2006
BIOASSESSMENT MONITORING PROGRAM IN LOS ANGELES COUNTY

Final Report

Prepared For:

Los Angeles County Department of Public Works
Watershed Management Division
900 South Fremont Avenue
Alhambra, California 91803-1331

June 2007

PUBLIC WORKS

WESTON SOLUTIONS

2006
BIOASSESSMENT MONITORING PROGRAM IN LOS ANGELES COUNTY

Final Report

Prepared For:

Los Angeles County Department of Public Works
Watershed Management Division
900 South Fremont Avenue
Alhambra, California 91803-1331
Contact: Dr. Youn Sim

Prepared By:

Weston Solutions, Inc.
2433 Impala Drive
Carlsbad, California 92010

June 2007

LIST OF CONTRIBUTORS

Bill Isham	Principal biologist, field surveys, taxonomy (Insecta, Misc. Phyla), data analysis, reporting
Damon Owen	Field survey leader
Carrie Burleson	Sample processing
Andrea Crumpacker	Statistical Analysis
Thomas Gerlinger	Sample processing, taxonomy (Crustacea)
Esther Goldstein	Field surveys
Sheila Holt	Taxonomy (Mollusca)
Jamie Hultman	Field surveys, sample processing
Michelle Patzius	Document production
Niki Woodward	Sample processing, quality assurance
Satomi Yonemasu	Data management, quality assurance

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
ABL	Aquatic Bioassessment Laboratory
ANOVA	Analysis of Variance
CDFG	California Department of Fish and Game
CF	Collector Filterer
CG	Collector Gatherer
cm	Centimeter
CSBP	California Stream Bioassessment Procedure
EPT	Ephemeroptera, Plecoptera, and Trichoptera
FFG	Functional Feeding Group
ft	Feet
IBI	Index of Biotic Integrity
LACDPW	Los Angeles County Department of Public Works
m	Meter
mg/L	Milligrams per Liter
MH	Macrophyte Herbivore
mm	Millimeter
mS/cm	Millisiemens per centimeter
NTU	Nephelometric Turbidity Unit
OM	Omnivore
PH	Piercer Herbivore
ppt	Parts per thousand
QA/QC	Quality Assurance/Quality Control
qt	Quart
SDRWQCB	San Diego Regional Water Quality Control Board
TV	Tolerance Value
U.S. EPA	United States Environmental Protection Agency
XY	Xylophage (wood eater)

1.0 INTRODUCTION

Weston Solutions, Inc. (Weston) was contracted by the Los Angeles County Department of Public Works (LACDPW) to perform biological assessments of various freshwater streams in six Los Angeles County watersheds. The goals of the program are to assess biological integrity and to detect biological trends and responses to pollution in receiving waters throughout the region. Sampling and analysis followed the protocols described in the California Stream Bioassessment Procedure (CSBP) (Harrington, 2003), and also incorporated the Southern California Index of Biotic Integrity (IBI) (Ode et al., 2005). This program was initiated in October of 2003, with monitoring surveys conducted once per year since that time.

The sampling protocol of the CSBP includes the collection and identification of stream benthic macroinvertebrates, and also assesses the quality and condition of the in-stream physical habitat and adjacent riparian zone. Utilizing species-specific tolerance values and community species composition, numerical biometric indices are calculated, allowing for the determination of habitat health in streams. Over time, this information is used to identify ecological trends and aid analyses of the appropriateness of water quality management programs (Yoder and Rankin, 1998). Invertebrates reside in streams for periods ranging from a month to several years, and have varying sensitivities to physical, biological, and chemical disturbances to the stream. By assessing the invertebrate community structure of a stream, a realistic, long-term measure of stream habitat health and ecological response is obtained. This information may complement monitoring programs that test water quality parameters which provide a measure of habitat conditions only at the moment sampling occurs. The addition of bioassessment to chemical, bacterial, and toxicological approaches to watershed monitoring programs gives a comprehensive indication of water quality and the effects of ecological impacts.

This report will present the results of stream bioassessment surveys of twenty monitoring reaches in the Los Angeles Basin, conducted between July 19 and 26 (San Gabriel Watershed only), and from October 3 to October 10, 2006. These two sampling periods were not affected by any significant rain events. A taxonomic listing of all collected benthic macroinvertebrates, biological metric and Index of Biotic Integrity calculations, and a discussion and analysis of the results are included.

2.0 STUDY AREA OVERVIEW

The monitoring reaches assessed in this study were located in six watersheds throughout Los Angeles County, including the Santa Clara River Watershed, the Santa Monica Bay Watershed (including the Ballona Creek Watershed and the Malibu Creek Watershed), the Dominguez Watershed, the Los Angeles River Watershed, and the San Gabriel River Watershed. The monitoring reaches are described in Table 1, and the rationale for monitoring each site is included. A map of the monitoring locations is shown in Figure 1.

