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MEMBER AGENCY OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

June 16, 2009

Ms. Tracy Egoscue, Esq.
Los Angeles Regional Water Quality Control Board
320 W. 4th Street, Suite 200,
Los Angeles, California 90013

Subject: Comments - 2008 Updated List of Impaired Waters, Los Angeles Basin

Dear Ms. Egoscue,

On behalf of the Las Virgenes Municipal Water District and our Joint Powers Authority (JPA) partner Triunfo Sanitation District, we are pleased to provide our comments on the 2008 update of the Los Angeles Basin List of Impaired Waters pursuant to §305(j) and §303(d) of the Clean Water Act.

Since the last update in 2006, the JPA and other government and non-governmental agencies have invested substantial financial and staff resources to better understand the nature and sources of water quality impairments in the Malibu Creek watershed and other water bodies in our service area. As a result, the amount of available data on local water quality has grown substantially, including over 30 new sites sampled by multiple government and non-governmental organizations, in addition to data from special projects focused on specific water quality issues ranging from benthic macroinvertebrates to algal growth to endangered fish species. This new information provides an unprecedently detailed snapshot of water quality in local creeks and lakes, which we have used to assess the state 303(d) list update.

Suggested Revisions

Table 1 (attached) lists our recommended changes to the state's draft update for specific listings. The majority of our recommended changes to the state update are related to proposed listings that appear to be unsupported by the data in the state decision lines of evidence (LOE), or where data relevant to their decision may have been overlooked. The one exception is our recommendation to list Cold Creek for invasive species, which is based on our understanding of the invasive potential of the New Zealand mudsnail found in 2008 for the first time in the creek's headwaters.

Note we are recommending that the Regional Board not list several water bodies currently listed or proposed for listings for metals (selenium), nutrients, organic enrichment, and specific conductivity. Our findings strongly suggest that natural sources are responsible for the observed exceedances of the water quality objectives and guidelines for these pollutants in the affected water bodies. See our discussion of geological impacts on local water quality below.

Lines of Evidence (LOE)

Lines of Evidence (LOE) for each JPA-recommended revision are provided electronically (separate submittal) in the same format as the state's draft update to facilitate their incorporation into the administrative record in the current listing cycle. Each JPA LOE is keyed to its respective state decision number.

The data used in the JPA LOEs derive primarily from three sources:

- NPDES permit monitoring data provide long time-series data (1978 – 2009) primarily from JPA monitoring stations located in the lower Malibu Creek watershed. Data QA/QC details are provided in JPA LOE 1 submitted electronically.

- Recent time series data (1998 – 2009) the upper watershed and nearby coastal streams were compiled from the Heal The Bay Stream Team website (http://www.healthebay.org/streamteam/data/chem/query/). Details are provided in JPA LOE 2 & 3, submitted electronically.

- Shorter but more recent timeseries data (2005 – 2007) were obtained from the Malibu Creek Watershed-Wide Monitoring Project, a Prop. 13 funded partnership of local cities and the JPA. Details are provided in JPA LOE 4 submitted electronically.

Other information sources consulted included:

- California Toxics Rule (CTR) data collected by the JPA
- USGS geological mapping (Yerkes & Campbell, 2000)
- Los Angeles County Hydro Unit Stream Gage records (F-130R)
- Peer-reviewed scientific and technical reports (footnoted where referenced)

Our review also included available datasets used in the state update pursuant to the CWA §305(j) biennial update requirement as an independent, JPA check on the state's listing decisions for the Malibu Creek watershed.

JPA staff also reviewed our comments on earlier 303(d) updates in 2002 and 2006 to determine which recommendations were addressed by the state and/or incorporated into the state's current draft update. Formal requests were submitted for both the 2002 and 2006 state updates to better document the 303(d) listing process, from source data to staff recommendation. *We are pleased to report substantial progress by the state* in this regard for the current 303(d) list update, although the traceability of pre-2006 listings remains extremely difficult.

Biostimulatory Substances – Potential Criteria

A long-standing problem throughout the country is how to translate narrative Biostimulatory Substances objectives into numerical thresholds – so called "Numerical Nutrient Endpoints, or NNE's - for quantifying the levels at which biostimulatory substances impair beneficial uses. Both the state and the US EPA have tried to provide national, regional and sub-regional guidance on this issue, as referenced in the 2008 Update Staff Report in Tables 3-2 and 3-3[1]. Some of this guidance is quite dated and/or unsupported by recent independent scientific peer review, and we therefore support the Regional Board's decision to defer adopting any of the potential criteria listed in Tables 3-2 and 3-3 in the current 303(d) listing cycle, pending further study by staff.

Nonetheless, we remain concerned that these criteria may be used in NPDES permits outside of the 303(d) listing process, or otherwise used to regulate JPA facilities. Our concerns center on three issues:

(1) Application of "guidance" criteria without adequate regard for site-specific, natural conditions at the watershed level.

Significantly, all five of the proposed NNE's for phosphorus in the staff report are exceeded in the Malibu Creek watershed, including the US EPA *sub-ecoregional* guidelines (Fig 1). Reference to the scientific literature on algal growth shows that these nutrient levels are consistently higher than that needed to support maximum growth in local mat-forming algal species (Fig. 1, saturation limit overlay).

