Las Virgenes – Triunfo Joint Powers Authority
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July 25, 2013

Ms. Alix Hobbs
Acting Executive Director
Heal the Bay
1444 9th Street
Santa Monica, CA 90401

RE: Comments on *Malibu Creek Watershed: Ecosystem on the Brink*

Dear Ms. Hobbs:

The Joint Powers Authority (JPA) comprised of Las Virgenes Municipal Water District and Triunfo Sanitation District provides wastewater treatment and composting services to approximately 100,000 customers and residents of the Malibu Creek watershed. On their behalf, we offer our comments on the report entitled *Malibu Creek Watershed: Ecosystem on the Brink*, which Heal the Bay released at a public workshop on March 19, 2013 at Diamond X Ranch (National Park Service) in Calabasas. The report summarizes over a decade of water quality monitoring by Heal the Bay in the Malibu Creek watershed and nearby coastal streams, including recommendations on water quality policy for the JPA, local cities and other public agencies. We appreciate Heal the Bay's request for feedback and comments from watershed stakeholders with an interest in water quality and the region's natural resources.

General Comment

Usually when a report like this is used in support of new water quality regulations by the U.S. EPA or the Regional Water Quality Control Board (RWQCB), potentially affected agencies and public stakeholders have a chance to review the report and address any factual errors. However, in this case, the EPA drew heavily from this report in drafting the Total Maximum Daily Load (TMDL) regulations for benthic community effects and sedimentation for Malibu Creek and Lagoon, closing the draft TMDL public comment period before Heal the Bay made its report available to the public. This was unfortunate, as our review has found a significant number of concerns, including factual errors and significant errors of omission in those sections cited by EPA in its draft TMDL.

Conclusions and Recommendations

The report, *Malibu Creek Watershed: Ecosystem on the Brink* includes a number of conclusions and recommendations for public agencies such as the JPA, that share Heal the Bay's goals and interests in local water quality. However, we need to draw your attention to two of these recommendations, as we cannot support them as currently presented in the report:

- **Increase of Water Storage Capacity at Tapia Facility**

  The JPA fully supports the long-term goal of a seasonal storage reservoir to significantly reduce discharges to Malibu Creek during the winter months. However, we believe the report's recommendation to increase recycled water storage capacity at Tapia WRF was an oversight, as there is simply no available land for additional water storage at this facility.

  Additionally, increases in off-season storage are only meaningful when they are coupled to equivalent increases in summer recycled water usage, when the demand peaks. While the JPA continues to look for opportunities to connect new customers to the recycled water system, most large water users within our service area are served by the system. We feel it is vital that any public documents recommending increased off-season storage of recycled water also acknowledge that, to be successful, they must be coupled with equivalent increases in peak season demand.

- **Implementation/Enforcement of Existing Water Quality Regulations**

  The reference to "existing" water quality regulations is a misnomer insofar as all five of the report's specific recommendations concern NEW water quality regulations. The nuance is that some of the "existing" water quality regulations referred to in the report have not yet been fully implemented. For example, neither of the two "existing" TMDLs cited in the report[1] have been fully advanced to the TMDL implementation stage, where the actual terms of NPDES permit requirements are developed. In fact, the 2003 Nutrient TMDL requirements were only incorporated into the LA County MS4 permit in December 2012.

  Heal the Bay recommends that these regulations include more stringent limits for nutrients (both nitrogen and phosphorus) than are currently identified in either TMDL. However, we do not believe that these limits, if adopted, would achieve their intended purpose of eliminating or even

[1] The EPA nutrient TMDL (March, 2003) and the draft EPA benthic macroinvertebrate /sedimentation TMDL.

reducing excessive algal growth in local streams and creeks, as discussed under General Technical Comments. Specifically, the nutrient levels recommended in the report are lower than those that occur naturally in the watershed, and would have to be lowered even further, below those natural levels in an attempt to "starve" the particular algal species that are responsible for excessive algal growth in the watershed. The JPA concludes this would be a futile, yet costly, strategy.

JPA Support for Additional Studies

The JPA concurs with findings and observations throughout the report that significant data gaps exist in the watershed that warrant further work. Additional research is essential to ensure that efforts intended to improve water quality are based on sound science and a complete understanding of the particular water quality problem or issue. For example, we agree with Heal the Bay that additional, targeted monitoring along Las Virgenes and Malibu Creeks would better identify sources of nutrients in these water bodies, especially those unrelated to JPA wastewater treatment facilities and operations. Currently, there appears to be a presumption that higher nutrient levels in these streams are primarily due to historical (and long-discontinued) wastewater sludge injection operations conducted in compliance with earlier EPA and state directives. We also concur that additional data on the sources of Malibu Creek's unusually high salt levels might resolve the report's observation that high conductivity does *not* appear to increase as water moves downstream through urban areas, as might be expected for water quality parameters influenced by urban runoff and other human sources.

General Technical Comments

Having recently completed our own compilation and assessment of water quality data in the Malibu Creek Watershed[2], the JPA applauds Heal the Bay for the impressive breadth of topics covered in its own effort, and acknowledge the extent of its water quality monitoring activities, spanning more than 10 years and over a dozen monitoring sites, sampled monthly. The tone of the report is also a welcome change from earlier reports by environmental advocacy groups in its acknowledgement of some of the JPA's environmental stewardship efforts in water conservation and water quality.[3] Unfortunately Heal the Bay's representation of the

[2] "Water Quality in the Malibu Creek Watershed, 1971-2010: Existing Conditions, Historical Trends and Data Inter-relationships." (JPA Report #2475.00)

[3] The District's conservation efforts are acknowledged on p. 96 for example, and p. 97 notes that Tapia's discharge is disinfected, which is often overlooked in discussions of downstream bacterial quality.

report as a "scientific roadmap," [4] is diminished by a significant number of technical errors, particularly with respect to its scientific foundation and methods.

In the acknowledgements section, Heal the Bay lists an impressive number of individuals and organizations who contributed to the report, and acknowledges three individuals who independently reviewed the report for errors prior to its release to the general public[5]. However, many of the errors we found were errors of omission, where critical information missing from the report may not have been available to the reviewers. Also, they may not have reviewed the report as critically as truly independent reviewers without any affiliation to either Heal the Bay or the EPA.

We highlight two of the scientific/technical issues the JPA finds particularly problematic.

- **Algal Mats and Nutrients**

  There is no question that, as stated in Heal the Bay's report, winter nutrient concentrations in Malibu Creek below Tapia are substantially elevated due to Tapia's discharge. The problem with this conclusion is one of omission. First, the report does not address the excessive algal growth in the creek below Tapia WRF (especially the floating algal mats) that occurs in summer, when Tapia does not discharge.

  Second – and more fundamentally as a practical matter - Heal the Bay's report is silent on perhaps the most important factual question of all with respect to algae control: *Regardless* of where the nutrients come from, to what degree would nutrient levels in the creek have to be reduced to keep algal growth in check? The answer to that, in turn, depends on which species are responsible for algal mats, because some algal species - including *Cladophora glomerata,* the creek's main algal mat forming species - do not require very high nutrient levels to sustain maximum growth.

  Existing scientific literature on this species strongly suggests that just the native, naturally-high nutrient levels found in the creek are more than sufficient to support the observed growth of this species, given high temperatures and sunlight (summer), and sufficiently high levels of calcium (which is also extremely elevated in the creek due to local geological sources).

[4] The report is subtitled (cover page) as "A Scientific Roadmap for Protecting a Critical Natural Resource."
[5] Dr. Richard Ambrose (UCLA), Dr. Cindy Lin (US EPA) and Dr. Alexandra Tower (Santa Monica College).

In short, while Heal the Bay continues to advocate for year-round phosphorus limits to be "more stringent," the "scientific roadmap" never mentions any scientific evidence suggesting that this "starve the algae" approach, which has worked on occasion elsewhere, simply will not work in Malibu Creek due to its naturally high nutrient levels. The creek's floating algae mats are dominated by *Cladophora glomerata,* which is acknowledged throughout the world for forming extensive algal mats in watersheds with even modest amounts of marine sedimentary phosphatic and calcium-rich rock.

Turning from floating to benthic (bottom-dwelling) algae, the JPA's research on benthic algae (diatoms) clearly show that Malibu creek's benthic algal community is numerically dominated by species adapted to the creek's naturally brackish, high organic nitrogen and calcium and phosphorus-rich water.

- **Conductivity and Salt Levels in Malibu Creek**

The authors do not acknowledge that Malibu Creek is one of California's saltiest creeks, that it is demonstrably brackish through its entire length, that its salt levels are a consequence of its natural geology, that both the amount and composition of this salt is known to adversely impact freshwater aquatic life, or that these impacts preclude fair comparisons with the water quality and aquatic life of other, genuinely freshwater streams.