Five of the monitoring reaches (Stations SGLR-063, 12, 13, 14, and 19) were located in concrete lined channels, and one (Station 11) was partially lined with concrete. Three of the monitoring reaches (Stations SGUT-504, 13, and 17) were considered reference sites that had minimal upstream urban development.

Table 1: LACDPW Stream Bioassessment Monitoring Sites, 2006.

Station	Receiving Water Body	Location – Date	Coordinates	Justification
San Gabriel River Watershed				
SGUT-504	San Gabriel River Mainstem	Upper San Gabriel River near East Fork Rd. – Jul. 25	N 34º 14.228' W 117º 49.129'	Offset site for the San Gabriel River Watershed Monitoring Project
SGUT-505	San Gabriel River Mainstem	Upper San Gabriel River below Morris Reservoir – Jul. 26	N 34º 10.164' W 117º 53.359'	Offset site for the San Gabriel River Watershed Monitoring Project
SGLR-063	San Gabriel River Lined channel tributary	San Jose Creek Diversion Channel Upstream of Fullerton Rd.– Jul. 19	N 34º 00.157' W 117º 54.182'	Offset site for the San Gabriel River Watershed Monitoring Project
5 (SGLT-506)	Walnut Creek Unlined channel	Walnut Channel upstream of San Gabriel River – Jul. 19	N 34º 03.704' W 117º 59.477'	Assess impacts of upstream land uses; nursery and residential area/San Gabriel River Watershed Monitoring Project site.
Los Angeles River Watershed				
6	Arroyo Seco Unlined channel	Upstream of Arroyo Seco Spreading Grounds – Oct. 4	N 34º 12.189' W 118º 09.968'	Assess impacts in upper to mid watershed from residential land use
7	Arroyo Seco Unlined channel	Arroyo Seco downstream from I-134 – Oct. 4	N 34º 08.676' W 118º 09.982'	Assess impacts of residential land use
8	Compton Creek Unlined channel	Compton Creek upstream of the confluence with the Los Angeles River – Oct. 10	N 33º 50.788' W 118º 12.535'	Assess impacts of urban pollution in Compton Creek
9	Zone 1 Ditch / Whittier Narrows Dam Unlined channel	Zone 1 Ditch at Whittier Narrows Dam- not visited	N 34º 01.452' W 118º 04.250'	Los Angeles County Sanitation District baseline site; not sampled due to dry conditions
10	Eaton Wash Unlined channel	Upstream of Eaton Wash Canyon Reservoir at New York Drive–Oct. 4	N 34º 10.538' W 118º 05.707'	Assess impacts of tributary to Los Angeles River; not sampled due to dry conditions
11	Los Angeles River Partially lined channel	Los Angeles River at Victory Blvd – Oct. 4	N 34º 09.362' W 118º 17.591'	Assess impacts of adjacent equestrian area
12	Los Angeles River Lined channel	Los Angeles River near confluence with Arroyo Seco Channel – Oct. 4	N 34º 05.112' W 118º 13.713'	Main river channel
13	Los Angeles River Lined channel	Los Angeles River upstream of Sepulveda Dam – Oct. 3	N 34º 10.207' W 118º 28.582'	Upstream reference site
Ballona Creek Watershed				
14	Ballona Creek Lined channel	Ballona Creek at I-405 and S. Sepulveda Blvd – Oct. 10	N 34º 00.445' W 118º 23.761'	Original location relocated due to tidal influence
Malibu Creek Watershed				
15	Medea Creek Unlined channel	Medea Creek at Thousand Oaks Blvd. and Kanan Rd. – Oct. 3	N 34º 09.043' W 118º 45.456'	Assess impacts of Medea Creek to Malibu Creek
16	Las Virgenes Creek Unlined Channel	Las Virgenes Creek near the Los Angeles County line – Oct. 3	N 34º 10.133' W 118º 42.192'	Assess impacts from tributary to Malibu Creek
17	Cold Creek Unlined channel	Cold Creek at Stunt Rd. at Cold Creek Preserve – Oct. 3	N 34º 05.707' W 118º 38.918'	Upstream reference site
18	Triunfo Creek Unlined channel	Triunfo Creek downstream of Troutdale Dr. and nursery – Oct. 3	N 34º 06.851' W 118º 46.750'	Assess impacts of nursery
Dominguez Watershed				
19	Dominguez Channel Lined channel	Dominguez Channel and Vermont Ave – Oct. 10	N 33º 52.270' W 118º 17.909'	Original location relocated due to tidal influence
Santa Clara Watershed				
1	Santa Clara River Unlined channel	Santa Clara River at The Old Road – Oct. 4	N 34º 25.945' W 118º 35.689'	Location of DPW mass emission monitoring site
20	Bouquet Canyon Unlined channel	Bouquet Canyon Wash below Vasquez Canyon Road Oct. 3	N 34º 28.422' W 118º 28.023'	Assess conditions upstream of Diazinon findings; not sampled due to dry conditions

