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Watershed Protection District

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December 5, 2018

Jessie Maxfield
State Water Resources Control Board
1001 I St.
Sacramento, CA 95814

Subject: Comment Letter – Prioritizing Management Goals for Stream Biological Integrity within the Developed Landscape Context

Dear Ms. Maxfield:

The Ventura County Watershed Protection District (District) appreciates the opportunity to comment on the draft manuscript for Prioritizing Management Goals for Stream Biological Integrity Within the Developed Landscape Context (hereinafter referred to as Channels in Developed Landscapes). The District appreciates the development of this tool to support consideration of appropriate management actions for waterbodies that have been modified or have other constraints on the ability to restore them to reference conditions. We highly encourage the State Water Resources Control Board to consider policy options that recognize that meeting reference conditions may be challenging in some waterbodies and develop a plan that protects high quality waters and provides flexibility for implementing prioritized management actions for other waters without requiring strict compliance with numeric reference values. We feel this tool can be useful for supporting this flexibility in identifying management actions and would support further exploration of how this tool and others could be used to identify categorical expectations for different types of waterbodies as part of the plan.

We did a high-level comparison between the tool and a separate GIS analysis done for Ventura County waterbodies to identify modified channels. The tool appears to do a good job of aligning with the areas where we would expect constrained biology due to channel modifications. As a result, we feel it could be a useful tool for supporting discussions about options for addressing modified channels in the Biointegrity/Biostimulatory Policy.

While the District supports the tool development, we are concerned with the submittal of a technical work product associated with the Biointegrity/Biostimulatory Policy being submitted to peer reviewed journals prior to being fully vetted by the Stakeholder Advisory Group and prior to the policy context being developed that would allow a better characterization of this work. To address these concerns, we have identified several comments on the presentation of the material that we feel need to be addressed before this is published.

As a general request, we ask that all work products related to the Biointegrity/Biostimulatory Policy include a statement at the beginning of the document, similar to the following:

a. The following technical work was developed to provide the scientific basis for technical options that may be used within the Biostimulatory Substances and Biological Integrity Project being developed by the State of California. The regulatory framework for this project has not yet been developed or decided upon and key policy decisions have not been made regarding the use of this technical work, including identification of objectives or required implementation actions or approaches.

It also appears that one primary purpose of this manuscript is to describe potential uses of the tool as demonstrated by a pilot project in the San Gabriel River watershed. If this is the case, the manuscript should be clear that the tool is being piloted in the watershed and the approach is not a framework that has been defined for the use of the tool by the State of California.

In addition, we request the following specific modifications to the presentation of the information in the manuscript.

1. The tool and associated manuscript are designed to allow an evaluation of how land use and other watershed characteristics that are readily available in a statewide dataset relate to expectations of biological condition index scores. The manuscript should discuss the findings of this analysis, but not make implied policy decisions regarding the levels of index scores that relate to poor or impaired conditions. Rather, the discussion should just refer to reference condition scores if that is the intention of the comparison. Examples of the language of concern and preferred language is included in the more detailed recommendations below.

2. Given that one of the purposes of this tool is to provide options for consideration in development of the Biostimulatory Substances and Biological Integrity Project, it should more explicitly provide options for consideration.

The following provides specific examples of modifications to address the comments identified above, but do not represent all of the changes that may need to be made to address the comments above. We request that the examples below be used to inform the overall edits to the manuscript and future work products.

Comment No. 1: Modify the Language in the Document to Avoid Implied Policy Decisions

On Lines 61 to 63, the document uses the terminology "achieving a reference condition of biological integrity." We request that this terminology be used throughout the manuscript in place of statements such as "stream management goals", "unlikely to achieve biological integrity", "poor biotic condition" etc. that imply policy decisions regarding the beneficial uses in a waterbody and whether those beneficial uses are being attained. Additionally, any references to specific numbers should be noted as reference conditions and not noted as potential management targets. Specific page numbers and examples are highlighted below:

- Lines 36-37 – The document states that "The model also predicted that 15% of streams statewide are unlikely to achieve biological integrity..." This should be modified to read "The model also predicted that 15% of streams statewide are unlikely to achieve reference conditions."