This oversight is particularly puzzling since they appear to agree with the JPA's findings that high salt levels can have negative impacts on benthic macroinvertebrate communities, citing some of the same scientific literature that we share (i.e. Pond et al., 2008). They even acknowledge that, "Specific conductance above 2000 µS/cm can be harmful to some freshwater organisms." But what the report does *not* mention is that this salt level is exceeded in Malibu Creek every summer, or that freshwater aquatic life in Malibu Creek is "on the brink" simply due to the creek's native salt levels.

Nor does the report acknowledge that "findings" on the health of Malibu Creek's aquatic life are based on comparisons with freshwater "reference" streams whose *maximum* salt levels are lower than Malibu Creek's *minimum* salt levels. *All* of the report's findings on Malibu Creek's aquatic insects are based on comparisons with southern California freshwater streams. Even the scientists who developed the assessment technique used in this report (the Southern California Index of Biological Integrity, or SoCal IBI) have concluded it does not work in high salinity streams such as Malibu Creek. Indeed, *the scientists who developed this technique* have also concluded

that even their new index (the CSCI), specifically developed to address the shortcomings of the SoCal IBI, is problematic at best in Malibu Creek.

Detailed Technical Comments

Attached is a table with more detailed technical comments on the report and references to the applicable page numbers.

On behalf of the JPA, we extend an invitation to you and your staff to visit our facilities and discuss our comments in more detail. We recognize and applaud Heal the Bay's continuing dedicated involvement in watershed matters.

Sincerely,

David W. Pedersen, P.E.
Administering Agent/General Manager

cc:

Senator Diane Feinstein
Senator Barbara Boxer
Congressman Henry Waxman
Congressman Brad Sherman
Congresswoman Julia Brownley
Congressman Buck McKeon
Gina McCarthy, Administrator, USEPA
Denise Keehner, USEPA Office of Wetlands, Oceans & Watershed
Jared Blumenfield, Region 9 Administrator, USEPA
Cindy Lin, Los Angeles Field Office, USEPA
Senator Fran Pavley
Assemblymember Richard Bloom
Assembly District 45
Assemblymember Jeff Gorell
Tom Howard, Executive Director, California State Water Resources Control Board
Samuel Unger, Executive Officer, Los Angeles Regional Water Quality Control Board
L.A. County Supervisor Zev Yaroslavsky
Ventura County Supervisor Linda Parks

City Managers and City Councilmembers for the Cities of:
- Agoura Hills
- Calabasas
- Hidden Hills
- Malibu
- Thousand Oaks
- Westlake Village
- Oak Park Municipal Advisory Council

Shelly Luce, Executive Director, Santa Monica Bay Restoration Commission

Attachment A - Technical Comments

Page	**EXECUTIVE SUMMARY**
11	The first sentence of the report notes the watershed includes a brackish water lagoon, but does not mention that its main tributary is the region's most brackish coastal stream: Malibu Creek. This is the first of several places in the report that either minimizes or ignores this important fact, which explains the creek's poor water quality for dozens of parameters, including the unpalatability of its water for human consumption due to high Total Dissolved Solids (TDS) and sulfate levels. The JPA believes that this is an important factor to consider. Simply from a public health perspective, this poor native water quality was the reason why local communities banded together to create the Las Virgenes Municipal Water District. They needed no convincing that native water quality was poor.
12	In highlighting the benthic macroinvertebrate (BMI) sampling, the report neglects to mention here, and throughout the report, that the metric of BMI health, the Southern California Index of Biological Integrity (IBI), was designed for southern California freshwater streams, not brackish waterbodies like Malibu Creek. The state is no longer using the SoCal IBI for Malibu Creek, instead using a new metric known as the California Stream Condition Index (CSCI), and it is unclear if the new metric works for Malibu Creek, since it includes a 2,000 uS/cm specific conductance "cut-off" threshold because of few unimpaired reference streams above that salt level in the state database. The report's conclusions on aquatic life rest almost entirely on comparisons with streams that are not comparable to Malibu Creek's native water quality.
14	High sulfate in Monterey formation-fed groundwater is why sulfur reducing bacteria are so widespread in Malibu Creek, not vice-versa. Sulfate levels measured in local groundwater are extremely high (>1,500 mg/L) before it ever emerges through seeps or springs or weep holes located at the base of upstream storm channels. This error gives the impression that naturally poor water quality (i.e. high sulfate levels) is limited to just a few seeps and springs, when in reality, the entire creek is impaired (in a regulatory context) for high sulfate from groundwater entering the creek regardless of its location. These exceedances of the sulfate water quality objective, one of several parameters (i.e. selenium, TDS) in Malibu Creek and its northern tributaries are due to groundwater coming into contact with the Monterey formation and in all likelihood, the Calabasas formation as well. The report found that sites with >6.3% upstream impervious area show biological degradation, and as a result, recommend stream health protection ordinances, adoption of a Local Coastal Program and restoration. The JPA notes that impervious area calculations may be overestimated as discussed in its comments in page 118 and Appendix C.
15	The report accurately states that high nutrient and bacteria levels are found in many locations, and immediately notes that high nutrient levels can promote algal growth, lower available oxygen and impact aquatic life and people. But it is one thing to say something can cause something, another to scientifically demonstrate it actually does. The report is deficient on its causative evidence. While high levels of nutrients were present in many locations, low dissolved oxygen (DO) less than the Basin Plan objective was only found at one site. There is very little data on nighttime DO levels, and lacking such data, the report's "lower available oxygen" statement is speculative. Of the water quality parameters where data do show exceedances, the report does not note those that are exceeded due to geology (i.e. sulfate, selenium, TDS).
16	The section header ("Efforts should include . . . implementation of existing regulations") is a statement with which the JPA concurs, insofar as the JPA is the only agency to date to actually act and meet the existing nutrient TMDL in-stream nutrient targets. But the conclusions regarding nutrient levels and algae are based (necessarily so) on those forms of nutrients Heal the Bay (HtB) measured – which did NOT include Total Kjehldahl Nitrogen (TKN), which measures both ammonia (which they measured) and organic nitrogen levels (which they did not). The JPA's measurements show organic nitrogen can

	constitute as much as 78% - of the total nitrogen at any particular location.
18	Again, in highlighting the major reasons for low IBI scores, the fact is, the entire creek and all of its northern tributaries are very brackish and this is known from existing scientific literature (benthic invertebrate salt tolerances) to pose a problem for freshwater aquatic species, but that important information is ignored. The same is true for naturally high sulfate levels (known to impact freshwater macroinvertebrates), and elevated levels of magnesium, chloride, bicarbonate, and most metals. The sidebar, which declares that native aquatic species have declined in numbers, is not supported by any evidence in the report (including its citations). The report describes the use of the Southern California IBI "to assess human stressors on biotic condition of waterbodies" and summarizes justification of conclusions by saying "the average IBI of reference sites is 62," in the "good" range, while average IBI scores at middle and outlet sites fall in the "poor" range with scores of 30 and 24, respectively. Averages are inappropriate for demonstrating that sites within and downstream of development are impaired, as indicated by a score of less than 39, while reference sites average "good" scores. This generalization presents significant issues. First, not all reference sites have the same averages - reference site averages range from 41 to 76. Secondly, there are a range of scores at each site. Heal the Bay reference sites in the Monterey Formation headwaters attained both passing and failing scores. It would have been better to consider the full range of scores observed at reference sites; the full range is representative of the natural condition, not the average.
20	In the section titled "development of a stream condition index as an integrated watershed health assessment tool" the report proposes the Stream Health Index composed of the IBI, habitat (percent impervious, upstream discharge pipes and bank modifications) and water quality (nitrate, phosphate and bacteria) data in equal measure. The JPA recommends not adopting a stream condition index based on an arbitrary combination of regulated and non-regulated parameters.
21	Lacking data on aquatic life trends (see comments for p. 73**)**, the call for immediate action loses much of its force. A better strategy, citing the limited availability of public funds, would be to limit immediate actions to those that are likely to achieve multiple objectives, specifically including objectives for which the underlying data provide solid evidence of a problem. This approach would ensure public funds are used to address problems for which there actually are solid, sound data on the need, cause and effect, while simultaneously addressing problems for which the justification may be weaker.
22	The assertion that reducing nutrients to background levels would eliminate nuisance algal growth is exactly what Biggs (2000) warned would NOT work in drainages with even modest amounts of rock like the Monterey Formation. The missing piece in the HtB assertion is whether background levels of nutrients alone are sufficient for algae to reach nuisance levels.
23	The recommendation to route surface runoff to groundwater via on-site infiltration **is exactly the wrong thing to do in those areas underlain by the Monterey Formation (MF)**. Any water coming into contact with MF will come out worse than it went in for over a dozen water quality parameters known to impact aquatic life. The JPA's report exhaustively documented findings on this fundamental feature of that LARGE portion of the watershed underlain by Monterey formation rock and sediments (Section 3).
	Chapter 1: A Watershed on the Brink
25	Again, the report highlights both sulfur springs and the brackish lagoon, without including the fact that Malibu Creek is brackish in its entirety, as are its northern tributaries in both developed and open space areas.
27	Water quality monitoring occurs monthly, but the report does not discuss what occurs at sites that do not have perennial flow.
29	Heal the Bay should qualify the characterization of the report as the "first comprehensive assessment"