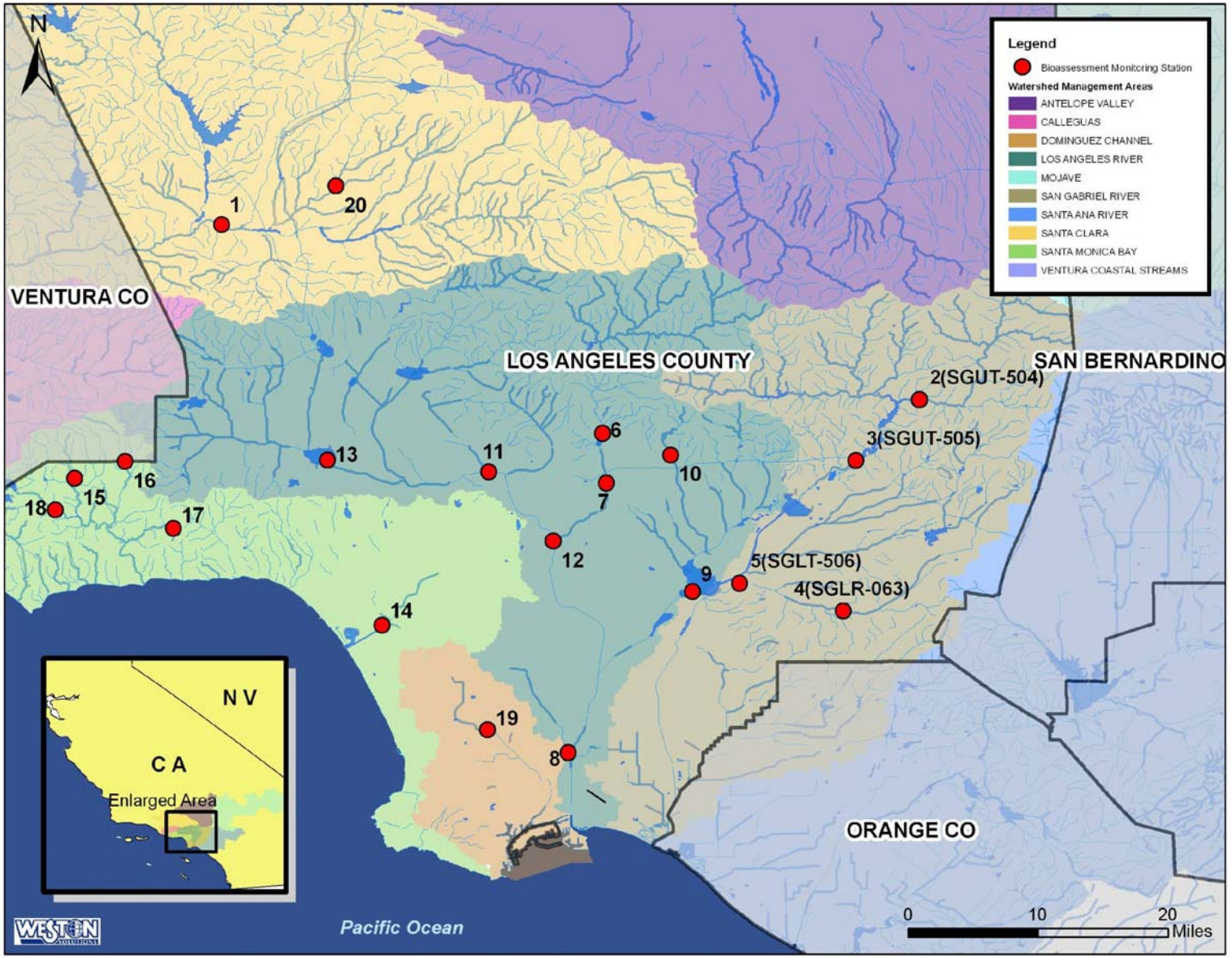


Figure 1: Stream Bioassessment Monitoring Locations, 2006.

3.0 METHODS

A general description of the methods incorporated in the sampling program is presented below. Weston personnel adhered to the protocols of the CSBP (Harrington, 2003) as closely as practicable, and this document may be referenced for more detailed procedural information (http://www.dfg.ca.gov/cabw/Field/csbpwforms.html).