- Lines 74-89 – The discussion in this paragraph provides a mix of statements and references to different policy approaches and concerns without context for the meaning of the statements. We would recommend narrowing this discussion to the main points shown by the tool - some waterbodies may not meet reference conditions and that figuring how to address and prioritize these areas has been a challenge, possibly by deleting the sentences starting on lines 81 and ending on line 87. While we fully support some of the policy options outlined in this paragraph, such as tiered aquatic life uses, our goal is to clearly delineate these documents as technical documents and feel these statements are incomplete discussions of policy options.

- Paragraph starting at line 90 – Clarify that this discussion regarding "poor" biotic condition is based on deviations from reference conditions. We would suggest that this paragraph is not necessary to be included in the manuscript and could be deleted.

- Lines 144-145- Suggest modifying 4) as follows: "4) pilot test an approach for prioritizing potential management decisions…"

- Lines 151-152 – Suggest modifying the description of SCAPE to reflect it was developed to pilot possible approaches to identifying management priorities.

- Lines 199-201 – This document declares that the CSCI threshold of 0.79 has been identified by state regulatory agencies as a potential management target. The

referenced document is an administrative draft document put out for discussion that developed the threshold based on other reports prepared by SCCWRP that identified this value as "likely altered biology." The administrative draft document has not gone through all the analysis necessary to develop a water quality objective and it is preliminary to identify it as a management target. Additionally, this value has not been identified by the State Water Board for the same use within this context. As a result, this value should be characterized as a comparison to reference conditions and identified as one option that could be used for evaluation. It would also be helpful for the document to identify other options and explain how the tool can be used regardless of the value.

- Lines 268-278 – This paragraph should be clarified based on the point above. The paragraph could clarify that the classification is in comparison to a percentile of reference without a link to it as a management goal, provide options, and/or clarify that the value selected was for the purposes of demonstration, but the tool would provide results in the classifications for whatever threshold was chosen for the analysis.

- Lines 450-451 - Delete these lines. Regulatory management could involve a variety of different options beyond just protection and restoration of sites based on meeting or not meeting biological objectives.

- Line 473 – Delete "beyond the pass/fail paradigm". The regulatory context does not need to be pass/fail.

- Line 525 – Replace "degraded biological integrity" with "biological integrity different from reference conditions."

Comment No. 2: Provide more explicit options for consideration

The purpose of the technical work products prepared for the Biostimulatory/Biointegrity Policy are to provide options for policy analysis. As a result, the work products should clearly outline and describe options rather than specific results. Below are some suggested modifications to address this concern:

- Lines 136-138 – Revise to say, "The goal of this study is to present the development and application of a landscape model to classify and identify options for prioritizing stream monitoring sites…."

- Lines 144-145 – Revise to say, "and 4) identify options for prioritization of potential management decisions by comparing expectations to observed…."

- Lines 151-152 – Revise to say "…is also described that was developed to help identify options for the selection of ~~choose~~ management priorities using the….

- Line 368 – It seems that only one option for binning the stream segments is presented here, rather than options for consideration by the State Water Board.

We appreciate your consideration of these comments and look forward to continuing to work with you on this important project. If you have any questions or need more information, please contact Ewelina Mutkowska at Ewelina.Mutkowska@ventura.org or (805) 645-1382.

Sincerely,

Arne Anselm
Deputy Director

Cc: Glenn Shephard, Director, VCWPD
Ewelina Mutkowska, County Stormwater Program Manager, VCWPD

Attachment: "Overview of Channels in Developed Landscape Model and Comparison to Ventura County Modified Channels Analysis" prepared by Larry Walker Associates, Inc.