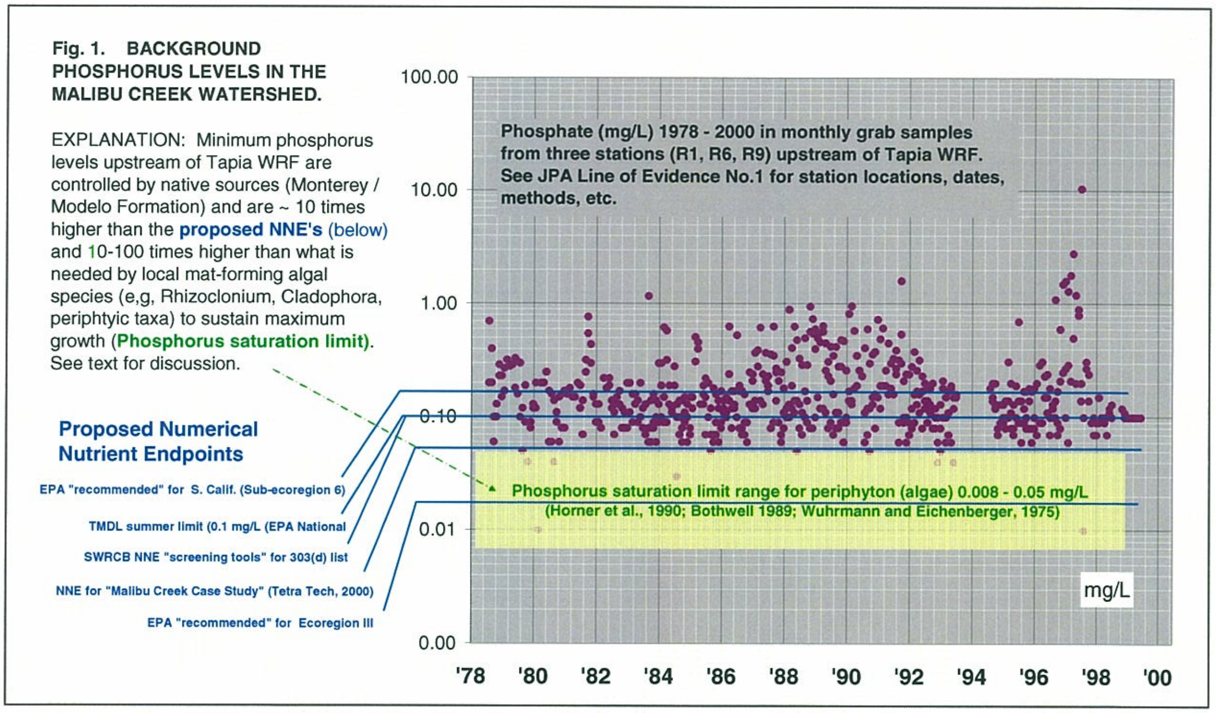

Fig. 1. BACKGROUND PHOSPHORUS LEVELS IN THE MALIBU CREEK WATERSHED.

EXPLANATION: Minimum phosphorus levels upstream of Tapia WRF are controlled by native sources (Monterey / Modelo Formation) and are ~ 10 times higher than the **proposed NNE's** (below) and 10-100 times higher than what is needed by local mat-forming algal species (e,g, Rhizoclonium, Cladophora, periphtyic taxa) to sustain maximum growth (**Phosphorus saturation limit**). See text for discussion.

In the following section and in our previous comments for the Triennial Review, we provide evidence that the nutrient levels observed in the Malibu Creek watershed do not fall below levels determined by natural sources of marine sedimentary phosphatic shale (Monterey Formation).

It is essential that the Regional Board acknowledge and address natural sources of nutrients, metals and salt <u>within the current 303(d) listing cycle</u>. Failure to do so may

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[1] Note these two tables appear to have their titles reversed in the Regional Board staff report.

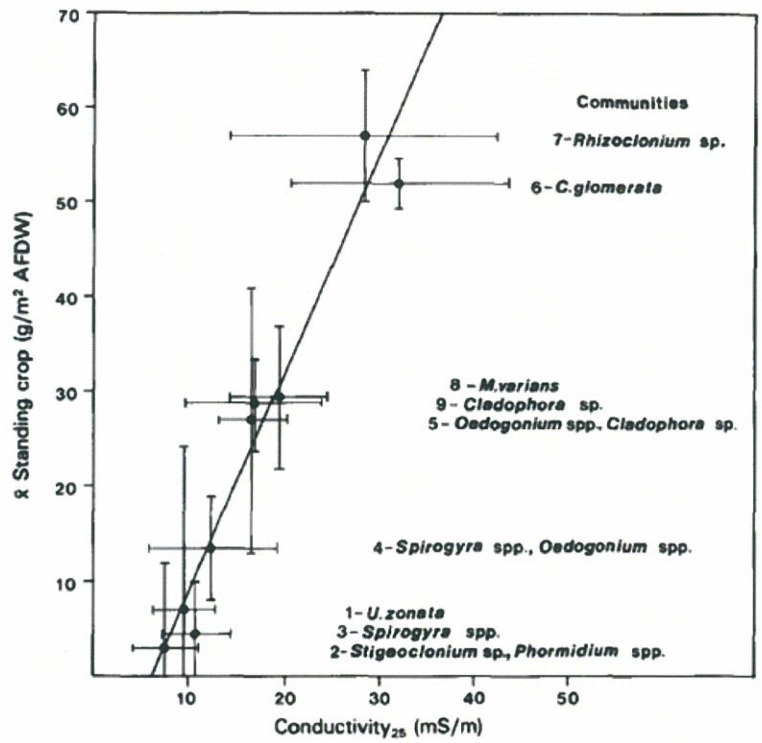
result in the subsequent promulgation of new regulations seeking to remedy water quality problems that are likely due to natural sources.

(2) Overly-narrow focus on phosphorus and nitrogen biostimulatory substances

For several decades regulators have focused almost exclusively on nitrogen and phosphorus compounds when applying and translating the biostimulatory narrative standard into water quality objectives. However, recent findings show that algal growth, particularly in those taxa responsible for the algal mats seen in local waters, is often better correlated with the specific conductivity of the waters in which they grow, with the highest growth seen in high conductivity waters (See Fig. 5 from Biggs and Price, 1987 below) [2].

Biggs & Price—Filamentous algae in New Zealand 181

Fig. 5 Relationship between the mean conductivity of the water and geometric mean standing crop of algae at the site cluster nodes. The error bars are 1 standard deviation of each mean and are included to show the overlap in cluster nodes along the continua. The cluster numbers and their dominant filamentous taxa are given on the right.



Source: New Zealand Journal of Marine and Freshwater Research 21:175-191. 1987.

The precise mechanism behind this correlation is unknown[3], although it appears to be independent of the particular ionic species that collectively contribute to overall water conductivity. Regardless, to date there have been five site-specific studies of algal growth in the Malibu Creek watershed; all five studies found better correlation of algal growth with specific conductivity. None of these studies were able to demonstrate a quantitative, <u>causal</u> relationship between "conventional" biostimulants – nitrogen and phosphorus – and algal growth, probably due to N and P levels in excess of that needed

[2] See our Triennial Review submission and associated electronic files regarding specific conductivity and algal growth.

[3] Potential mechanisms range from physiological advantages (e.g. better osmoregulation) to simple physical effects of saltier water (e.g. increased buoyancy = increased sunlight for attached algae that form floating algal mats).

for algal growth in the sites studied. This includes sites located in open spaces upstream of urban development.

(3) Recent scientific literature on saturation levels of biostimulatory substances in algae.

The fundamental premise to NNE's is that algal growth can be limited by reducing the concentration of at least one essential algal nutrient in a water body to a level insufficient to sustain maximum algal growth. The key question, then, is how low must one reduce nutrient levels in a water body to reduce algal growth? This is the so-called limiting nutrient concentration or numerical nutrient endpoint (NNE).