The sampling and analysis for the 2006 survey was different from previous surveys in two respects which reflected the difference between the 1999 CSBP version and the 2003 version. One difference was in the level of field sampling, where the total benthic area sampled was reduced from 18 ft^2 to 9 ft^2. The second difference was in the laboratory sample processing. Prior methods required three sample replicates be processed separately with 300 organisms removed from each replicate. In the new protocol, the three replicate samples were combined and a total of 500 organisms were removed from the sample. It did not appear that this reduction in effort affected the final results, as there was a greater overall diversity of taxa in the 2006 survey than in all previous surveys (see Section 4.6).

3.1 Sampling Site Selection

A field reconnaissance of the monitoring reaches by LACDPW staff occurred prior to program initiation in 2003 to determine the suitability of the twenty proposed sites. Since the program inception, variability in rainfall amounts has resulted in some inconsistency in flow regimes at the monitoring sites. In 2006, Stations 9, 10 and 20 were dry and could not be sampled. Originally established Stations 2, 3, and 4 in the San Gabriel River Watershed were offset with Stations SGUT-504, SGUT-505, and SGLR-063 as a contribution to the San Gabriel River Watershed Monitoring Project for the San Gabriel River Watershed Council. Data from Station 5 were also shared with the Watershed Council with an alternate station designation of SGLT-506. All other monitoring sites that were sampled in 2006 were in the same locations as in previous years of the program.

3.2 Monitoring Reach Delineation

The sampling points specified in the CSBP target a stream feature known as a riffle. An ideal riffle is an area of variable flow regimes with some surface disturbance and a relatively complex and stable substrate. These areas provide increased colonization potential for benthic invertebrates. Riffles typically support the greatest diversity of invertebrates in a stream, and by selecting the richest habitats available at each stream, comparability among streams is possible. For some of the monitoring reaches in this study, optimal riffle habitat was not always available; therefore “best available” habitat was sampled.

Under optimal conditions, five riffles constituted a monitoring reach, and three of these were randomly selected for sampling using a random number table. Given sufficient riffle width and length, a sampling transect perpendicular to stream flow was selected randomly in the upper third of the riffle. In situations where the only available riffles were very short and/or narrow, the samples were taken to best represent available substrate types. For monitoring reaches in uniform concrete channels, a 150-meter reach of the stream was selected, and 3 separate 1-m

wide transects were randomly selected. Every monitoring reach was sampled from downstream to upstream. Photographs were taken of every monitoring reach and most of the individual riffles sampled. Representative photos of the monitoring reaches are presented in Appendix A.

3.3 Sample Collection

Once a sampling transect was established, benthic invertebrates were collected using a 1-ft wide, 0.5-mm mesh D-frame kick-net. A 1-ft^2 area upstream of the net was sampled by disrupting the substrate and scrubbing the cobble and boulders so that the organisms were dislodged and swept into the net by the current or by hand sweeping. In areas with little or no current, the substrate was disturbed and the net was swept back and forth to capture the organisms. The duration of the sampling generally ranged from 1 to 3 minutes, depending on substrate complexity. Three 1-ft^2 areas were sampled along each transect and combined into one composite sample representing approximately 3 ft^2 of substrate area. The three sample points on the transect were usually taken near the right and left margins and in the middle of the stream, or were selected to best represent the diversity of habitat types present. This procedure was repeated for the next two riffles until three separate replicate samples were collected. Samples were transferred to 1-qt jars and preserved with 95% ethanol and returned to Weston's benthic laboratory for processing.

3.4 Physical Habitat Quality Assessment

For each monitoring reach sampled, the physical habitat of the stream and its adjacent banks were assessed using U.S. EPA Rapid Bioassessment Protocols. Habitat quality parameters were assessed to provide a record of the overall condition of the reach. Parameters such as channel alteration, frequency of riffles, width of riparian zones, and vegetative cover help to provide a more comprehensive understanding of the condition of the stream. Additionally, specific characteristics of the sampled riffles were recorded, including riffle length, depth, gradient, velocity, substrate complexity, and substrate composition.

Water quality measurements were taken at each of the monitoring sites. Measurements included water temperature, specific conductance, pH, dissolved oxygen, turbidity, and hardness.