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Memorandum

DATE: December 5, 2018

TO: Ewelina Mutkowska, County of Ventura

COPY TO:

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SUBJECT: **OVERVIEW OF CHANNELS IN DEVELOPED LANDSCAPES MODEL AND COMPARISON TO VENTURA COUNTY MODIFIED CHANNELS ANALYSIS**

The County of Ventura requested Larry Walker Associates (LWA) conduct a comparison of the Channels in Developed Landscapes Tool prepared by the Southern California Coastal Water Research Project (SCCWRP) as documented in Beck et. al. with previous work conducted to document channel modifications in Ventura County prepared by Kasraie Consulting. The results of the comparison along with recommended considerations for the SCCWRP work are described in this memorandum.

MODEL OVERVIEW

To identify stream segments in California for modelling biological integrity, SCCRWP has integrated stream segments data from the National Hydrography Dataset Plus (NHD-plus) with landscape metrics available from the StreamCat Dataset to estimate land use at the riparian zone (i.e., a 100-m buffer on each side of the stream segment), the catchment (i.e., nearby landscape flowing directly into the immediate stream segment, excluding upstream segments), and the entire upstream watershed for each segment. They have combined this dataset with a dataset of 2620 unique California Stream Condition Index (CSCI) scores as a measure of biological condition in California streams.

Using a quantile random forest model, they developed estimate ranges of CSCI scores associated with land use gradients, such as road density or urban and agricultural land use. The CSCI is a predictive index that compares the observed taxa and metrics at a site to those expected under reference conditions. They modelled expected CSCI scores using estimates of canal/ditch density, imperviousness, road density/crossings, and urban and agricultural land use for each stream segment.

Comparing a segments CSCI threshold with its predicted range or predicted median score, they classified the stream segments in one of four different constraint classes:

- Likely unconstrained
- Possibly unconstrained
- Possibly constrained
- Likely constrained

Constrained segments have a biological community that is impacted by large-scale, historic alteration of the landscape. The above classifications have been identified based on three thresholds for the CSCI (1st, 10th, and 30th percentile of reference sites) and a prediction interval ranging from the 10th to the 90th percentiles of the quantile predictions. For example, for the 10th percentile of the reference sites as the threshold, stream segments with the range of CSCI score expectations entirely below the threshold (set to be at 0.79, which is corresponding to the 10th percentile of the reference sites) were considered likely constrained, whereas those with expectations entirely above were considered likely unconstrained. The remaining sites were classified as possibly unconstrained or possibly constrained, based on whether the median expectation was above or below the threshold (respectively). Streams with insufficient data to predict score expectations were not assigned a classification.

To develop this model, SCCRWP has evaluated the responses of four biointegrity indices (one for benthic macroinvertebrates—CSCI, and three for benthic algae assemblages—ASCIs) to five eutrophication indicators (total nitrogen [TN], total phosphorus [TP], benthic chlorophyll-a [chl-a], benthic ash-free dry mass [AFDM], and percent macroalgal cover [% cover] of the streambed. Thresholds for algal indices were often higher than corresponding thresholds for the invertebrate index. Therefore, once the CSCI thresholds were met, that should also satisfy the ASCI thresholds.

To assess the percent of sites likely to meet biointegrity thresholds across California, SCCRWP derived four thresholds for each eutrophication indicator (i.e., one for each biointegrity index) and used the lowest threshold as the indicator. In validating every threshold for the benthic macroinvertebrate index (CSCI), they realized regional models rarely resulted in thresholds that could be validated. However, in data-rich regions, such as the South Coast and the Chaparral, thresholds did meet validation requirements. In general, comparing with the other regions of the state, Ventura County region has relatively higher number of reference sites (**Figure 1**).

Figure 1. Reference sites across California

SCCRWP analyses showed that TN, benthic chl-a and AFDM demonstrates strong coherence in predicting risk of failing biointegrity; TN and TP have statistically stronger relationships than benthic chl-a, AFDM, and % cover; the benthic macroinvertebrate index often has a stronger relationship with eutrophication indicators than the algal indices; and nutrient concentrations had stronger relationships than measures of organic matter.

