phormidium	um3/cm2		3.29E+04					2.72E+04
			Pseudanabaena mucicola	um3/cm2	3.37E+02	1.75E+02					
			Pseudanabaena sp 1	um3/cm2				1.00E+02			
	Rhodophyta	Florideophyceae	Chantransia	um3/cm2		3.06E+04					
	Streptophyta	Zygnematophyceae	Closterium moniliferum	um3/cm2		2.29E+05					
Qualitative	Bacillariophyta	Coscinodiscophyceae	Pleurosira laevis	count		P	P		P		P
		Xanthophyceae	Tribonema utriculosum	count					P		
			Vaucheria	count					P		
	Chlorophyta	Ulvophyceae	Cladophora cf fracta	count				P			
			Cladophora cf glomerata	count		P	P	P		P	P
			Rhizoclonium hieroglyphicum	count				P	P		P
			Ulva flexuosa	count	P						
	Rhodophyta	Compsopogonophycea	Compsopogon caeruleus	count				P			

P= present in sample, but not counted.

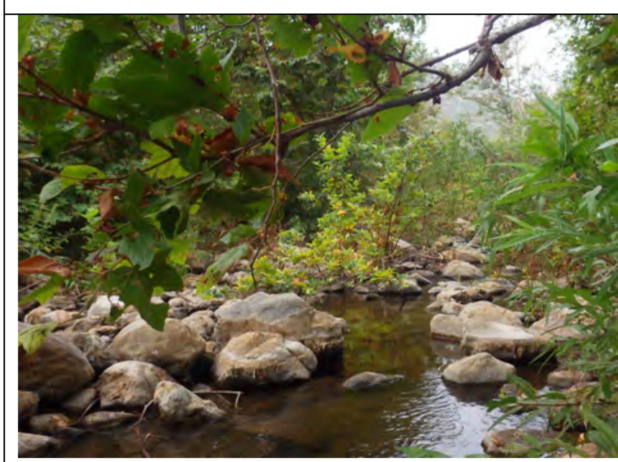
Appendix B – Photos of Sampling Sites

RSW-MC011D facing picnic area

RSW-MC011D facing towards the ocean

RSW-MC004D facing upstream

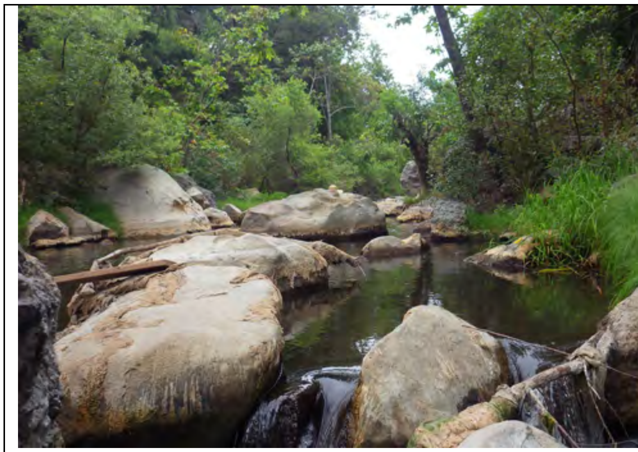
RSW-MC004D facing downstream



RSW-MC003D facing upstream

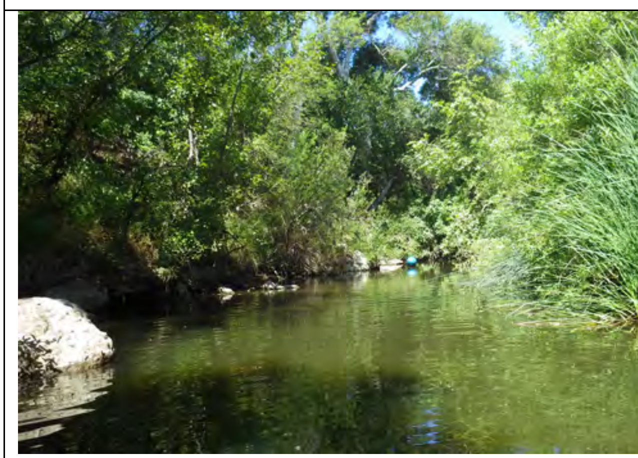
RSW-MC003D facing downstream

Figure 7. Sampling location photos of the eight sampling sites within the Malibu Creek watershed.



RSW-MC013D facing upstream

RSW-MC013D facing downstream



RSW-MC002D facing upstream

RSW-MC002D facing downstream

Figure 7. (continued).

RSW-MC001U facing upstream

RSW-MC001U facing downstream

RSW-MC009U facing upstream

RSW-MC009U facing downstream

RSW-MC007U facing upstream

RSW-MC007U facing downstream

Figure 7.

INVOICE NO: LVS0320.0181

TO: **Accounts Payable**
Las Virgenes MWD
731 Malibu Canyon Rd
Calabasas, CA 91302

FROM: **Aquatic Bioassay**
29 North Olive St.
Ventura, CA 93001

PAY THIS AMOUNT: $48,866

DATE: **March 6th, 2020**

Invoice for tasks related to bioassessment reporting for spring 2019

Task	Contract Amount	Previous Billing	Current Billing	Billed To Date	Funds Remaining
Sampling					
Mobilization	$682	$0	$682	$682	$0
Bioassessment (9 sites, includes BMIs + attached algae)	$20,184	$0	$20,184	$20,184	$0
Laboratory Analysis					
Benthic Macroinvertebrates (8 sites)					
BMI 600 Count (Sorting and ID, SAFIT Level 2)	$8,441	$0	$8,441	$8,441	$0
BMI QC: to DF&W Rancho Cordova (1 sample)	$767	$0	$767	$767	$0
Attached Algae (8 sites)					
Diatom/Algae ID & Enumeration	$5,439	$0	$5,439	$5,439	$0
Diatoms & Algae Qualitative	$5,439	$0	$5,439	$5,439	$0
Ash Free Dry Weight (AFDM)	$455	$0	$455	$455	$0
Chlorphyll a	$728	$0	$728	$728	$0
Reporting					
CEDEN/SWAMP Reporting (Biology & Chemistry)	$1,137	$0	$1,137	$1,137	$0
Final Report	$5,593	$0	$5,593	$5,593	$0
Total	**$48,866**	**$0**	**$48,866**	**$48,866**	**$0**

Aquatic Bioassay
29 N. Olive St.
Ventura, CA 93001