3.5 Laboratory Processing and Analysis

At the laboratory, samples were relinquished to the laboratory sample custodian. Prior to sample processing, technicians signed out each sample in a sample tracking log book. The three sample replicates were poured over a No. 35 standard testing sieve (0.5-mm stainless steel mesh) and the ethanol retained for re-use. The sample was gently rinsed with fresh water, and large debris such as wood, leaves, or rocks were removed. The sample was transferred to a tray marked with grids approximately 50 cm^2 in size and spread homogenously to a thickness of approximately ¼". One grid was randomly selected and the sample material contained within the grid was removed and processed. In cases where the animals appeared extremely abundant, a fraction of the grid may have been removed. The material from the grid was examined under a stereomicroscope and all the invertebrates were removed, sorted into major taxonomic groups, and placed in vials containing 70% ethanol. This process was repeated until 500 organisms were removed from the sample. Organisms from a grid in excess of the 500 were placed in a separate vial labeled "extra

animals", so that a total abundance for the sample could be estimated. All sample processing information was entered onto a Stream Bioassessment Sorting Sheet (Appendix C). Processed material from the sample was placed in a separate jar and labeled "sorted", and the unprocessed material was returned to the original sample container, checked in to the sample tracking log book, and archived. Sorted material was retained for quality assurance purposes.

All organisms were identified to standard taxonomic level I as specified in the Southwest Association of Freshwater Invertebrate Taxonomists List of Freshwater Invertebrate Taxa (available at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf); genus level for most insects, and order or class for non-insects. The taxonomic levels are fixed under this document to prevent inconsistencies in taxonomic effort between laboratories. The level of taxonomic effort has not changed since the inception of the LACDPW bioassessment monitoring program in 2003, although a few minor adjustments in taxa determinations have been made. With the exception of some beetles, nearly all of the insects identified in the program were in the larval and pupal stages of development, which metamorphose into an aerial adult form. Nearly all of the non-insect taxa are aquatic for their entire life history.

QA/QC: After sample processing is complete, at least 10% of the sample lot, or one sample processed per each technician are checked to ensure a 90% or better organism removal efficiency. Results of the sorting QA/QC were entered onto the Stream Bioassessment Sorting Sheet. To ensure accuracy of the taxonomic identifications, 10% of the samples (two samples) were sent to the CDFG Aquatic Bioassessment Laboratory (ABL) for verification. Any discrepancies between ABL identifications and the original identifications were changed in the taxonomic database. Results of the sorting and taxonomic QA/QC analyses are presented in Appendix C.

3.6 Data Analysis

Taxonomic data were entered into an electronic file using Microsoft Word and converted into a SAS database for QA/QC and data reduction. Benthic macroinvertebrate community-based metric values were calculated from the database. A list of the metrics and a brief description of what they signify is presented in Table 2. A taxonomic list of the macroinvertebrates present in each sample was created in Microsoft Excel, including the designated tolerance value (TV) and functional feeding group (FFG) of each taxon. Macrophyte herbivores (mh), piercer herbivores (ph), omnivores (om), parasites (pa) and xylophages/wood eaters (xy) were combined into a group designated "Other". Also note that for some organisms identified at the Family level or above, a single TV or FFG was not assigned. This is because the taxa within the group have a broad range of tolerances or feeding strategies and a single designation is not representative.

In addition to the individual metric values, a multi-metric Index of Biotic Integrity (IBI) was calculated for each monitoring reach (Ode et al., 2005). The IBI is a quantitative scoring system for assessing the quality of benthic macroinvertebrate assemblages, and is currently our most useful tool in reducing a complex macroinvertebrate data set to a qualitative rating for each monitoring reach. The IBI score is derived from the cumulative value of seven biological metrics (Table 2, asterisked metrics). The total scores were categorized into ratings of the benthic community, ranging from Very Poor to Very Good. It has been noted that the Southern California IBI was developed with very few sites located in low elevations in Los Angeles County, and future development of a refined IBI has been suggested.

Table 2: Bioassessment Metrics Used to Characterize Benthic Invertebrate Communities.