Most of the guidance-based biostimulatory NNE's cited in Table 3-3 of the Staff Report are correlative in nature, meaning they are based on various statistical measures of ambient nutrient levels found in relatively unimpaired freshwater streams and lakes. As regulatory remedies for excessive algal growth, these NNE's assume that nutrient levels in waters with low algal growth would also result in low algal growth if applied elsewhere[4]. The efficacy of this approach depends on two conditions; (1) that the NNE's can be met by controlling human nutrient sources and (2) that the NNE's, if met, are in fact capable of limiting algal growth. Our findings show that neither condition is met in the Malibu Creek watershed.

In our review we searched the scientific literature for laboratory and field studies on the limiting concentrations of nutrients for the specific algal taxa responsible for floating algal mats (e.g. *Cladophora* and *Rhizoclonium*) and bottom-coating algal films (periphytic diatoms) in the Malibu Creek watershed. Concentrations of phosphate of 0.714 mg/L and 0.12 – 0.47 mg/L were sufficient to sustain maximum growth in *Cladophora glomerata* and periphytic diatoms, respectively (Stevenson et. al., 1996; Taylor et al., 2001) [5].

As for the NNE's proposed by Regional Board staff in the Staff Report (Tables 3-2 & 3-3), these levels are consistently exceeded in the Malibu Creek watershed, including those locations upstream of all known point and non-point sources and presumably minimally impacted by human activities (see Fig. 1 and JPA LOEs 1-3). These levels are lower than all five of the NNE's proposed in the Staff Report.

We are not suggesting that the proposed NNE's are inappropriate for the entire Los Angeles basin. They may prove effective in those water bodies where algal impairments are related to algal species whose limiting nutrient levels are higher than the proposed NNE's, and where natural nutrient sources do not exceed these levels. We do note, however, that the algal species responsible for most occurrences of floating algal mats (e.g. *Cladophora glomerata* and *Rhizoclonium sp.*) are fairly widespread in the region, and can support sustained growth on relatively low levels of nutrients.

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[4] The sole exception is the US EPA National Guidance, which suggests NNEs of 1.0 and 0.1 mg/L for nitrogen and phosphorus respectively. However, this guidance is based on a very dated (1974) and simplistic desk-top estimate of the amount of N and P found in algae in relation to their amounts in treated sewage and other waters. It is not based on field work or laboratory study

[5] Stevenson, R. J., M. Bothwell, and R. L. Lowe (eds.). 1996. *Algal Ecology: Freshwater Benthic Ecosystems* Academic Press, San Diego, CA.; Taylor, R.; Fletcher, R. L.; Raven, J. A.. *2001.* Preliminary Studies on the Growth of Selected 'Green Tide' Algae in Laboratory Culture: Effects of Irradiance, Temperature, Salinity and Nutrients on Growth Rate. *Botanica Marina* 44(4): 327-336.

Geological sources of 303(d) listed pollutants (nutrients, metals and salts)

Native geological sources of nutrients, metals and salts are well-known in the scientific literature (e.g. Isaacs & Rullkotter, 2001[9]), and their locations in the Los Angeles region are documented in US Geological Survey and Mineral Management Service maps (Fig. 2). Yet neither the current Basin Plan nor any of the completed nutrient TMDLs for the Los Angeles region mentions this known source of metals (e.g. Selenium), biostimulatory substances (e.g. phosphorus, high specific conductivity), and high levels of total organic carbon (TOC).

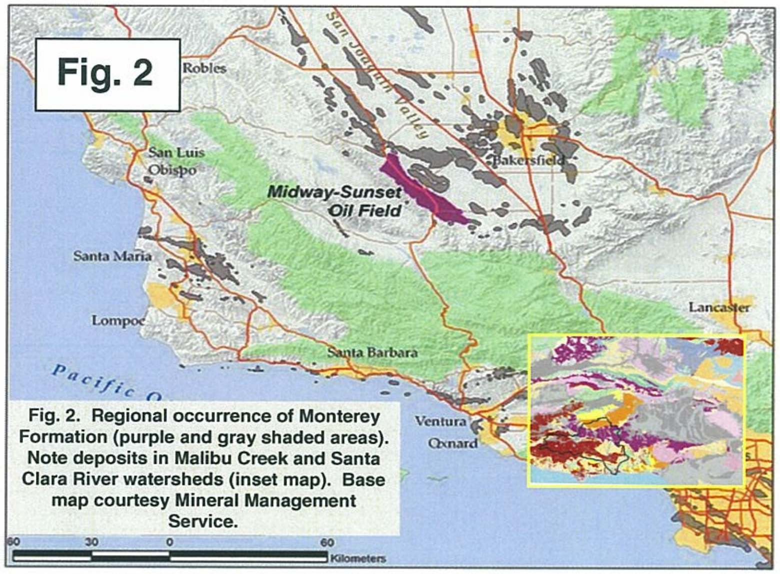
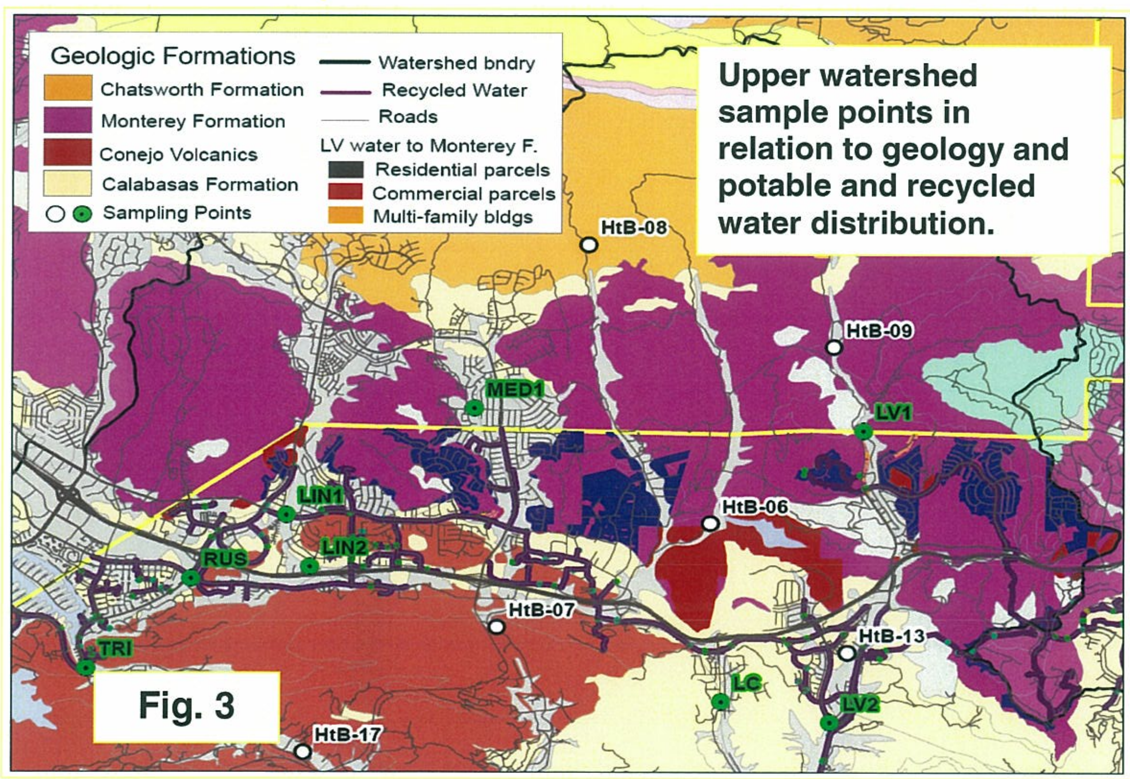