	with the more accurate statement that it is perhaps one of the first. There are other reports, depending on how one defines "comprehensive" and how far back in time one goes. The JPA genuinely respects the effort and fieldwork that serves as the foundation of this report. But it should fairly acknowledge that its analysis of water quality does not appear to include data from other monitoring programs such as those of the JPA, the National Park Service, LA and Ventura Counties, or local cities. These programs included parameters that HtB did not measure, and those done for regulatory compliance were conducted to a much higher standard than the State Surface Water Ambient Monitoring Program (SWAMP) protocols followed by HtB. What is interesting - and worthy of further analysis - is that the JPA report, which analyzed all the data collected as of 2010 by all organizations (including HtB), differs so much in its conclusions from those in this report. They differ on conclusions regarding water quality trends, whether nuisance algal growth is natural in the creek or not, and whether comparisons between Malibu Creek and other nearby coastal streams are valid given their large differences in salinity, geologic setting, drainage size, water temperature, sulfate and phosphorus and magnesium and bicarbonate differences, and stream order. An open workshop exploring the reasons for these differences might be informative and valuable for regulatory agencies, stakeholders, and the general public faced with two, conflicting summaries of water quality in the same watershed.
30	The observation that HtB's monitoring program cost is lower than other local efforts omits the fact that it does not have to meet the same QA/QC standards as National Pollution Discharge Elimination System (NPDES) permitees, nor do they monitor nearly as many parameters as do others. Likewise the assertion that the HtB program is a reputable source of information is based on the State SWAMP protocol (some parameters) and guidelines for volunteer monitoring groups which is not the same as the JPA's monitoring requirements and those of other NPDES permitees in the watershed.
31	"No water" is cited as why monitoring is discontinued at some stream sites, yet BMI data from these sites are used as reference values for other sites that never dry. Heal the Bay says sites were "specifically chosen to represent relatively homogeneous stream habitat types," and admits "this also limited our analysis of specific habitat impairments on benthic communities…" The state recommends using a Reach-wide Benthos (Multi-habitat) Sampling procedure or a Targeted Riffle Composite Procedure (Ode 2007) as those types of sites are most likely to capture BMI diversity in a stream. Heal the Bay's Stream Team, by selecting sites with a single habitat type per site, limits the biodiversity in samples.
32	Eleven of the 19 sites listed are downstream of the Monterey Formation.
33	The figure can be improved by providing the dates of the photos. All sites are shown with nearly bankfull flow in contrast with JPA photos showing dry conditions which are available for review.
35	The HtB assertion that degradation is spreading is not well supported except for the findings on the New Zealand mudsnail. Only four figures on trends are presented, three of which are for the same parameter (nitrate). Of these, none include any statistical test of significance for the trend shown. The fourth figure on trends is not on water quality, but on land use over 2001-2010, The caption for that figure admits that the total change over that period was about 1% of the total watershed area. How this equates to an "ecosystem on the brink" is not explained.
	Chapter 2: State of the Habitat
37	The JPA agrees that: "The Malibu Creek Watershed contains some of southern California's most precious resources, and is unique because it has substantially more open space than most other watersheds draining into Santa Monica Bay."
37 & 41	We urge Heal the Bay to use Southern California Association of Governments (SCAG) land use data for

	estimating impervious area with caution. The report says that "the degree of imperviousness of an area depends on land use classification." The JPA has found that land use classification is a poor indicator of impervious cover in this watershed. For example, there may be a standard estimate of impervious cover for rural residential land uses, but this watershed has many properties with very large lots where the standard percentage is not accurate and overestimates imperviousness. See the comments on page 118 and Appendix C.
39	Heal the Bay expects increases in viticulture and equestrian land uses, with only "a slight increase in impermeable area." So if Low Impact Development (LID) would only be required in new or re-development, LID will not have much effect in terms of the minimal impervious development expected. Greater effect would result from riparian set-back ordinances and LID in the agricultural land uses.
	Chapter 3: State of the Water Quality
69	Given the non-perennial nature of most stream reaches in the Malibu Creek watershed, the JPA wonders if sampling or analysis takes non-perennial conditions into account. We know, for example, that the stream reach at Heal the Bay's site 1 often pools and dries each summer. But Heal the Bay data show that monitoring continues at this site when it is pooled (July 15, 2004), when it is mostly dry (October 5, 2005), and during periods of time where it may have been entirely dry (July-October 2009). The USGS gage showed no flow at that site for 120 days in 2008, 134 days in 2009, 91 days in 2010 and 62 days in 2011, but Heal the Bay monitoring data show that not a month of monitoring was skipped during these periods. We do not have 2011 data, but suspect monitoring continued through these drying conditions then, as well. Low dissolved oxygen and high nutrient values should be expected in naturally eutrophic conditions found in drying ponds and puddles, and data from these sites should not be used to characterize stream flow conditions.
71	None of the findings on N trends are certain absent measurements of TKN, which were not performed. Heal the Bay notes that reference sites have lower nitrate concentrations than outlet sites with one exception. The Solstice Creek reference site has higher average concentrations of 0.11 mg/L, excluding data from a period when a failed septic system increased concentrations. Although there is very little Monterey Formation in that watershed (3% of the watershed, but all downstream of sampling), 34% of the watershed is mapped as the Miocene Marine Calabasas Formation, which may also be enriched in biogenic material and contribute to higher nutrient concentrations.
72	There is an error in the sentence "Las Virgenes Creek, another tributary of Malibu Creek, also shows an increase in average nitrate concentration below Tapia's outlet in the wet season." Tapia does not have an outlet in Las Virgenes Creek.
73	These three figures (3-2, 3-3, 3-4) are the only water quality time series data presented in the report. One interesting result in fig. 3-3, which is actually contrary to HtB's findings, is the conspicuous increase in nitrate in 2005-06, the wettest winter (by far) sampled, when nitrate levels ABOVE Tapia rose to nearly 1 mg/L. This is why reducing the winter total nitrogen (TN) objective to 1 mg/L is unlikely to succeed. If the nitrate N can rise to nearly 1 mg/L in wet weather, then total N is almost certain to rise to > 1 mg/L when TKN is added to the TN calculation.
74	The conspicuous drop in nitrate to well below the TMDL summer target begs the question of why there has been no subsequent decrease in algae levels. Likewise, the fact that algae in Malibu Creek above Tapia are as high as below despite already meeting the objectives is something neither noted in the report nor explained. A good graphic showing this is the JPA's figure of algal cover from 1983 to 2001 above vs. below Tapia on p. 46 of JPA report #2475.00. The caption to the photo is incorrect - the pipe shown is not the Tapia outfall (001) but the old pipe to the percolation ponds and is no longer used.
76	Tapia's average daily discharge during the winter is not 8-10 mgd as stated. While this represents the influent to Tapia, the actual discharge is less, due to recycled water usage by customers during the