POTENTIAL CONCERNS

1. Nearly all benthic macroinvertebrate models had a statistically significant coefficient and intercept ($p < 0.05$). Among the models with statistically significant coefficients, accuracy ranged from 54% to 99% at both calibration and validation sites. At sites with multiple samples, mean within-site accuracy ranged from 54% to 99% at calibration sites, and between 50% and 99% at validation sites.
2. The SCCWRP model considers urban and agricultural factors to classify streams. However, there are other factors that could cause constraints, but have not been considered in the model. These include hydromodification, silviculture/timber harvesting, and cannabis cultivation.
3. As demonstrated in **Figure 2**, the SCCWRP model shows some gaps in the stream segments South of Ventura and around Oxnard. It is not clear if these waters were removed based on previous comments about only including Waters of the US or if there is missing information. Given the challenges of determining drainages in this area, more specific information could be provided to SCCWRP to improve the model if desired.

Figure 2. Containment booms during dredging activities

COMPARISON BETWEEN THE KASRAIE AND SCCWRP TOOL

The SCCRWP tool was compared to the Kasraie Consulting analysis of modified channels in Ventura County by visually and technically comparing the results from the two tools. The SCCWRP tool is meant to predict biological condition not locations where channel modification has occurred. This tool can assist to identify whether the stream segments are likely constrained, possibly constrained, likely unconstrained, or possibly unconstrained. On the other hand, the layer developed for the Ventura County Project by Kasraie Consulting identifies the modification status of conveyance features within the County. Modification status categories include: Modified, Likely Modified, Mostly Natural, Likely Natural, and Natural. Additionally, the Kasraie Consulting analysis has a much shorter riparian buffer than the SCCRWP model (10-, 20-, 30-m vs 100-m). The two tools are not intended to represent the same information, but a comparison of the tools allows for an assessment of whether or not the SCCWRP tool is identifying constraints associated with modified channels.

Visual Comparison

Based on the visual comparison, the two tools seem to provide similar answers, with most modified and likely modified channels in Kasraie's tool being identified as constrained or likely constrained by SCCWRP's tool. However, there may be some mismatches between the two tools that could be further explored. Below are some specific examples of the comparison.

- The "surprisingly" Mostly Natural segment in Kasraie's tool has been almost correctly identified as Possibly Unconstrained in the SCCRWP tool (**Figure 3**).
- In **Figure 4**, the SCCRWP tool shows two branches, where Kasraie's tool only shows one branch. However, one of the SCCRWP branches matches the Kasraie's tool and the other one is constrained, which makes sense because the SCCRWP's unconstrained branch flows through a natural land (based on what Google Earth shows), but the constrained branch is next to an urban area.
- This example shows a potential mismatch. The upstream reach is likely constrained, but right below where it branches out, one branch is likely constrained and the other one is possibly unconstrained **Figure 5**.