Fig. 2. Regional occurrence of Monterey Formation (purple and gray shaded areas). Note deposits in Malibu Creek and Santa Clara River watersheds (inset map). Base map courtesy Mineral Management Service.



Aside from its high salt content (responsible for the remarkably high levels of specific conductivity shown in Figs. 5 & 6, below), the majority of the biogenic compounds in the Monterey Formation are associated with unusually high levels of organic sediment derived from marine algae (diatoms). It should therefore come as no surprise that local streams fed by Monterey Formation-derived groundwaters are naturally enriched in algal nutrients such as phosphorus and nitrogen (Figs. 5 & 6), even in areas upstream of all known point and point sources (Fig. 3).

The effects of geology on surface water quality in southern California native streams was noted by Southern California Coastal Water Research Project staff in a regional study of presumably unimpaired natural reference streams that included Cold Creek and Cheseboro Creek in the Malibu Creek watershed (Stein & Yoon, 2007)[6]:

> "The combined effect of geology and hydrology may also explain the higher nutrient fluxes observed in the natural streams in this study compared to nation-wide averages reported from a study by Clark *et al.* (2000). Clark reported total annual loading of nutrients from 85 natural stream basins across the United States, with a median annual basin flux of ammonia, total nitrogen, orthophosphate, and total phosphorus of 8.1, 86, 2.8, and 8.5kg/km2, respectively (Table 27). At four of the five sites from this study, nutrient flux was three to four time greater than the basin median value reported by Clark *et al.* The higher phosphorus loadings at the natural streams may have resulted from mineral weathering of phosphorus-enriched sediments. For example, the TP loadings at Santiago Creek, where the dominant geologic type is a marine sedimentary rock, were three times higher than the values recorded in the Clark *et al.* (2000) stream basin study."
>
> [Emphasis by JPA]

In conclusion, the authors noted (p. 87) that,

> ***"Concentrations of several nutrients were higher than the USEPA proposed nutrient guidelines for Ecoregion III, 6.*** It is important to note that the ultimate approach for nutrient 88 criteria adopted in the State of California will likely differ from the approach used in the proposed EPA guidelines. Furthermore, the proposed guidelines were based on a combination of both wet and dry weather data. Nevertheless, this result indicates that background nutrient levels in southern California may be higher than in other portions of the country."
>
> [***Emphasis*** by Stein and Yoon]

It is also important to note that Stein and Yoon (2007) discussed potential geological effects in broad terms, noting that marine sedimentary rocks in general can contribute to high observed levels of TDS, nutrients and some metals. They did not specifically discuss Monterey Formation-fed streams, which show elevated levels of these pollutants significantly higher than the other marine sedimentary drainages in their study.

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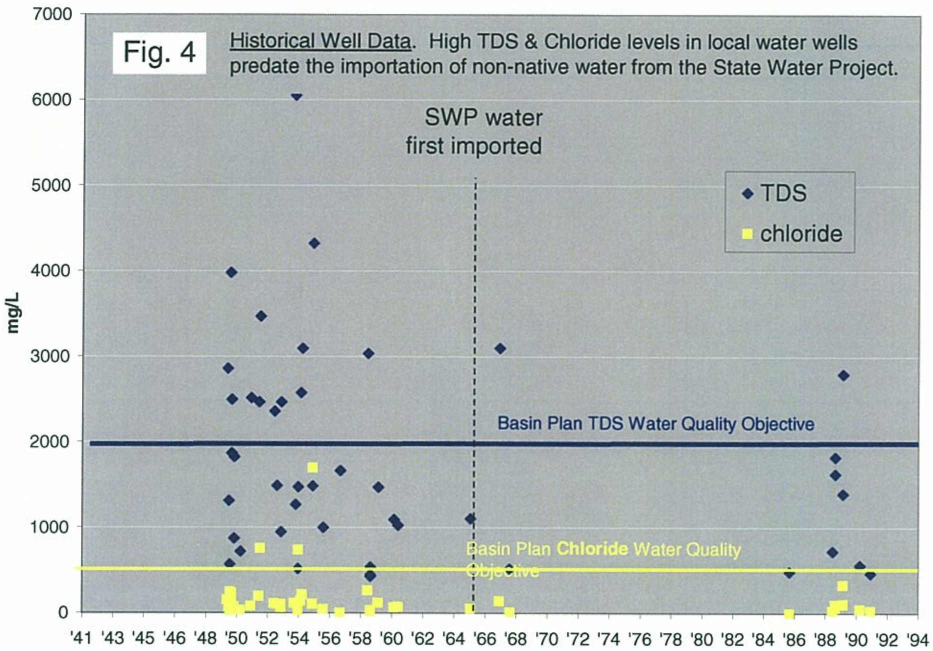
[6] Stein, E. and V.K. Yoon. 2007. Assessment Of Water Quality Concentrations And Loads From Natural Landscapes. Southern California Coastal Water Research Project Report 500. Available at www.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/500_natural_loading.pdf

Several lines of evidence demonstrate that many of the proposed and existing 303(d) listings are due to this natural source. Historical water well logs often included basic water quality tests for total dissolved solids, conductivity and some metals. Well data from the Malibu Creek watershed show that Total Dissolved Solids (TDS) and chloride levels in excess of Basin Plan water quality objectives predate the importation of non-native State Water Project water the majority of the region's development (Fig. 4)[7].

Fig. 4



Two additional lines of evidence come from two independent studies of recent surface water quality monitoring results from sites located in undeveloped areas upstream of urban areas and potable and recycled water systems (See Fig. 3). In the Malibu Creek watershed these include creeks that lie within the Monterey Formation and immediately downstream of it (e.g. sites HTB-6, HTB-9 and LV-1), and also in similar undeveloped headwaters lying outside of the Monterey Formation (e.g. upper Cold Creek). Both datasets show that specific conductivity and phosphorus levels in the undeveloped Monterey Formation sites are substantially higher than similar sites in equally undeveloped areas underlain by other geology (Figs. 5-7)[8].