	winter season.
77	Aside from several technical errors, the report does a fair job on the regulatory history of Tapia's summer discharge prohibition, although it tends to overstate the impact of earlier Tapia summer discharges on actual lagoon breaching events. To the JPA's knowledge, only one late summer breach, during the 1998-99 "El Nino" event, has ever been shown to have resulted from Tapia's summertime discharges. For documentation on this point and the lagoon breaching event, see the JPA's response to the CDO that was issued for this event by the LARWQCB. Additional documentation can be found in the JPA's appeal to the SWRCB when the LARWQCB first extended the 3-month prohibition to 6 months. The JPA conducts water quality monitoring at 6 sites above Tapia, not 2. Those sites are RSW-MC001U, RSW-MC009U, RSW-MC007D, RSW-MC001F, RSW-MC002F, and RSW-MC003F. The text refers to a "fourth site slightly further down the creek," but there are a total of five monitoring sites downstream of Tapia: RSW-MC001D, RSW-MC013D, RSW-MC003D, RSW-MC004D and RSW-MC011D. There is an error in the sentence "However, none of the sites are above the influence of Tapia's composting…" RSW-MC001F is above the influence of all operations. Regarding the Tapia annual nitrogen loading to the watershed, it should be pointed out that this discharge contributes loading to only a small percentage of the watersheds stream length because discharge is low in the watershed. There are errors in the second paragraph: Tapia no longer uses percolation beds and there is no wastewater treatment plant along Las Virgenes Creek.
78	Heal the Bay alleges high upstream phosphate levels are due to the county landfill, ignoring the county's definitive study on this question (Carry, 1996), a study required by the LARWQCB in its own investigation of this issue. This report and the issue of the "mystery phosphorus" in open space reference sites was covered at length in the JPA's comprehensive compilation of water quality data in the watershed (LVMWD report #2475.00), section 3. The closest the HtB report comes to acknowledging the presence of phosphatic rock in these areas is a qualified "may be influenced by the Monterey Formation." But even that spare acknowledgement is then immediately followed with the statement that the relative effects of this natural P source versus human sources are "difficult to separate." In this section, HtB dismisses the results of the anomalous reference sites as indications that they do not truly represent true reference conditions - while elsewhere in the report's section on IBI scores, both HtB and the EPA highlight the high IBI score at Site 6 as a reference condition. Which is it? Is it a true reference site, or are the results too difficult to separate? Their exclusion of both the Site 6 and Site 9 sites from their calculation of natural reference P levels is a simple dismissal of results that do not agree with the stated finding. There is phosphatic rock in the upper tributaries, and it elevates natural P to levels that can exceed the regulatory target (0.1 mg/L TP). High P levels at Site 17 in Triunfo Creek may be due to its presence directly downstream of both phosphatic rock in the upper watershed, but also to surface exposures along Mulholland Hwy immediately upslope of the creek. While it may be true that "phosphate levels increase from reference to outlet sites" at Heal the Bay's sites, there are anomalously high phosphate concentrations in the Monterey / Modelo Formation headwaters of Malibu Creek watershed. The median values from open space sites in these northern headwaters ranges from 0.01 mg/L to 0.99 mg/L. This higher value is from the National Park Service site on the East Fork of Las Virgenes Creek, which has a median dry season average of 1.24 mg/L - twelve times the dry season regulatory limit. Phosphorus is naturally elevated at some locations in the Monterey / Modelo Formation headwaters because it is phosphatic shale. Phosphate concentrations are not homogenous throughout the northern tributaries because phosphatic rock is not homogeneous

	throughout the formation. This is because rates of phosphorus accumulation in ocean sediments vary with how oxic or anoxic bottom waters were at the time of deposition and with oceanic sedimentation rates. (2) Page 78: The second paragraph says "even with potential increased phosphorus loading from geologic activity in the upper watershed, concentrations do not exceed 1.0 mg/L until directly below the Tapia outfall." While this is true at Heal the Bay's monitoring sites, National Park Service data show that this statement is incorrect. Phosphorus values frequently exceed 1.0 mg/L in the East Fork of Las Virgenes Creek.
79	Sites 6 and 9 are identified as reference sites in Fig. 3-7. Again, are they or aren't they reference sites? The statement "Tapia contributes approximately 48% of the phosphorus loading to the watershed annually despite the fact that the discharge is only permitted five months of the year" is misleading. First, Tapia discharges to only the lower portion of Malibu Creek and does not discharge to tributaries in the larger upper watershed. Secondly, Tapia discharges in winter months when rain and higher flows are more likely to wash the load to the ocean. (2) Heal the Bay acknowledges the Monterey Formation as a contributor to phosphate in the watershed, and especially Las Virgenes Creek, but says it is contributing only up to 0.5 mg/L. As stated earlier, one undeveloped headwaters site in the East Fork of Las Virgenes Creek regularly exceeds 1.0 mg/L. The highest measured value at that site is 1.6 mg/L. Further studies would be required to determine the natural maximum background levels of phosphorus.
81	The JPA concurs with the last sentence, that Tapia, in the wet season, is the largest P source in the lower creek. The rest - claiming that high P levels might be due to a nursery abandoned over 40 years ago, grazing abandoned even earlier, and "oil extraction operations" - is not only speculative, but contrary to what evidence exists. State wells records do not support the notion that oil has ever been extracted (commercially or otherwise) in the watershed except for two exploratory wells in the upper watershed that failed. Nor would large oil deposits be expected, given the fact that the Monterey formation locally (Modelo fm.) did not achieve a sufficient post-burial depth or temperature to convert its organic fraction to kerogen (see Section 3 of LVMWD Report No. 2475.00). Large-scale grazing ended decades ago, as did the nursery. The elevated phosphorus levels in the northern watershed are readily-explained by the abundant scientific literature on California's most phosphorus-laden rock in these areas. If urban runoff is the source, it is certainly easy to measure samples of urban runoff in the street gutters before it touches anything else. When the JPA did just that, the results were definitive: One simply cannot explain the observed P levels by blaming it on urban runoff, nor the anomalously high levels of over a dozen other water quality measures (i.e. metals, salts, radioactivity) from sites within and immediately downstream of Monterey Formation rock. The ad hoc and speculative explanations for high P levels in these areas are totally unsupported, contrary to our findings, those of the Cary (1996) report, or any of the scientific literature cited in our report on the unusually high phosphorous, sulfur, selenium etc. content of California's best-known and most-studied petroleum source rock. The JPA is not suggesting that urban development causing poor water quality should NOT be addressed because of the Monterey Formation's impact on native water quality. However, both the HtB report and EPA TMDL suggest that a rock formation capable of maintaining below-standard mineral quality in the entire creek is a minor issue. If urban runoff were capable of that feat, then ALL urban streams in the southland would be brackish - but they are not, not even remotely.
82-83	Nothing in the report addresses the warnings contained in the cited algae guidance (attributed to the LARWQCB, which referenced it from Biggs (2000), that nuisance levels of algae may be impossible to control in areas draining Tertiary marine sedimentary rock like the Monterey Formation. Simply setting the nuisance threshold higher (50% cover) and re-running the numbers ignores the reality that levels of both floating mats of *Cladophora glomerata* and benthic mats of halophilic diatoms will not change from current levels. This is because this rock can maintain N and P and also micronutrients like calcium and iron at levels known to be in excess of those needed to sustain optimal growth in these species.

	Again, this natural fact is NOT an argument against better controls on human sources; it is simply a check on what should realistically be expected if these controls are pursued. The source of both the state and the EPA's algae guidance (Biggs, 2000) warns that reducing nuisance algal growth may be difficult in areas with this unusual geology. This is true wherever it has been found, and studied, worldwide.
84	The last sentence of paragraph 1 on this page confirms what state and federal algal control guidance documents warn about for drainages with Tertiary marine sedimentary phosphatic rock like the Monterey Formation: Streams in this kind of rock formation will naturally exceed 30% algal cover over 10% of the time. Their confirmation of lower algae levels in upper Cold Creek, outside of either human influence or Monterey Formation rock, provides further, and very clear evidence for this conclusion, but this is not discussed in the report. There is a good citation on the incidence of excessive growth of *Chara* and its preference for hard water - Malibu Creek certainly has the hardest water of any coastal stream in the region, which is clearly due to its unusually high percentage of tertiary marine sedimentary rock. Here is one of many instances that support the connection between the creek's "hard water" and its biota, actually noting a direct linkage between water hardness and algal growth. But the last sentence overlooks this connection for other algal species such as *Cladophora glomerata* and diatoms in Malibu Creek, which are dominated by halophilic species. In their defense, the JPA did not identify the hardness / diatom connection until just recently, when the JPA systematically researched the salt and nutrient optima of all of the diatom species identified in its own surveys. HtB staff did attend the TAC meeting where the evidence was presented. The text states that "only 0.36 miles of the 21.5miles of stream documented with greater than 50% algae cover occurred above developed areas." This shows that in some locations algal growth greater than 50% can occur naturally, and does not support the use of a 50% threshold. The text states that there are differences in macroalgal species by site, with *Chara* more prevalent at reference sites and *Cladophora* more prevalent at impacted sites. The growth of *Cladophora glomerata*, the species responsible for most surface algal matting in Malibu Creek, is enhanced in waters with high calcium and sulfur levels such as those found downstream of the Monterey Formation. The claim is made that thick diatoms are associated with pollutants. Diatom surveys conducted by the JPA in Malibu and Las Virgenes Creeks show a prevalence for brackish water diatoms. High ionic strength enhances the growth of halophilic diatoms, which grow as benthic algal mats. Over 25% of the creek's diatom species are halophilic based on diatom surveys required under our NPDES permit monitoring. JPA surveys also show that Malibu Creek's diatom community includes species capable of fixing atmospheric nitrogen via symbiotic association with nitrogen-fixing bacteria. Diatom surveys have not been conducted in the undeveloped portions of the watershed, so it is premature to suggest that the diatom mats are a result of pollution. Table 3-1 shows the percent of creeks mapped with >50% algal cover. The JPA observes that the creeks with the least canopy cover at sites included in Luce (2003) are in those creeks with the most algal cover and vice versa.
85	The maps showing seasonal algal growth and the table on % of creeks impaired by algae are consistent with comments for previous pages in this section (pp. 82-84).
86	This section on seasonal algae growth concludes that algae are a problem in winter, based on wintertime algal cover data. But it does not address the fact that winter algal growth does not impact aquatic life as much as equivalent growth in summer, and may not impact it at all. The key question here is "where's the data?" Where are the data showing impacts on wintertime DO for example? Or pH? Or any parameter showing a causal (even by association) linkage between algal biomass and impacts on other aquatic life or recreation? One problem with the HtB explanation is that it does not