BMI Metric	Description	Response to Impairment
Richness Measures		
Taxa Richness	Total number of individual taxa	Decrease
Coleopteran Taxa*	Number of taxa in the insect order Coleoptera (beetles)	Decrease
EPT Taxa*	Number of taxa in the Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) insect orders	Decrease
Dipteran Taxa	Number of taxa in the insect order Diptera (true flies)	Increase
Non-Insect Taxa	Number of non-insect taxa	Increase
Predator Taxa*	Number of taxa in the predator feeding group	Decrease
Composition Measures		
EPT Index	Percent composition of mayfly, stonefly, and caddisfly larvae	Decrease
Sensitive EPT Index	Percent composition of mayfly, stonefly, and caddisfly larvae with tolerance values between 0 and 3	Decrease
Shannon Diversity Index	General measure of sample diversity that incorporates richness and evenness (Shannon and Weaver 1963)	Decrease
Margalef Diversity	Measure of sample diversity weighted for richness	Decrease
Tolerance/Intolerance Measures		
Tolerance Value	Value between 0 and 10 of individuals designated as pollution tolerant (higher values) or intolerant (lower values)	Increase
Dominant Taxon	Percent composition of the single most abundant taxon	Increase
Percent Chironomidae	Percent composition of the tolerant dipteran family Chironomidae	Increase
Percent Intolerant Organisms*	Percent of organisms in sample that are highly intolerant to impairment as indicated by a tolerance value of 0, 1 or 2	Decrease
Percent Tolerant Organisms	Percent of organisms in sample that are highly tolerant to impairment as indicated by a tolerance value of 8, 9 or 10	Increase
Percent Tolerant Taxa*	Percent of taxa in sample that are highly tolerant to impairment as indicated by a tolerance value of 8, 9 or 10	Increase
Percent Non-insect Organisms	Percent of organisms in sample that are not in the Class Insecta	Increase
Percent Non-insect Taxa*	Percent of taxa in sample that are not in the Class Insecta	Increase
Functional Feeding Groups (FFG)		
Percent Collector-Gatherers*	Percent of macrobenthos that collect or gather fine particulate matter	Increase
Percent Collector-Filterers*	Percent of macrobenthos that filter fine particulate matter	Increase
Percent Scrapers	Percent of macrobenthos that graze upon periphyton	Increase
Percent Predators	Percent of macrobenthos that feed on other organisms	Variable
Percent Shredders	Percent of macrobenthos that shreds coarse particulate matter	Decrease
Percent Other	Percent of macrobenthos that are parasites, macrophyte herbivores, piercer herbivores, omnivores, and xylophages	Variable
Abundance		
Estimated Abundance	Estimated number of organisms in entire sample	Variable

*indicates metrics used to calculate the Index of Biotic Integrity
Source: modified from SDRWQCB 1999

4.0 RESULTS

A discussion of the results of the survey is presented below. A complete listing of the benthic invertebrates identified at all stations and replicates are presented systematically in Appendix B.1. Ranked total abundance for each species at all sampling sites combined are presented in Appendix B.2, and the calculated metric values for each monitoring reach are presented in Appendix B.3.

The reader may notice seeming discrepancies between the number of unique taxa listed in the metrics tables and the apparent number of taxa in the taxa list. This is due to the presence of immature or damaged specimens that were identified at a higher systematic level than the standard effort, but were not thought to be unique taxa.

4.1 Benthic Invertebrate Community: Study Area Summary

Summing all stations in the Los Angeles County study area, a total of 96 unique taxa were identified from 8,445 individual organisms (Appendix B.1, Appendix B.2). The five most abundant taxa in descending order were Chironomid midges (3,367 individuals), the Amphipod crustacean, *Hyalella* (970 individuals), Oligochaete earthworms (508 individuals), Turbellarian flatworms (337 individuals), and the Baetid mayfly, *Baetis* (301 individuals) (Appendix B.2). All of these taxa are moderately to highly tolerant to habitat impairment, and with the exception of flatworms are in the collector-gatherer feeding group. Collector-gatherers feed on organic detritus, algae, and various micro-organisms (Pennak, 2001; Usinger, 1956) and high abundances of these organisms are often associated with high levels of urban runoff.

The order Diptera (true flies) had the greatest number of unique taxa identified (21 taxa), followed by Trichoptera (caddisflies) and Coleoptera (beetles) with 15 taxa per order (Appendix B.1). Chironomid midges were present at all of the monitoring sites and were the dominant organism at seven of the seventeen sites.

4.2 Benthic Invertebrate Community Metrics

Benthic invertebrate community metric values for each monitoring reach are presented in Appendix B.3. A listing of the five most dominant (abundant) taxa for each monitoring reach is in Appendix B.4.

Taxa Richness: Taxa richness is the total number of unique taxa in a sample. This number does not account for damaged or immature specimens that were identified at a higher taxonomic level than specified in the SAFIT list (also referred to as “indiscriminate” taxa). Taxa richness per sample ranged from 4 taxa at Station 11-Los Angeles River to 38 taxa at Station 6-Arroyo Seco (Appendix B.3).