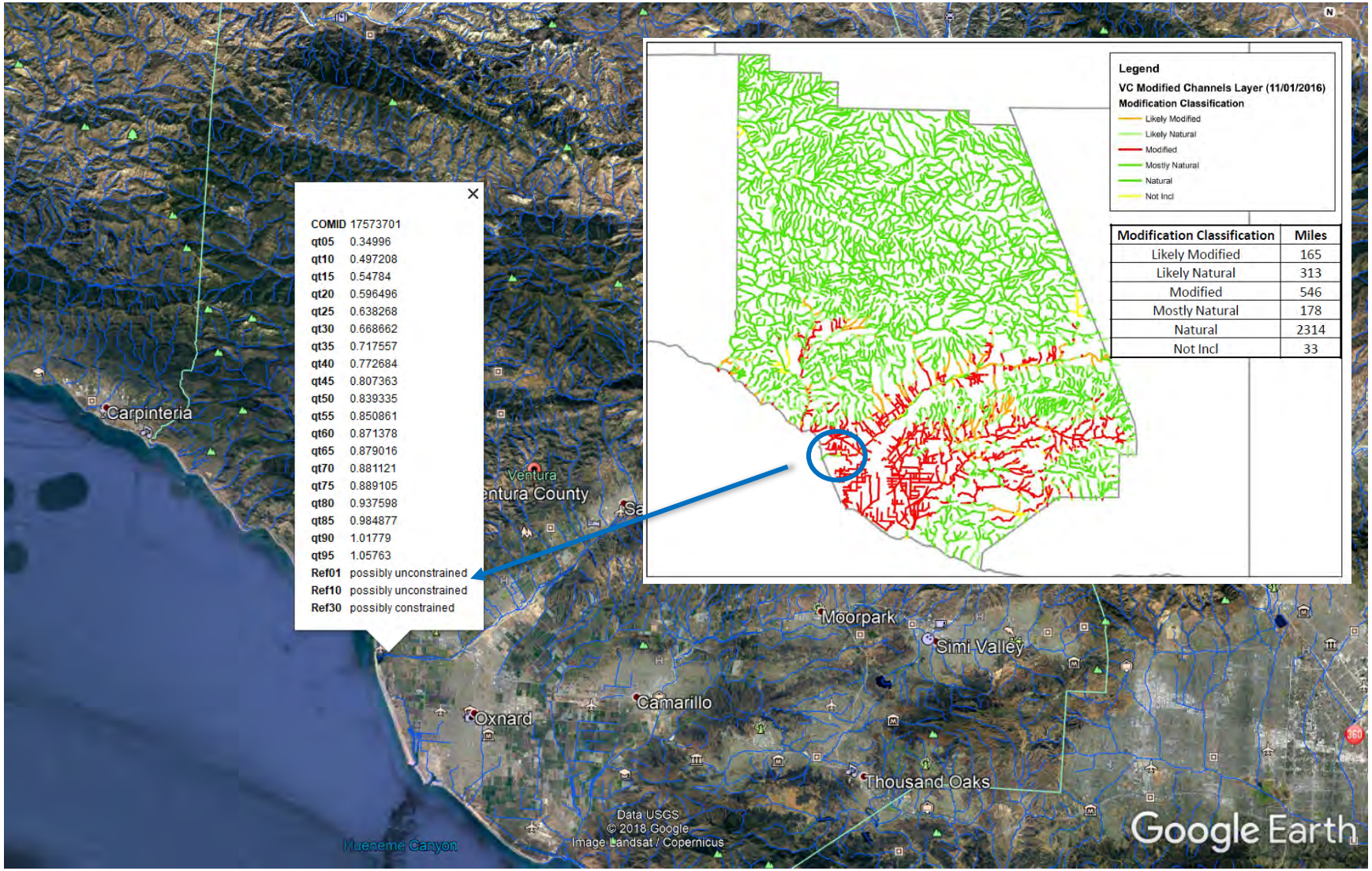

Figure 3. Mostly Natural segment in Kasraie's tool almost correctly identified as Possibly Unconstrained in the SCCRWP tool