	define "background" nutrient levels. Heal the Bay's analysis of algal relation to nutrients "found that nutrients were the strongest controlling factor of algal cover in the watershed." Details of the analysis are not available. The EPA concluded from their analysis of Heal the Bay data (EPA draft Bioassessment TMDL, Page 8-36) that "An examination of all of the Heal the Bay data shows that there is almost no correlation between algal coverage and either inorganic N or inorganic P concentrations (Figure 8-21)." These are contradictory conclusions using the same data.
87-88	The "Start pool" data shown in their Fig. 3-13 were collected in mid-summer (Aug. 8 - Sept. 1, 2009). They are uninformative of winter DO levels. Daytime DO levels recorded by HtB and analyzed by JPA staff (LVMWD Report #2475.00, p. 49) show that of 1,159 DO samples from 110 sites, 8 sites did not meet the 7 mg/L Basin Plan WQO for COLD aquatic life (i.e. southern steelhead trout, spawning season). All 110 sites met the 5 mg/L DO WQO except two: A NPS monitoring site in open space on the east fork of Las Virgenes creek (J_EFLASVIR), and a NPS site in Liberty Canyon in developed suburban / commercial space. The JPA concurs with HtB's caveat on these data, as they are collected during the day and thus are uninformative of DO levels in non-daylight hours, when DO is expected to drop as algal DO production falls off with photosynthesis. Even here, however, some caution is warranted, as minimum DO levels where they have been sampled on hourly time steps do not coincide with dawn, as expected, but several hours later (LVMWD data, Malibu Lagoon, cross-referenced against daylight hours via Google Planet Earth application show min. DO levels occurred at 10 am, 4 hours after local daybreak). This anomaly, along with the data gap for winter minimum DO levels, is something easily resolved through multiple sonde rental and deployment according to a modest synoptic sampling design. The lack of 24-hr DO data in winter is a critical data gap that is forcing parties to indirect arguments for something that we could obtain direct empirical data on. Collecting these data would be orders of magnitude less costly than further nutrient reductions from Tapia WRF, and would substitute definitive, empirical data for what is little more than speculation on the outcome of further reductions in nutrients on subsequent algal growth and its benefit with respect to low dissolved oxygen levels - levels for which existing data on nighttime levels are woefully sparse. There is an opportunity here to explain an issue through simple data collection.
89	HtB provides a good summary of the lagoon restoration effort. However, the highlighting of the low pre-dawn DO levels (1.15 mg/L - quite low) begs the question of how the reintroduced tidewater goby population has remained stable and actually increased since their reintroduction by the Resource Conservation District of the Santa Monica Mountains (RCDSMM) in the 1980's. LVMWD (Dr. Randal Orton) investigated one report of a fish die-off in the lagoon, and on arrival at the lagoon found dead atherinid fishes (*Atherinopsis californiensis*, "Silversides" common name), NOT grunion (*Leuresthes tenuis*), and H_2S smell (rotten egg odor) and, using a DO meter, found that many of the streams of bubbles rising off the bottom were NOT oxygen. All evidence strongly suggested that as the lagoon breached, the water depth fell, and sediment degassing increased, including H_2S, known to be toxic to atherinid fishes at very low concentrations. Regardless, the sensitivity of the lagoon biota to H_2S and low DO, and the linkage of these gases with lagoon depth, is something that can be better understood with 24/7 monitoring of depth, DO, H_2S, pH, and specific conductance (SC) for a couple of years. This data collection is an opportunity for collaborative work amongst the stakeholders.
90	The JPA concurs with HtB's statements regarding the impact of salt on freshwater benthic macroinvertebrates, and appreciate their reference to McKee and Wolf (1971)., But the suggestion that the salt levels in Malibu Creek are due to a few sulfur "seeps" is unfounded. It is not just the daylighting sulfur springs that raise salt levels in the creek but ALL of the groundwater reaching the creek from the drainage's marine sedimentary rock, thoroughly documented in LVMWD Report #2475.00 for the Monterey Formation, and possibly the Calabasas Formation as well (e.g. Stokes Creek,

	Las Virgenes creek below the 101 freeway). The JPA also concurs with the report's note that Malibu Creek's brackish water may harm freshwater species ("specific conductance above 2,000 µS/cm can be harmful to some freshwater organisms.") The EPA's causal assessment website says, "Natural geologic variability among neighboring watersheds may result in profound-yet natural-differences in ionic strength of associated streams, especially in arid regions, such as the southwestern U.S." High conductivity (salt) and major ion concentrations in Malibu Creek are natural. Regarding the statement that "Conductivity appears to correlate strongly with geology; however, it is difficult to determine specific anthropogenic influences due to Stream Team's fixed monitoring locations," the large number of monitoring sites from multiple programs within and downstream of the Monterey Formation with exceptionally high conductivity makes it hard to suggest that anthropogenic causes may be responsible, especially with data from all the National Park Service sites in undeveloped headwaters.
91	The claim that sites downstream of Malibou Lake are outside of the influence of the Monterey Formation is unfounded. These sites receive water from SEVERAL tributaries that run through the formation. The observed salt levels HtB claims are unexpected, based on our research are, on the contrary, EXACTLY what is to be expected for any stream receiving even modest amounts of water derived from either groundwater or surface runoff from the Monterey Formation. Dismissing this natural source and promoting the alternative theory that it is urban runoff begs the question why the incredibly high levels of salt and so many other mineral constituents are not observed in other urban areas throughout the greater LA basin, even areas with twice the urban density of local development. Taking a step back, this whole question can be settled by directly measuring these parameters in actual gutter water draining urban areas. The JPA did exactly that in 2009 - the result was that even pure urban runoff did not have ANY parameter higher than runoff measured directly off of surface exposures of Monterey Formation rock in the same neighborhood. See Report #2475.00, p. 78. Page 90-91: "Apart from the sites directly affected from sulfur springs, the outlet of Medea Creek (O7), Malibou Lake (O4), and Upper-middle Malibu Creek (M12) also exhibit average conductivity levels above 2000 µS/cm. … These sites are outside of areas where increased conductivity is expected based on research conducted by the Las Virgenes Municipal Water District." The JPA would first like to point out that sulfur and high conductivity probably do not result only from "sulfur springs" but also from ordinary groundwater flow to channels. During the dry season, the primary source of water to streams is groundwater base flow seeping into the channel where the channel intersects the water table. The text appears to attribute all high conductivity water to sulfur springs alone. Secondly, all of these sites are downstream of the Monterey Formation, and not outside the influence of the Monterey Formation. About 36% of the watershed surface area upstream of O7 has exposures of the Monterey Formation. About 15% of the watershed upstream of O4 is Monterey Formation and about 14% of the watershed upstream of M12 has Monterey Formation. Stein and Yoon have shown that "catchments underlain by sedimentary rock generally produce higher constituent concentrations than those underlain by igneous rock." The JPA found that surface water solute concentrations in the Malibu Creek watershed are highest within and downstream of the Monterey Formation (LVMWD 2011). The U.S. Geological Survey maintains a website on Hazardous Trace Elements in Petroleum Source Rocks that focuses on the potential of only two geologic formations found in California: the Moreno Formation (near Kesterson Reservoir) and the Monterey Formation. Figure 5 of the website shows the Monterey Formation as having selenium concentration 51 times higher than average shale, for example, and 55 times higher for cadmium. The evidence for a geologic source of high concentrations of various water quality