Aside from salts and nutrients, the Monterey Formation is a known source of sulfate and heavy metals (e.g. selenium) currently listed or proposed for listing in several tributary streams within the Monterey Formation or immediately downstream of it (see Table 1). Our CTR test results (Fig. 8) were consistent with this association, showing detectable levels of selenium and other metals known to occur in the Monterey Formation[9], but non-detects for other organic compounds common in runoff from more developed areas[10].

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[7] See JPA LOE No. 5 (historical well data - electronic submission)
[8] See JPA LOE No. 2-3 (Heal The Bay Streamteam© data) & JPA LOE No. 4 (Malibu Creek Watershed-Wide Monitoring Project data), submitted electronically.
[9] Piper, D. Z and C, M. Isaacs. 2001. The Monterey Formation: Bottom-Water Redox Conditions and Photic-Zone Primary Productivity. In *The Monterey Formation: From Rocks to Molecules.* C.M. Isaacs & J. Rullkotter (eds). Columbia University Press. New York. 553 pp.
[10] See JPA LOE 6 (CTR test results – submitted electronically)

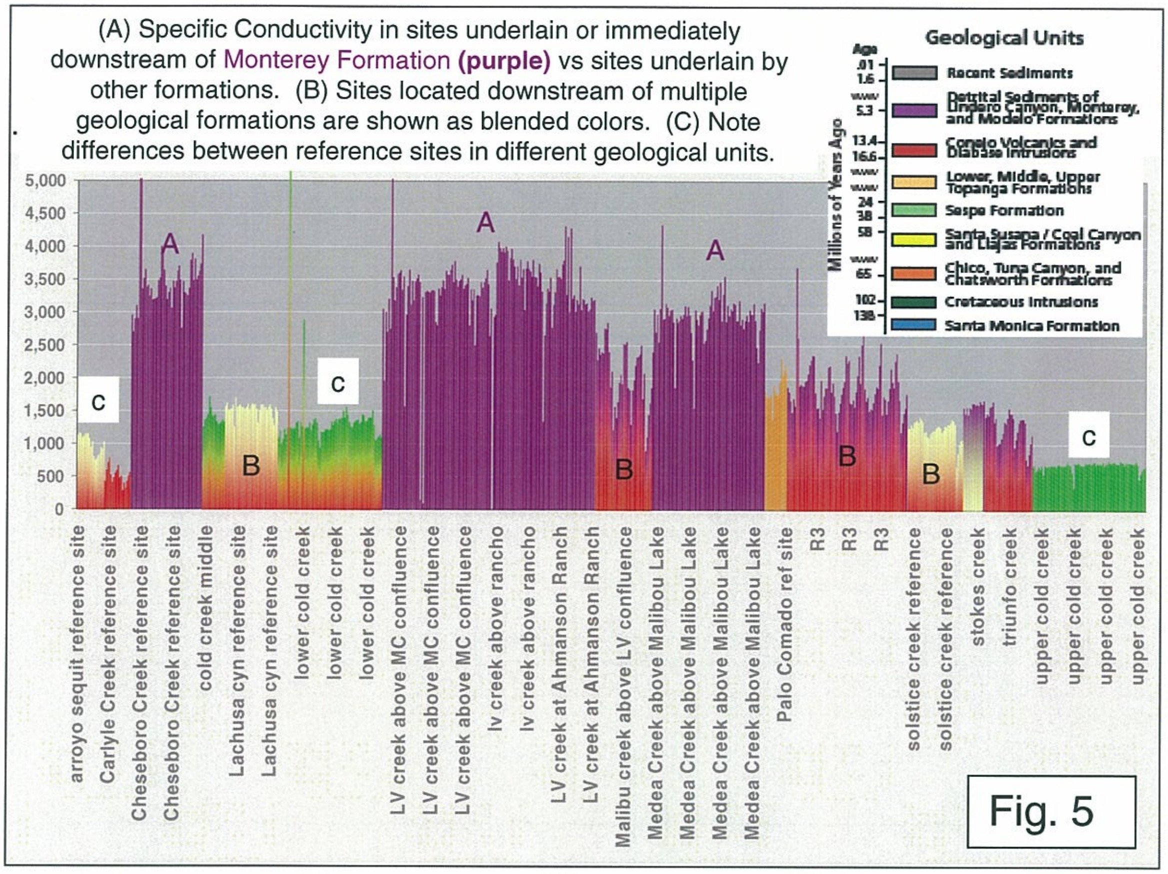

(A) Specific Conductivity in sites underlain or immediately downstream of Monterey Formation (purple) vs sites underlain by other formations. (B) Sites located downstream of multiple geological formations are shown as blended colors. (C) Note differences between reference sites in different geological units.
Geological Units
Age
Millions of Years Ago
Recent Sediments
Detrital Sediments of Lindero Canyon, Monterey, and Modelo Formations
Conejo Volcanics and Diabase Intrusions
Lower, Middle, Upper Topanga Formations
Sespe Formation
Santa Susana / Coal Canyon and Llajas Formations
Chico, Tuna Canyon, and Chatsworth Formations
Cretaceous Intrusions
Santa Monica Formation
A
B
C
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
arroyo sequit reference site
Carlyle Creek reference site
Cheseboro Creek reference site
Cheseboro Creek reference site
cold creek middle
Lachusa cyn reference site
Lachusa cyn reference site
lower cold creek
lower cold creek
lower cold creek
LV creek above MC confluence
LV creek above MC confluence
LV creek above MC confluence
lv creek above rancho
lv creek above rancho
LV creek at Ahmanson Ranch
LV creek at Ahmanson Ranch
Malibu creek above LV confluence
Medea Creek above Malibou Lake
Medea Creek above Malibou Lake
Medea Creek above Malibou Lake
Medea Creek above Malibou Lake
Palo Comado ref site
R3
R3
R3
solstice creek reference
solstice creek reference
stokes creek
triunfo creek
upper cold creek
upper cold creek
upper cold creek
upper cold creek