Diversity and Dominance: Two diversity indices were calculated for each site: Shannon diversity, which weights for evenness of the distribution of the different taxa, and Margalef diversity, which weights for total number of different taxa. Shannon diversity values per station

ranged from 0.4 at Station 19-Dominguez Channel to 3.0 at Station 6-Arroyo Seco (Appendix B.3). Margalef Diversity values per station ranged from 0.5 at Station 11-Los Angeles River to 6.0 at Station 6-Arroyo Seco (Appendix B.3). Dominance by a single taxon ranged from 11.3% *Caloparyphus/Euparyphus* at Station 6–Arroyo Seco to 90.2% Chironomidae at Station 19-Dominguez Channel (Appendix B.4). Other sites with very high dominance values included Station 13-Los Angeles River (86.9% Chironomids), Station 16-Las Virgenes Creek (81.6% Chironomids), and Station 15-Medea Creek (81.1% *Hyalella*). Chironomids were the dominant taxon at seven of the monitoring reaches.

EPT Taxa: The orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) contain many taxa that are sensitive to impairment. Several of these taxa however, are tolerant to urban runoff that does not contain high levels of chemical pollutants, including mayflies in the family Baetidae and the caddisflies, *Cheumatopsyche*, *Hydropsyche*, and *Hydroptila*. This means that number of EPT taxa and % sensitive EPT are much stronger metrics than total % EPT for assessing ecological health of a site. All of the stonefly taxa are quite sensitive to urban runoff.

The greatest number of EPT taxa were collected at Station 17-Cold Creek, with 15 different EPT taxa (Appendix B.3). There were no EPT taxa collected at six of the monitoring sites including, Station 11-Los Angeles River, Station 12-Los Angeles River, Station 13-Los Angeles River, Station 15-Medea Creek, Station 18-Triunfo Creek, and Station 19-Dominguez Channel. EPT individuals were most dominant at Station 3-San Gabriel River, where they comprised 58.8% of the benthic community (Appendix B.3). The most abundant of the EPT taxa across the survey region included the mayfly, *Baetis* and the caddisfly, *Hydroptila* (Appendix B.2). Sensitive EPT taxa (tolerance value 0-3) were collected at four of the sites and were most abundant at Station 17-Cold Creek, where they comprised 44.8% of the benthic community. Also notable is that 89% of the total EPT taxa at Cold Creek were sensitive EPT taxa. The other sites with sensitive EPT taxa included Station 2 (SGUT-504)-San Gabriel River, Station 3 (SGUT-505)-San Gabriel River, and Station 6-Arroyo Seco. Stoneflies were collected at Station 17-Cold Creek only, although exuviae of *Calineuria californica* were observed at SGUT-504.

Tolerance Values: For most stream macroinvertebrates, a tolerance value has been determined for each taxon through prior research on the animals' life history. Tolerance values range from 0 for organisms highly sensitive to impairments, to 10 for organisms that are highly tolerant to impairments. Low to moderate abundance of impairment tolerant organisms does not necessarily imply impairment (SDRWQCB, 2001), but more importantly, the presence of sensitive organisms is unlikely when a stream is impaired. The presence of highly intolerant organisms (tolerance value 0-2) is likely the strongest single indicator of good water quality.

Average community tolerance values for all sites ranged from 3.8 at Station 17-Cold Creek to 7.6 at Station 15-Medea Creek (Appendix B.3). Highly tolerant organisms (tolerance value 8-10) were most abundant at Station 15-Medea Creek, where they accounted for 89.2% of the benthic community, and were least abundant at Station 8-Compton Creek, accounting for 4.6% of the benthic community. Highly intolerant organisms (tolerance value 0-2), were collected from three sites: Station 2 (SGUT-504)-San Gabriel River, Station 6-Arroyo Seco, and Station 17-Cold Creek, and were represented mostly by stonefly taxa. Highly intolerant organisms were much more abundant at Station 17-Cold Creek than at any of the other sites, where they

comprised 45.4% of the community. Station 2 (SGUT-504)-San Gabriel River had the second highest number of highly intolerant organisms, where they comprised 7.6% of the community.

Functional Feeding Groups: As with tolerance values, functional feeding group designations have been determined through prior life-history research or observations of each taxon. The percent composition of the functional feeding groups provides useful information about benthic community function, and some feeding groups contain greater numbers of intolerant organisms (Table 2). The information from feeding group composition may be particularly useful in detecting physical habitat degradation and impacts from urbanization.

All of the monitoring reaches except for Station 17-Cold Creek and Station 18-Triunfo Creek were dominated by taxa in the collector-gatherer feeding group (Appendix B.1, Appendix B.3). Four of the top five dominant taxa in the study region (Chironomid midges, *Hyalella*, Oligochaetes, and *Baetis*) were all in the collector-gatherer feeding group, and are general indicators of urbanization of a watershed. Station 11-Los Angeles River had the greatest dominance by a single feeding group, where collector-gatherers comprised 99.8% of the community. Station 6-Arroyo Seco and Station 17-Cold Creek had the greatest evenness of distribution of the various feeding strategies, indicating a more dynamically functioning benthic community than the urban influenced sites. The two upper San Gabriel River sites, Station 2 (SGUT-504) and Station 3 (SGUT-505), also had good diversity of feeding groups. Station 18-Triunfo Creek had a rather unique species composition where scrapers made up 30% of the community. This site had an extremely high diversity of Gastropods (snails) with nine different taxa. By comparison, no other site had more than two different snail taxa.