	constituents within and downstream of the Monterey Formation in Malibu Creek watershed is pretty compelling. Furthermore, the JPA does not expect that the Monterey Formation will be the only formation contributing to high sulfur concentrations or high conductivity. All the geology in the watershed is young and not yet well chemically weathered and the Monterey Formation is not the only Miocene marine shale in the watershed. The USGS says the Calabasas Formation's clayey siltstone and shale are similar to the Monterey / Modelo Formation.
92	Nowhere in this section is there recognition of the quickly evolving science on bacteria source tracking and epidemiology. For example, California's Beach Water Quality Working Group, recently held a State-of-the-Science Workshop on Fecal Source Identification and Associated Risk Assessment tools, and concluded that source identification tools are still in their infancy and that there are still major knowledge gaps on the pathogenicity of organisms. The same is true for freshwater.
93	High fecal bacteria levels from "sewage sludge injection fields" is extremely improbable because such injection ended decades ago. That fact - the time gone by since those operations ended - is overlooked. Start-up of the Rancho Las Virgenes Composting Facility in 1994 resulted in the diversion of sludge away from the injection fields. "Some of the highest concentrations of bacteria occur in and below high density residential areas. The mid-Las Virgenes (M13) monitoring site located just downstream of the City of Calabasas, south east of U.S. Route 101 (Ventura Freeway) and Las Virgenes Road intersection, exceeded *Enterococcus* standards in 64 of 68 samples and 28 of 69 *E. coli* samples." The City of Calabasas undertook a study of bacteria in Las Virgenes Creek but was not able to identify a source; the study was conducted by Matt Horns, Heal the Bay's Stream Team field crew supervisor from 2001-2005. Horns reported that two of the samples highest in coliform concentration were from "some of the most pristine locations sampled" including the East Fork of Las Virgenes Creek where, perhaps not coincidentally, phosphate concentrations are highest. More investigation is needed to determine bacteria sources and differentiate from natural and anthropogenic sources. High bacteria concentrations in the pristine East Fork of Las Virgenes Creek show that there are, indeed, natural sources of bacterial exceedances.
96	We appreciate the acknowledgement of JPA efforts to reduce nuisance runoff from irrigation and the excellent quality of the Tapia WRF effluent.
98	The JPA concurs with the finding that Malibu Creek is a low turbidity, or "clear water" stream, and also concur it is most certainly NOT a low turbidity stream in storm events. The storm events, especially larger ones, are spectacular in the sheer mass of sediment they drive off local rock and transport all the way to plumes from the lagoon, visible on historical aerial imagery coincident with storm events. Malibu Creek's hydrography is very representative of so-called "flash hydrograph" drainages, which exhibit rapid, several order of magnitude changes in flow during large rain events, rapid declines of peak flows to double-digit flows within a day or two, and then a steady decline of flow to single-digit flows by mid-summer. Exceptions are significant rainy seasons, which are followed by conspicuously higher base flows, such as those following the 1998 El Nino event and, to a lesser extent, the springtime flows following the very high rainfall winter of 2005-06.
99	Heal the Bay's call for better sediment runoff controls from construction sites is particularly important for parcels located atop Monterey Formation rock, which has substantial percentages of siltstone and is very friable. The JPA's research (p. 42 of LVMWD Report #2475.00) suggests that sediment runoff from Monterey Formation rock exposed during the watershed's most active period of new-home construction grading was possibly responsible for the unexplained rise in phosphate levels coincident with this period (1985 - 1992). Alternatively, it may have been due to lower dilution of normal P background levels due to the low rainfall up until the wet winter of 1992-93, or some combination of those factors.
100	Absent TKN measurements, HtB cannot conclude that all sites outside of influence of Tapia discharge

	average less than 1 mg/L total nitrogen throughout the year. Even on an annual basis, 13 sites above Tapia exceed this amount just for nitrate N alone. When organic N is added, even more sites do not meet the 1 mg/L N target. But more importantly, we already know from the scientific literature that the main algal species responsible for nuisance levels of growth can sustain optimal growth at TN levels well-below those present even at natural background levels. With respect to those natural background levels, once again, as in other locations in the report, the most definitive statement that HtB is willing to offer regarding these levels is that, "phosphate levels in the upper watershed MAY be affected by geologic factors." [emphasis provided]. The JPA's findings on this point are very solid: phosphate levels, along with over a dozen other water quality parameters ARE influenced by contact with the Monterey Formation. The report ignores evidence contrary to its conclusions that human sources are the only important influences on Malibu Creek's water quality. Nutrients and bacteria are qualified as severe water quality problems while ignoring the fact that Malibu Creek is BRACKISH its entire length, due to levels of sulfate, magnesium, bicarbonate and chloride known to impact both freshwater aquatic life across multiple trophic levels, in addition to precluding the creek's use for municipal drinking water. It is a "severe water quality problem" that is not mentioned or highlighted. There is disproportionate discussion on the nutrient problem, while the creek's extraordinarily high salt levels - the highest, by far, of any coastal stream in the region, possibly the state – was largely ignored, despite the host of problems it poses for everything from potable water supplies to concrete cracking in urban areas to the level of cathodic protection required for underground water and sewer lines. Then there are the public health consequences beyond the water: There are severe human health risks associated with the watershed's large percentage of Monterey Formation rock on cancer risk from radon, a risk of serious illness that far exceeds the risk of serious illness due to waterborne pathogens at Surfrider Beach. Page 100: "The number of listings on the US EPA and State Water Resources Control Board 303(d) List for Impaired Waters alone testifies to the poor water quality in the watershed." 303(d) lists While the US EPA has issued guidance for "establishing site specific aquatic life criteria equal to natural background," the state has no mechanism for removing a listing that exceeds water quality objectives naturally. The EPA permits removal of listings due to natural conditions, but the state of California has no mechanism to do so. Natural source exclusion policy development is one of the goals the Los Angeles Regional Water Quality Control Board established in their most recent Triennial Review. Our analysis (LVMWD 2011) indicates natural sources contribute wholly or partially to about half the listings in the creeks and lakes in the watershed.
101	Omitted from the list of stream restoration efforts was a project of the City of Calabasas in Las Virgenes Creek adjacent to Starbucks immediately below Las Virgenes Creek where it passes under Agoura Road. The City removed the creek's concrete bottom and sides and restored the riparian canopy. Algae mats of *Cladophora glomerata* have largely disappeared from that site, even though nutrient levels in the water have not changed. This project highlights the fact that shade of any sort, i.e. overhead tree canopy, can be more important for nuisance algal growth than nutrient controls if nutrient levels, natural or otherwise, are higher than what the particular algal species causing the nuisance needs to sustain growth. This basic principle in ecology is the law of the minimum: Growth is determined by whatever growth factor is in shortest supply. If algal nutrient requirements are fully met at 0.5 mg/L total nitrogen and 0.05 mg/L total phosphorus, then growth will proceed until it is constrained by another factor in short supply. For *Cladophora glomerata*, the algae responsible for most floating algal mats in the creek, other factors are temperature and sunlight. This is why floating algal mats are more prevalent in summer than winter irrespective of nutrient levels. This information is covered in the report by Earl Byron submitted during the 2003 nutrient TMDL, which is cited in the HtB report. It is

	also consistent with the correlation analysis found in S. Luce's dissertation, as discussed in a more recent JPA report. The HtB report states that Las Virgenes Creek receives drainage from, among other sources, the Las Virgenes Municipal Water District spray field irrigation site. While this irrigation influences Las Virgenes Creek, it does not drain directly to the creek.
102	Tapia can continue to remove nitrogen from the community's sewage, just as it can continue to pursue opportunities to expand winter recycled water storage and recycled water volumes. However, nutrient reductions and termination of all discharge for up to 7 months each summer for 14 yearshas not resulted in lower algal growth. The issue is therefore not whether Tapia can further reduce its nutrient levels and discharge volumes - anything can be done with sufficient public money. Rather, the issue is whether, if this money is spent, it will achieve the latest prediction of reduced algal growth downstream of its discharge. Trying to reduce algal growth by reducing non-native nutrient sources will not succeed if the nutrient levels native to the creek remain higher than those necessary to support optimal growth in the target algal species. The JPA's review of the ecology of both the main floating algal mat species and the main benthic diatom algal species, finds that native nutrient levels alone are sufficient to sustain optimal growth in these taxa. This is also true of essential algal micronutrients such as calcium (*Cladophora glomerata* prefers high calcium hard waters like Malibu Creek) and iron (all algae). As to this section's call for Low Impact Development (LID), a fine approach in general, but absent ACTUAL SAMPLING OF URBAN STORMWATER QUALITY, RIGHT FROM THE GUTTER, there is no guarantee of success as the state's algae control guidance warns. It is a significant omission. While the JPA agrees with some recommendations (increased water storage capacity, Low Impact Development policies, source identification for pollutant sources, etc.) it cannot endorse other recommendations without further research. One Heal the Bay recommendation is to "reduce algal growth." We cannot support that recommendation without further research to determine what natural levels of algal growth are for this watershed with primarily non-perennial flow and abundant Tertiary marine shales. The JPA cannot support the recommendation to establish a wet season limit for phosphate concentration. Plant upgrades to meet nutrient limits proposed in the EPA TMDL for Sedimentation and Nutrients would be extremely expensive and they will not make a difference in algal cover until upstream sources are controlled, if possible. JPA research has shown that the percentage of the water surface covered by floating algal mats is generally equal to *or higher* above the treatment plant discharge point as below (see eutrophication section of LVMWD report No. 2475.00). It seems premature to adopt new nutrient limits when the upstream watershed has not yet met the earlier 2003 TMDL limits (and thereby enable an informative check to see how algae levels respond).
103	Previous comments regarding the likelihood of reducing algal growth by nutrient reduction apply to 2 of the "top five" recommendations highlighted in the upper sidebar art.
	Chapter 4: State of the Biota
105-106	State of the Biota, Introduction. Pages 105-106: In the introductory paragraph on benthic macroinvertebrate (BMI) monitoring the report notes that "individual BMI species reside in the ecosystem for months to several years." The JPA would like to point out that in primarily non-perennial systems like the Malibu Creek watershed, the longer lived species are less likely to be present, especially for those species that require flowing water year round. Many reaches of Malibu Creek watershed dry or form isolated pools without surface flows in the dry season.
107	The report fails to acknowledge that the authors of the So Cal IBI have discontinued its use because of methodological issues with its application in streams such as Malibu Creek. That is why the state of California is moving to a new index (CSCI) - which its authors are also having trouble with for Malibu