Fig. 5

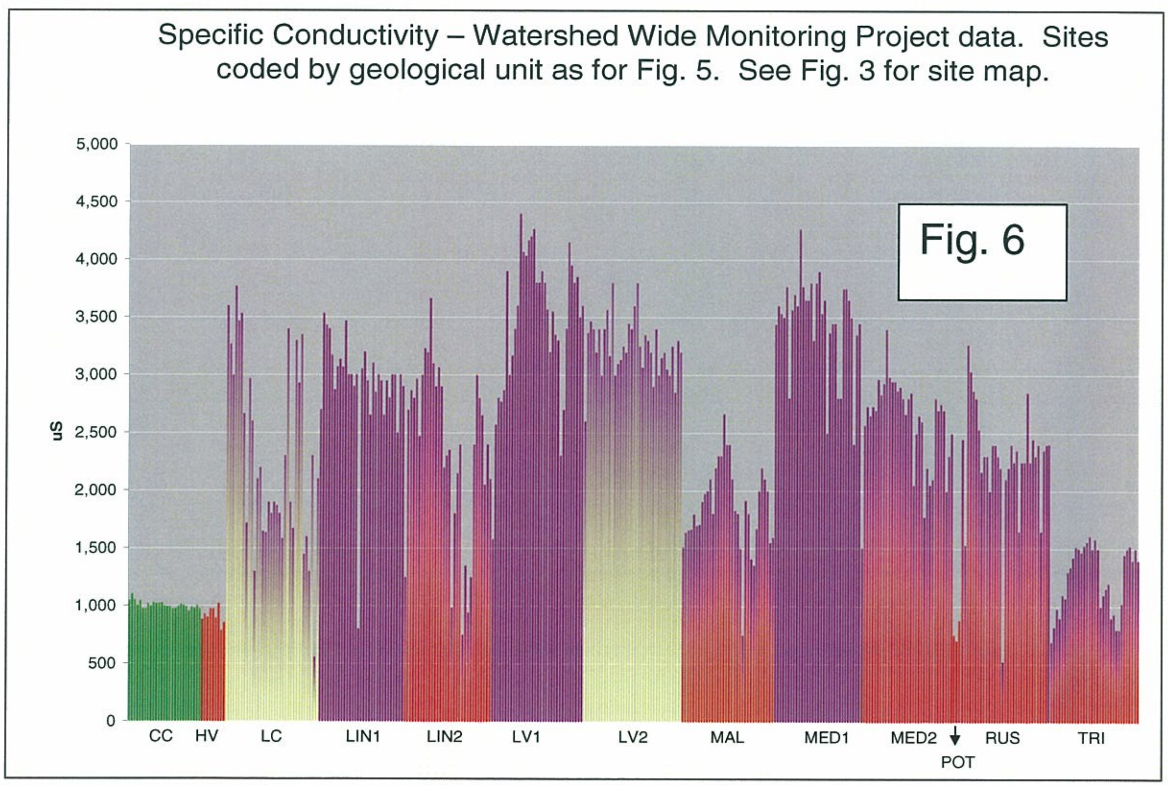
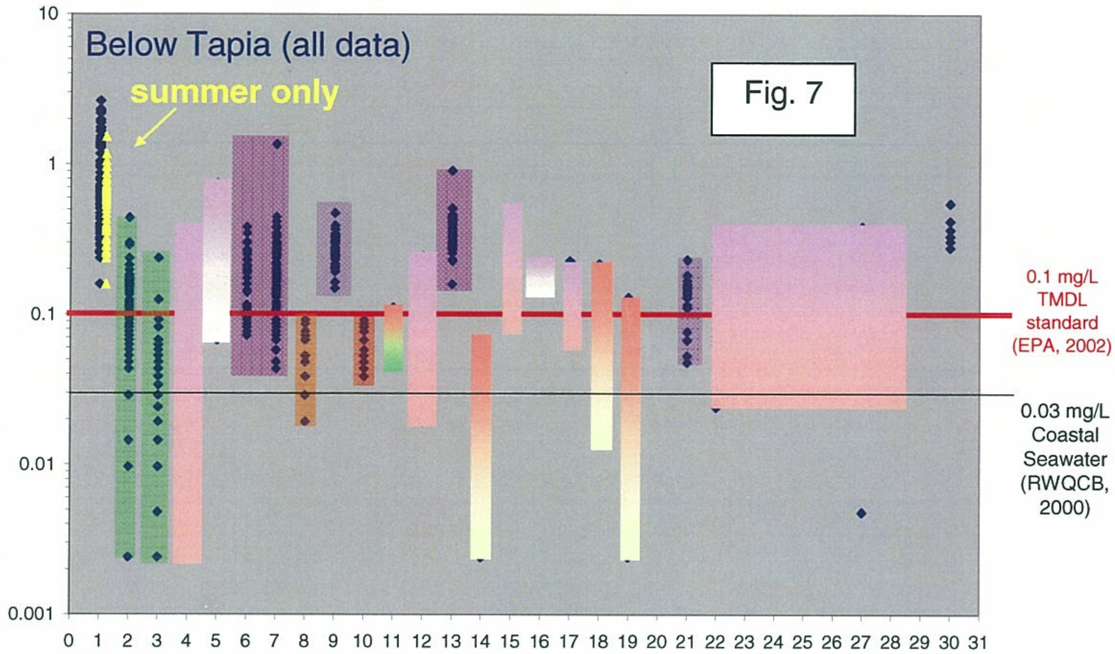
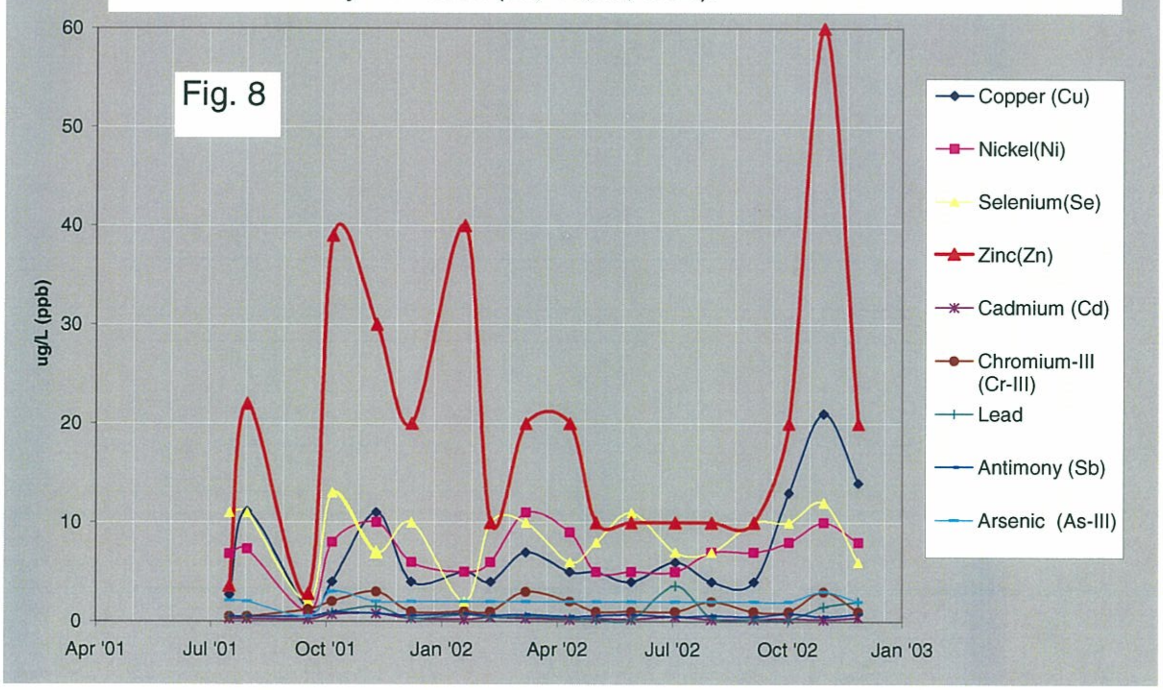