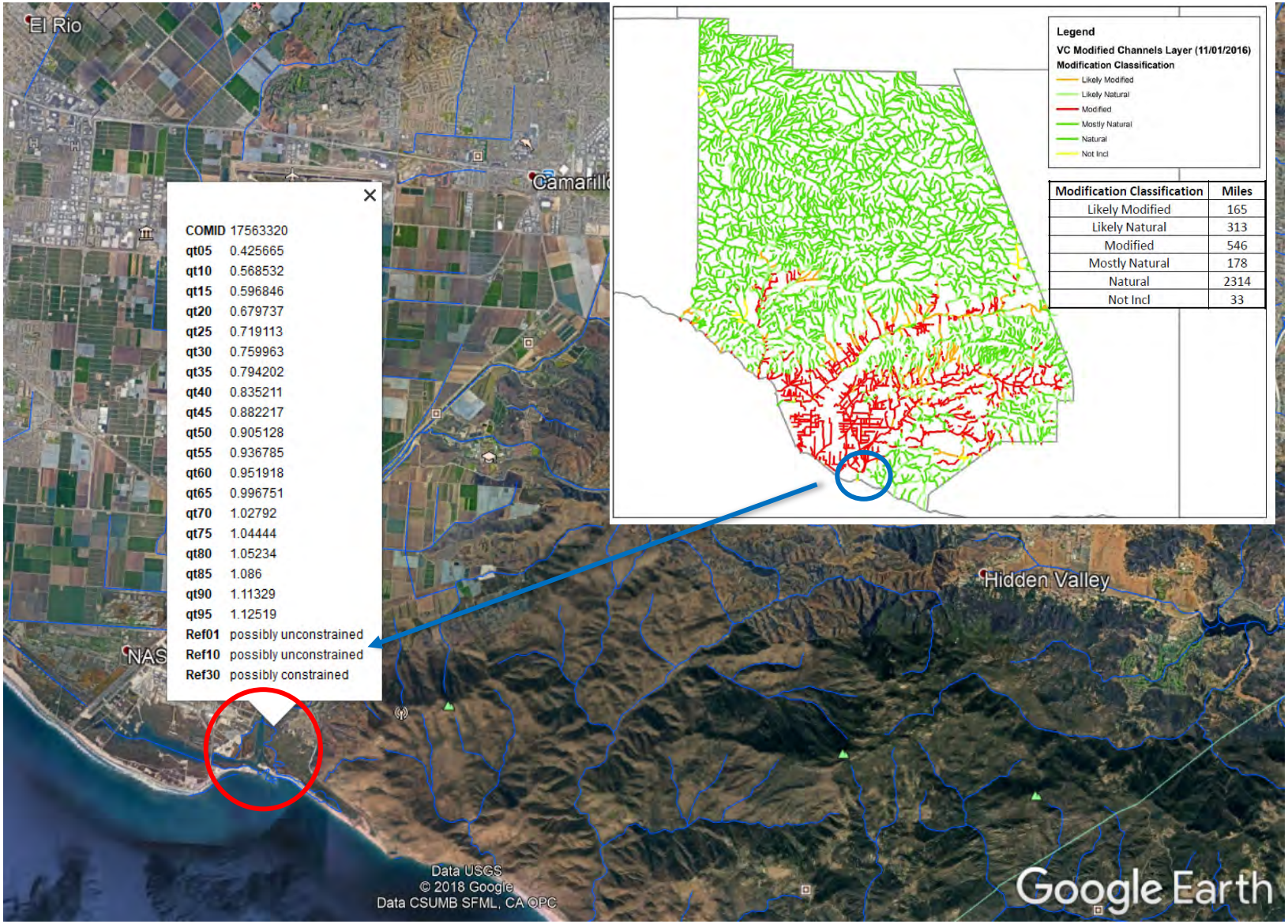

Figure 4. One out of two branches in the SCCRWP tool matching the Kasraie tool's only branch

Figure 5. An example shows a potential mismatch between the two tools

Technical Comparison

A more detailed comparison of Ventura County's assessment of modified channels (Kasraie's tool) and the Channels in Developed Landscapes Tool developed by SCCWRP was conducted using GIS and MS Excel spreadsheet analysis. The more detailed analysis confirms that the SCCWRRP tool does a decent job in terms of classifying Ventura County stream segments, but not all modified channels are characterized as constrained by the SCCWRP tool and the choice of threshold has an impact on whether or not the waterbody characterization aligns. The analysis process is summarized below and also included in the Technical Analysis Process sheet of the attached Excel file:

1. The stream segments were matched up between the two tools. Using the COMID field in both Kasraie and SCCWRRP layers, these layers were overlapped in Excel; i.e. the VLOOKUP function was used to match stream segments in both layers.
2. All "Not incl" segments in Kasraie's tool and unidentified segments in the SCCWRP tool were filtered out, narrowing the number of segments down to 2588.
3. To make the two layers comparable, each segment was scored based on its classification. For scoring, as Kasraie's tool has five classes versus four classes for SCCWRP, both Natural and Mostly Natural classes in Kasraie's classifications were given the same score, 1. This is justifiable as Likely Natural segments are those having greater than 75% natural land cover. **Table 1** summarizes these scores. A copy of this table is also available in the "Scoring Guide" sheet of the attached Excel file.
4. The SCCWRP tool scores were compared to the ClassC characterization of channels in Kasraie's layer.
5. Columns L though O in the "Comparisons" sheet of the attached Excel file show the segment scores.
6. The scores assigned based on Kasraie's classification were compared with their corresponding segments' Ref01, Ref10, and Ref30 scores based on the classifications from the SCCWRP tool. Each segment was assigned one of the following identifiers:
    a. Matching: The stream segment's classifications in both layers have equal scores; Or
    b. Likely Matching: The stream segment's classifications in both layers are either below or equal to 2 (natural/unconstrained category), or is equal or greater than 3 (modified/constrained category); Or
    c. Not Matching: The stream segment's classifications in the layers are not in the matching or likely matching categories.

    These results are shown in Columns P through R in the "Comparisons" sheet of the attached Excel file.

Table 1. Scoring the Kasraie and SCCWRP's classifications

Score	Kasraie's Classifications	SCCWRP's Classifications
1	Natural Mostly Natural	Likely Unconstrained
2	Likely Natural	Possibly Unconstrained
3	Mostly Modified	Possibly Constrained
4	Modified	Likely Constrained

As presented in **Table 2**, over 90% of stream segment classifications for the Ref01 and Ref10 thresholds and close to 90% of them for the Ref30 threshold are matching or likely matching

between the two tools. Only 13% of segments do not match for the Ref30 thresholds. This value is only 6% for the other thresholds. However, when the segments were filtered for modified and likely modified channels in the Kasarie's tool, the Ref30 threshold was more likely to be matching or likely matching. At the lower biological thresholds (Ref01 and Ref10), the SCCWRP tool was more likely to identify a modified channel as possibly unconstrained or likely unconstrained.

Table 2 Number and percentage of segments matching, likely matching, and not-matching between the two models (out of a total of 2588 segments) based on different thresholds

Identifier	Ref01 (no.)	Ref10 (no.)	Ref30 (no.)	Ref01 (%)	Ref10 (%)	Ref30 (%)
Matching	2026	1500	274	78%	58%	11%
Likely Matching	400	928	1975	15%	36%	76%
Not-Matching	151	148	327	6%	6%	13%

CONCLUSIONS

The SCCRWP tool was compared to the Kasraie Consulting analysis of modified channels in Ventura County by visually and technically comparing the results from the two tools. Based on the visual comparison, both tools seem to provide similar answers, with most modified and likely modified channels being identified as constrained or likely constrained by SCCWRP's tool. However, there are some minor mismatches between the two tools.

Technical comparison of the tools shows that about 90% of stream segment classifications for all thresholds (Ref01, Ref10, and Ref30) are matching or likely matching between the two tools. For modified and likely modified channels in the Kasarie layer, the Ref30 threshold was more likely to be matching or likely matching. At the lower biological thresholds (Ref01 and Ref10), the SCCWRP tool was more likely to identify a modified channel as possibly unconstrained or likely unconstrained.

This analysis confirms that the SCCWRRP tool does a decent job in terms of classifying Ventura County stream segments, but not all modified channels are characterized as constrained by the SCCWRP tool and the choice of threshold has an impact on whether or not the waterbody characterization aligns.