	Creek in finding sufficient reference sites with comparable brackish water. Both indexes, the So Cal IBI used by HtB and the newer CSCI, were developed for freshwater perennial streams, not brackish water intermittent streams like Malibu Creek. Benthic Macroinvertebrates (BMI) and the Index of Biological Integrity (IBI) Background- The report notes the standard use of certain pollution sensitive species as water quality indicators, but does not discuss the confounding effects of sensitivity to the naturally high solute concentrations found in this watershed.
109	HtB's "reference sites" cannot serve as a basis for expected natural water in Malibu Creek because they do not match, or even come close to, Malibu creek's levels of salt, a major determinant of freshwater aquatic species diversity and abundance across all trophic levels (primary producers, herbivores, carnivores, decomposers). Most of Malibu Creek's diatoms, for example, are known halophilic (salt-loving or salt tolerant) species. So is its only native freshwater fish, the arroyo chub and so is the creek's main algal mat-forming species (*Cladophora glomerata*, which prefers hard water / high calcium). If HtB's reference sites are not matched for salt content, then how can it state differences between reference site scores and creek scores are not simply due to Malibu Creek's naturally brackish water, especially when so many of its species are exactly those expected for brackish waters? None of this is discussed or even mentioned in the report. Page 109: IBI Trends in the Malibu Creek Watershed, the report states that "As an indicator of biotic health at a particular site, IBI scores can be used to help identify degraded sites and inform further research on potential stressors, such as physical habitat and/or water quality degradation." Unfortunately, natural stressors can also affect the IBI and confound attempts to identify sources of impairment. The EPA has a causal assessment method called CADDIS (Causal Assessment Diagnostic and Decision Information System) that includes a stressor module called "Ionic Strength," saying that "Increased ionic strength and changes in ionic composition may lead to shifts in community composition and function based on factors such as taxa-specific preferences and adaptations. Measurements of electrical conductivity, salinity, and total dissolved solids (TDS) are often used to represent the ionic strength of water and generally increase with increasing ion content." The Biological Objectives Technical Team has struggled to find reference sites with comparable geology and ionic strength to that in Malibu Creek and its northern, Monterey Formation dominated tributaries, and we do not yet know if even their more robust reference pool covers the natural variation in ionic strength seen here.
109-110	Figure 4-1 and Table 4-2: Figure 4-1 and Table 4-2 obscure the natural variability in scores in the Malibu Creek watershed. Bars that appear to show confidence intervals for average IBI scores at outlet, middle and reference sites in Figure 4-1 are not described in the caption or text and do not appear to be accurate. The JPA would like to point out that there is wider variation in average scores than the bars would indicate and much wider variation in actual scores. For example, reference site averages ranged from 41 to 76, while reference site scores ranged from 11 to 92. R9 alone had scores ranging from 26 to 59 with about half the scores failing. This section contains a serious omission in that the State of California has decided against the use of the Southern California IBI and is in the process of developing a new metric. One reason the southern California IBI was rejected was because it was never validated in low gradient streams (<2%). The biggest problem with the southern California IBI identified by the State's Biological Objectives Technical Team and Scientific Advisory Group experts is that reference expectation is based on a region-wide pool of reference locations without regard to site specific differences in geology and geochemistry, soil characteristics, watershed size, slope, climatic differences, and so on. New tools being developed for

	the State Biological Objectives Policy take these and other site specific conditions into account. This section also omits restrictions on applicability of the southern California IBI in that it was developed for perennial, wadeable streams. It is not an appropriate metric for use in non-wadeable pools and non-perennial sites in the watershed. We have already reported details on the non-perennial nature of Heal the Bay site 1 at the outlet to Malibu Creek, and there is strong indication that other sites throughout the watershed are also non-perennial. The bioassessment reach for Heal the Bay site 12 (Malibu Creek) begins at the visitor center pool, which becomes completely dry most summers, runs up a reach of stream that mostly dries each summer, and ends in deep pool. Most of upper and lower Malibu Creek are similar with isolated pools separated by long dry reaches in the summer. Year round flow is less common. Most of the smaller tributaries dry up or reduce to very small flows. Heal the Bay ceased water quality monitoring at site 6 because it is frequently dry, but continued bioassessment using methods designed for perennial streams. Most of Triunfo Creek dries up to form isolated pools. Constraints on the applicability of the southern California IBI are especially relevant to Heal the Bay sites which "were specifically chosen to represent relatively homogeneous stream habitat types" (Ecosystem on the Brink, page 31). As Heal the Bay has noted, "this also limited our analysis of specific habitat impairments on benthic communities and water quality because the sites were not selected randomly and do not necessarily represent all habitat types or impairments" (ibid.). The state recommends using a Reachwide Benthos (Multihabitat) Sampling procedure or a Targeted Riffle Composite Procedure (Ode 2007) as those types of sites are most likely to capture BMI diversity in a stream. Heal the Bay's Stream Team, by selecting sites with a single habitat type per site, intentionally limits the biodiversity in samples. Mazor et al. (2012) found that while the IBI accurately assessed the condition of some non-perennial streams, IBI scores declined with increasing stress other than non-perennial flow. We contend that natural water quality conditions constitute that additional stress, so we expect non-perennial flow to further depress scores.
110	After positing that low IBI scores are due to human influences on water quality, data indicates that none of the sites have experienced decreases in IBI scores over the 10 year history of monitoring IBI scores in the creek and other nearby streams. This result is the only time-series data on the creek's biota in the entire report except for New Zealand mudsnail numbers, yet the whole theme of the report is rich in the vocabulary of an impending water quality crisis if action is not taken immediately. Oddly, the only site where HtB did find a decreasing trend in IBI results was in one of their reference streams (Solstice Creek), but after noting that the site is above New Zealand mudsnail areas, the authors quickly conclude that it might be due to increased agriculture, especially vineyards. There is no evidence of causal linkage. The most noteworthy feature of the data on which the report rests is the degree to which there are no clear linkages between their results and urbanization, and clear linkages with natural sources of poor water quality. For example, the easiest way to interpret Cold Creek's good IBI scores relative to Malibu Creek is that it is Malibu Creek's least salty tributary, which in turn is because it has almost no Monterey Formation rock in its drainage, which in turn is why its phosphorus levels are so low - no phosphatic rock.
113	The purpose of having reference sites is to determine the full natural gradient in conditions for a study region. Reference sites should be selected using objective criteria related to the degree of anthropogenic influence in the upstream watershed (Ode et al. 2005) where no or minimal disturbance is considered reference. Heal the Bay has done this, as shown in Table 2-1 on page 41. On page 113, however, Heal the Bay calculates average rapid bioassessment procedure (RBP) without including