Specific Conductivity – Watershed Wide Monitoring Project data. Sites coded by geological unit as for Fig. 5. See Fig. 3 for site map.
uS
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
CC
HV
LC
LIN1
LIN2
LV1
LV2
MAL
MED1
MED2
POT
RUS
TRI

Fig. 6

Phosphate (mg/L) in Malibu Creek watershed and nearby coastal reference streams (HTB stream team data). Note P levels in summer below Tapia (no discharge season) fall within range of upstream background levels influenced by Monterey Formation. Color coding by primary geologic unit as for Fig. 5.



Metal concentrations in upper Malibu Creek watershed surface water samples (Tapia WRF NPDES monitoring station R1). Note elevated levels of metals known to occur in Monterey Formation (Zn, Cu, Ni, & Se).



Conclusion

In summary, the last decade has seen a substantial public investment in water quality monitoring in the Malibu Creek watershed and the JPA service area. We hope the Regional Board will carefully consider the findings presented here on the basis of these monitoring efforts, and incorporate these data and our recommendations for improving the accuracy of the state 303(d) list of impaired water bodies.

The JPA would welcome an opportunity to meet with your staff and other interested parties to review our findings, both with respect to the present 303(d) list update and the influence of native geology on local water quality. I am sure you can appreciate the need to fully vet these findings, particularly if they are to form the basis for specific listings or delistings in the 303(d) list, or to develop Site Specific Objectives (SSOs) for specific tributaries impacted by native geology.

As always, we appreciate the opportunity to comment. Please direct questions regarding our comments to Dr. Randal Orton in our Resource Conservation and Public Outreach Department. He can be reached at 818 / 251-2145 or via email at rorton@lvmwd.com.

Sincerely,

John R. Mundy
General Manager

c. JPA Board of Directors

Attachments

z:/my documents 303d list comments

TABLE 1. Las Virgenes Municipal Water District and Triunfo Sanitation District Joint Powers Authority (JPA) - 303(d) List Recommended Changes

State draft update				JPA Comments	
Water Body	**State decision No.**	**Impairment / Pollutant**	**State decision**	**Recommended revision**	**Rationale / Line of Evidence in support of revision**
Lake Lindero (CAL4042300019990201145528)	7319	Eutrophic	List on 303(d) list (being addressed by USEPA approved TMDL)	**List if Supporting Information revised (see right)**	*Supporting Information should include data demonstrating that phosphorus levels exceed TMDL established-limits due to contributions from marine phosphatic rock (Monterey Formation). See text for disussion and JPA Lines of Evidence (LOE) 1-5 (submitted electronically)*
	Not given	Selenium	Listed - TMDL required	**Delist - Natural source**	*Selenium levels in the Malibu Creek watershed (and possibly the upper Los Angeles River) derive primarily from a natural source (Monterey Formation; Issacs and Rullkotter, 2001) in the Malibu Creek watershed (Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 6 (submitted electronically).*
	Not given	Chloride	Listed - TMDL required	**Delist - Natural source**	*Elevated chloride levels predate imported water and are linked to marine phosphatic rock, a natural source. See JPA LOE 5 (submitted electronically). Also see comments for specific conductivity listing decisions (chloride is one constituent of Specific Conductivity).*
	Not given	Specific Conductivity	Listed - TMDL required	**Delist - Natural source**	*Specific Conductivity exceedances in the Malibu Creek watershed exclusive of Cold Creek is clearly due to natural sources (Issacs and Rullkotter, 2001; Staalner, Dunn & Gardner, 1992; Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 3 & 4.*
Lake sherwood CAL4042600019990201154540	7332	Eutrophic	List on 303(d) list (being addressed by USEPA approved TMDL)	**List if Supporting Information revised (see right)**	*Supporting Information should include data demonstrating that phosphorus levels exceed TMDL established-limits due to contributions from marine phosphatic rock (Monterey Formation). See text for disussion and JPA Lines of Evidence (LOE) 1-5 (submitted electronically)*
	7024	Organic Enrichment/Low Dissolved Oxygen	List on 303(d) list (being addressed by USEPA approved TMDL)	**Delist - unsupported by weight of evidence, approved TMDL**	*No new data in support of this listing are provided in the Supporting Information. The TMDL referenced in state update does not cite any data from this waterbody, and it is not clear what the original basis was for this listing.*
	7332	Eutrophic	List on 303(d) list (being addressed by USEPA approved TMDL)	**List if Supporting Information revised (see right)**	*Supporting Information should include data demonstrating that phosphorus levels exceed TMDL established-limits due to contributions from marine phosphatic rock (Monterey Formation). See text for disussion and JPA Lines of Evidence (LOE) 1-4 (submitted electronically)*

TABLE 1. Las Virgenes Municipal Water District and Triunfo Sanitation District Joint Powers Authority (JPA) - 303(d) List Recommended Changes

Las Virgenes Creek **(CAR4042201019990201141611)**	7059	Nutrients (Algae)	List on 303(d) list (being addressed by USEPA approved TMDL)	**List if Supporting Information revised (see right)**	*Supporting Information should indicate that phosphorus and possibly nitrogen levels as well exceed TMDL established-limits due to contributions from marine phosphatic rock (Monterey Formation). See text for disussion and JPA Lines of Evidence (LOE) 1-3 (this submittal).*
	7108	Organic Enrichment/Low Dissolved Oxygen	List on 303(d) list (being addressed by USEPA approved TMDL)	**Delist - unsupported by weight of evidence, approved TMDL**	*Recent data from 1998 - 2009 from multiple datasets including both daytime grab samples and 24 hr continuous monitoring provide no support for listing this tributary as impaired by low DO. Also, these two pollutants (organic enrichment, Low DO) should be separated until a causal linkage is demonstrated. See text for further discussion.*
	Not given	Selenium	Listed	**Delist - Natural source**	*Selenium levels in the Malibu Creek watershed (and possibly the upper Los Angeles River) derive primarily from a natural source (Monterey Formation; Issacs and Rullkotter, 2001) in the Malibu Creek watershed (Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 6 (submitted electronically).*
Lindero Creek Reach 1 **(CAR4042300019990201144612)**	Not given	Selenium	Listed	**Delist - Natural source**	*Selenium levels in the Malibu Creek watershed (and possibly the upper Los Angeles River) derive primarily from a natural source (Monterey Formation; Issacs and Rullkotter, 2001) in the Malibu Creek watershed (Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 6 (submitted electronically).*
Lindero Creek Reach 2 **(CAR4042500019990201150614)**	Not given	Selenium	Listed	**Delist - Natural source**	*Selenium levels in the Malibu Creek watershed (and possibly the upper Los Angeles River) derive primarily from a natural source (Monterey Formation; Issacs and Rullkotter, 2001) in the Malibu Creek watershed (Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 6 (submitted electronically).*
Malibou Lake **(CAL4042400019990201142748)**	7243	Eutrophic	List on 303(d) list (being addressed by USEPA approved TMDL)	**List if Supporting Information revised (see right)**	*Supporting Information should include data demonstrating that phosphorus levels exceed TMDL established-limits due to contributions from marine phosphatic rock (Monterey Formation). See text for disussion and JPA Lines of Evidence (LOE) 1-4 (submitted electronically)*
	7244	Organic Enrichment/Low Dissolved Oxygen	List on 303(d) list (being addressed by USEPA approved TMDL)	**List if Supporting Information revised (see right)**	*Supporting Information should note that recent data from daytime grab samples provide no support for listing this tributary as impaired by low DO in winter (See DO worksheets in JPA LOE 2). Also, these two pollutants (organic enrichment, Low DO) should be separated until a causal linkage is demonstrated. See text for further discussion.*

TABLE 1. Las Virgenes Municipal Water District and Triunfo Sanitation District Joint Powers Authority (JPA) - 303(d) List Recommended Changes

Malibu Creek **(CAR4042100019990201132825)**	16265	Copper (dissolved)	Delist - TMDL	**Delist - TMDL unnecessary**	*0 of 59 samples exceeded applicable standard (State Supporting Information)*
	Not given	Selenium	Listed - TMDL required	**Delist - Natural source**	*Selenium levels in the Malibu Creek watershed (and possibly the upper Los Angeles River) derive primarily from a natural source (Monterey Formation; Issacs and Rullkotter, 2001) in the Malibu Creek watershed (Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 6 (submitted electronically).*
	Not given	Sulfates	Listed - TMDL required	**Delist - TMDL unnecessary**	*Sulfate levels in surface waters reflect native groundwater levels influenced by high salt and mineral content of Monterey Formation. See text for further information.*
	16265	Toxicity	Delist - TMDL	**Delist - TMDL unnecessary**	*0 of 1 samples exceeded applicable standard*
	7247	Nutrients (algae)	Delist - approved TMDL	**List if Supporting Information revised (see right)**	*Supporting Information should include data demonstrating that phosphorus levels exceed TMDL established-limits due to contributions from marine phosphatic rock (Monterey Formation). See text for disussion and JPA Lines of Evidence (LOE) 1-5 (submitted electronically)*
Malibu Lagoon **(40421000)**	16282	Antimony | Arsenic | PAHs | C1-C4 | Copper | Dibenz[a,h]anthracene | Lead | Phenanthrene | Pyrene | Zinc	Delist - TMDL	**Delist - TMDL unnecessary**	*0 of 3 samples exceeded applicable standard*
	16266	Sediment Toxicity	Delist - TMDL	**Delist - TMDL unnecessary**	*0 of 3 samples exceeded applicable standard*
	7252	Eutrophic	Delist - TMDL	**List if Supporting Information revised (see right)**	*Supporting Information should include data demonstrating that phosphorus levels exceed TMDL established-limits due to contributions from marine phosphatic rock (Monterey Formation). See text for disussion and JPA Lines of Evidence (LOE) 1-4 (submitted electronically)*
Medea Creek Reach 1 **(40424000)**	Not given	Selenium	Listed - TMDL required	**Delist - Natural source**	*Selenium levels in the Malibu Creek watershed (and possibly the upper Los Angeles River) derive primarily from a natural source (Monterey Formation; Issacs and Rullkotter, 2001) in the Malibu Creek watershed (Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 6 (submitted electronically).*

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Medea Creek Reach 2 **(40423000)**	Not given	Selenium	Listed - TMDL required	**List if Supporting Information revised (see right)**	*Selenium levels in the Malibu Creek watershed (and possibly the upper Los Angeles River) derive primarily from a natural source (Monterey Formation; Issacs and Rullkotter, 2001) in the Malibu Creek watershed (Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 6 (submitted electronically).*
Triunfo Canyon Creek Reach 1 **(40424000)**	16626	Invasive Species	Do not list	**List for Invasive Species**	*The state supporting document omits important data from the Bay commission report that New Zealand mudsnails were in fact found for the first time in the highest reaches of Cold Creek in 2008. The state fact sheet cites to "applicable standards," but th*
Westlake Lake **(CAL4042500019990201153000)**	7025	Eutrophic	List on 303(d) list (being addressed by USEPA approved TMDL)	**List if Supporting Information revised (see right)**	*Supporting Information should include data demonstrating that phosphorus levels exceed TMDL established-limits due to contributions from marine phosphatic rock (Monterey Formation). See text for disussion and JPA Lines of Evidence (LOE) 1-4 (submitted electronically)*
Los Angeles River Reach 6 **(40521000)**	Not given	Selenium	Listed	**List if Supporting Information revised (see right)**	*Selenium levels in the Malibu Creek watershed (and possibly the upper Los Angeles River) derive primarily from a natural source (Monterey Formation; Issacs and Rullkotter, 2001) in the Malibu Creek watershed (Yerkes & Campbell, 2005). See Discussion in text and JPA LOE 6 (submitted electronically).*
Cold Creek **(CAR4042100020020130153315)**	16623	Invasive Species	Do not list	**List for Invasive Species**	*The state supporting document omits important data from the Bay commission report, specifically that New Zealand mudsnails were in fact found for the first time in the highest reaches of Cold Creek. The state fact sheet citation to "applicable standards" is unsupported - none exist. See discussion in text. Characterization of NZ mudsnail density as "low" in 2008 field surveys should be translated as impaired for this species given its ability to rapidly expand its range.*