	reference site 9 in Upper Las Virgenes Creek because it "had the lowest average RBP monitored." The study also omits reference site 6 in Cheseboro Creek "because of its low RPB value and very low flows." It is not a scientifically valid practice to remove reference sites from calculations simply because the results obtained from those sites do not fit expectations. Reference sites are selected to capture the full range in natural variation. By removing part of that range in reference condition, comparison of test sites to remaining reference sites may erroneously result in classification of test sites as impaired when they may in fact fall within the range of natural variation. Furthermore, the average RBP (149) is not valid for establishing an "optimum" score. Rather, it is the lowest score in the range of scores obtained by reference sites that establishes the lower limit for reference. Since the lowest reference RBP score was 123 (at site 9 in upper Las Virgenes Creek), then scores of less than 123 lie outside the reference range, but no scores at any site are less than 123. It appears the report selectively removed sites to say that middle and outlet sites failed. This is not good science.
117	There is no proof that New Zealand mudsnails (NZMS) were not present in earlier surveys. The data of first detection are ALWAYS after an invasive species has arrived, and citing negative evidence as proof of absence is hardly definitive. The JPA agrees with the statement that "the IBI score may not adequately reflect the effects of NZMS invasion on biotic condition." The draft EPA TMDL to address benthic macroinvertebrate bioassessments noted that essentially the same score was attained by a site when the NZMS constituted 3% of the sample as at another time when the invasive snail constituted 81% of the sample
118	Percent Impervious Area. The JPA suspects estimates of impervious area (detailed in Appendix C) will be higher than actual impervious area for many land uses in Malibu Creek watershed. Impervious area was calculated based on SCAG land use GIS data and impervious factors (IF) reported in the academic literature and by Los Angeles County Department of Public Works. Impervious factors were then multiplied by land use areas and summed for the areas upstream of monitoring sites. As noted in the review of Chapter 2, the JPA has found that impervious calculations based on land use classification result in large overestimates of impervious cover in this watershed. For example, there may be a standard estimate of impervious cover for rural residential land uses, but this watershed has many properties with very large lots where the standard percentage is not accurate and overestimates imperviousness.
119	The report contains results from a regression analysis of mean IBI scores and imperviousness, saying "percent impervious area accounts for nearly 74% of the variation in IBI scores (R2=0.74)." Lay readers will not know that correlation is not proof of causation. We suspect the large R2 value derives in part from spatially confounding influences, since sites that are downstream of development are for the most part also downstream of the Monterey Formation. When we regressed median IBI on median conductivity for just the Heal the Bay reference sites and obtained R2=0.76, indicating that conductivity may also have a strong influence on non-reference sites, too. The results for both are likely to be even less strong if we were to perform regressions on individual IBI scores, which vary widely per Heal the Bay site, with either percent imperviousness or conductivity values measured during bioassessment - data we do not have. We are recommending that a full causal assessment be conducted to more accurately identify and assess potential causes.
120	The JPA agrees that more needs to be done in terms of educating the public about the New Zealand mudsnail and how to curtail their spread. Precautions are already being taken by all the water quality monitoring programs we know of.
121	While not a recent arrival, the invasive crayfish is equally damaging to native aquatic life than NZMS,

	especially in the dry season when large sections of the creek become ever-smaller ponds crowded with foraging crayfish. It is doubtful any fish will survive being caught in this habitat given the predation intensity of a bottom carpeted with foraging crayfish. It is odd that the conclusions drawn for the causes of biotic degradation are not listed in the "Top 5" list. The four stressors examined (beginning on page 110) were physical habitat scores, New Zealand mudsnails, impervious area and water quality. Yet the "Top 5" recommendations for the chapter include only recommendations on invasive species and lagoon restoration.
	Chapter 5: Stream Health Index
123	The proposed components of the Stream Health Index (SHI) for other than water quality parameters do not have established regulatory thresholds.
124	This introductory paragraph suggests that inclusion of additional metrics would improve the stream health assessment. While the JPA does not support the SHI, there are certainly other data important to consider in order to understand stream conditions in the Malibu Creek watershed. One parameter, for example, would be flow. While Stream Team data forms have a narrative field for flow, the field is often blank in data we have tried to analyze. Flow is very influential on many water quality parameters including algal cover, and dissolved oxygen and nitrogen mass loadings, for example. The expectation for each of these in a creek with significant flow is entirely different than it would be in an isolated pool, especially as they progress towards being a dry channel.
125-126	See comments for p. 123 Figure 5-2: The report shares results from a regression of mean IBI score on water quality score for all sites and for sites without high upstream impervious area. Again - see the comments on page 119 regarding regression. Figure 5-2 shows a good regression fit for IBI score versus water quality score, but we point out that the sites at the low end are also sites with the highest conductivity values and sites at the high end are also sites with the lowest conductivity values.
126	The JPA recommends against using the defunct southern California IBI and 39 point threshold. Newer measures of benthic macroinvertebrate biological integrity for use in the state have not yet been finalized and may never apply to the Malibu Creek watershed. The northern tributaries have exceptionally high conductivity and there are currently no comparably high conductivity reference sites in the state's reference database. The technical team developing assessment tools has said that there will always be locations where the tool won't work, and that Malibu Creek watershed may be one of those places. The JPA does support the addition of algal bioassessment to watershed assessments once completed and validated for use in Malibu Creek watershed. Diatoms, especially, can be used to discriminate between different water quality conditions. JPA diatom assessments confirm this is a very brackish watershed. The JPA is also supportive of ongoing invasive species monitoring but not used in an assessment metric not based on established regulatory thresholds. There are many invasive species, but other than New Zealand mudsnails (NZMS), they are not counted, so there is no way to know whether their density is high, medium or low. The NZMS is not the only invasive species with negative impacts, and is not the only species of concern.
127-128	Physical Habitat and Watershed Characteristic Metric. The JPA recommends against the inclusion of this metric on habitat for many reasons, primary among them the lack of regulatory threshold. Furthermore, unless the Stream Team will be conducting repeat Stream Walk investigations, there will

	be no way for these parts of a score to change over time. Percent impervious appears to be based on assumed percentages for each land use type, so unless properties are abandoned and restored to natural condition, this part of the score will never improve. Discharge pipes would need to be recounted, as would stream bank modifications.
	Chapter 6: Conclusions & Recommendations
131	The report concludes that "… the Malibu Creek watershed is clearly on the brink of severe ecological degradation." The JPA does not see the evidence to support this opinion. Temporal trends do not indicate a precipitous decline in condition, but a relatively stable condition, despite gradual development. Furthermore, the MS4 permit has just been adopted and permitees will be developing plans and implementing projects to improve conditions, which should be allowed to take effect and then have those measures evaluated after a reasonable period of implementation.
135	Reducing nutrients will not reduce algae until the nutrient levels fall below those sufficient to support algal growth. In this watershed, those levels, which are considerably lower than the targets suggested here, are unlikely to be met given natural sources of these nutrients.
136	Given the reasonable evidence in this report for the impact of just one failing septic tank on creek nutrient and bacteria levels in one of the reference coastal streams, the JPA would agree with the recommendations on septic tanks in locations along local creeks, where even one daylighting system can clearly impact nutrient levels. The relative cost-effectiveness of HtB's various recommendations for future action is not addressed, but could prove useful.
	Appendices
A	2008 303(d) listings include Westlake Lake even though EPA's March 2012 LA Area Lakes TMDL recommends removing that listing.
C	Heal the Bay relies on two sources for their estimates of impervious area. Estimates of the percentage impervious area per land use class were taken from Los Angeles County Department of Public Works Hydrology Manual. But that manual gives ranges of these percentages, such as 21% to 45% for single family residential. As noted for Chapter 2 and page 118, even the low end of these ranges may overestimate impervious area in this watershed where there are very large numbers of large lots with small developed footprints. The JPA found that Appendix D of this manual, where impervious estimates were supposed to be found was blank. http://dpw.lacounty.gov/wrd/publication/engineering/2006_Hydrology_Manual/2006%20Hydrology%20Manual-Divided.pdf The academic article (Ackerman et al. 2003) assessed the ability of Hydrological Simulation Program-Fortran (HSPF) to model flow in Malibu and Ballona watersheds. However, that study made some assumptions which may not be valid in the Malibu Creek watershed. The study estimated evapotranspiration (ET) based on ET at Los Angeles Airport (LAX). LAX is adjacent to Ballona, but most of Malibu Creek watershed is inland with significantly higher summer temperatures. More significantly, they estimated percent impervious based on LACDPW methods. Results showed that the model performed poorly during low flow (<1 m3/s) occurring 79% of the time. There is no indication that the authors were aware of Tapia's requirement to discharge to maintain steelhead habitat during low flows. Instead, they suggest that the model worked poorly because of large contributions of imported water "from activities such as lawn overwatering and car washing." But Hibbs et al. (2011) demonstrated that imported water downstream of highly urbanized areas in Las Virgenes Creek, one of Malibu Creek's largest tributary streams constituted, "a surprisingly small amount – usually less than 10 percent based on isotopic analysis." And this study included the dry season in a very dry year (2007), when lawn watering was likely at maximum volume.

F	Heal the Bay used physical habitat stressors identified by Mazor et al. (2011): sandy substrate, low habitat complexity and high human disturbance. But habitat complexity may not be very useful in assessing sites that were "specifically chosen to represent relatively homogeneous stream habitat types" (Ecosystem on the Brink, page 31). It is likely that scores will be generally lower than if sites were chosen probabilistically or if sites with habitat complexity were specifically chosen. The JPA recommends either selecting new sites for habitat and bioassessment monitoring or omitting the habitat complexity measure for analysis. At the very least, acknowledge this limitation in the report.