Estimated Total Abundance: The estimated total abundance is the total number of animals predicted to be in the sample if the entire sample had been processed. This value was then used to calculate the estimated number of animals living in one square foot of benthic habitat. When the total abundance was less than 500 animals in a sample, the entire sample was sorted and the total abundance is an exact count, as was the case for Station 18-Triunfo Creek. Response to moderate habitat impairment is often indicated by an increase in total abundance by highly tolerant organisms, with a corresponding decrease in taxa richness and diversity; however, severe impairment can result in a catastrophic decrease in total abundance.

Estimated abundance ranged from 34 organisms per square foot of substrate at Station 18-Triunfo Creek to 7,097 organisms per square foot at Station 11-Los Angeles River (Appendix B.3). Station 4 (SGLR-063)-San Gabriel River also had very high organism abundance, with 6,933 organisms per square foot. Abundance at the reference sites was 163 and 261 organisms per square foot (Station 2 (SGUT-504)-San Gabriel River and Station 17-Cold Creek, respectively).

4.3 Physical Habitat Quality Assessment

The 10 parameters of the physical habitat of the monitoring reaches were scored on a 0 to 20 scale, thus 200 is the highest possible score. Table 3 lists the parameters and gives a brief description of the conditions that are most beneficial to macroinvertebrate communities. Most of the physical habitat quality parameters are scored in a qualitative manner, and they provide a good comparative tool for sites within a sampling program. Physical habitat quality scores for

each monitoring reach are presented in Appendix B.5, and water quality data are presented in Appendix B.6.

Table 3: Parameters Used to Characterize the Physical Habitat of a Stream Reach.

Parameter	Conditions Assessed	Optimal Conditions
Instream Cover	The percentage of substrate favorable for epifaunal colonization. Most favorable is a mix of layered cobble, snags, submerged logs, undercut banks, vegetation, and other stable habitats.	Complex mix of stable substrates occupying a high percentage of the stream bottom.
Embeddedness	The percentage of fine sediment surrounding gravel, cobble, and boulder particles.	Very little embeddedness, with layered substrate.
Velocity/Depth Regimes	The four velocity/depth regimes are: Slow-deep, slow-shallow, fast-deep, and fast-shallow.	A mix of all four regimes, dominated by fast-shallow.
Sediment Deposition	The percentage of bottom affected by the deposition of new gravel, sand or fine sediment.	Little or no new deposition, less than 5% of the bottom affected.
Channel Flow	The percentage of the stream channel filled by flowing water and the amount of substrate covered.	Water reaches base of both lower banks and minimal amount of substrate is exposed.
Channel Alteration	The amount of channelization, dredging, embankments, or shoring structures present.	Channelization or dredging absent or minimal; stream with normal pattern.
Riffle Frequency	The frequency of occurrence of riffle habitat.	Occurrence of riffles frequent, with variety of habitat.
Bank Stability	Evidence of erosion or bank failure.	Evidence of erosion and bank failure absent or minimal.
Vegetative Protection	The percent cover by undisturbed, native vegetation on the streambank surfaces and immediate riparian zones.	More than 90% of the streambank surfaces covered by native vegetation.
Riparian Vegetative Zone Width	The width of native riparian vegetation along both streambanks.	Width of riparian zone >18 meters; human activities have not impacted zone.
Source: Physical Habitat Form for the CSBP, revision date May 1999		

Total physical habitat quality scores ranged from 73 at Station 8-Compton Creek to 169 at Station 6-Arroyo Seco. Under the current scoring protocol, concrete lined channels are often over-scored due to high ratings in categories such as Embeddedness, Sediment Deposition, and Bank Stability. The scores generally rank the sites in the proper order based on overall quality, however.

Water quality measurements at most of the monitoring sites did not indicate severe impairment. Values for pH were all between 7.7 and 8.7. Specific conductance, a general indicator of dissolved solids, was moderate to low at all sites except Station 15-Medea Creek and Station 16-Las Virgenes Creek. Hardness measures ranged from 64 mg/L $CaCO_3$ at Station 16-Las Virgenes Creek to 1120 mg/L $CaCO_3$ at Station 15-Medea Creek. The hardness value at Medea Creek was substantially higher than at any of the other sites. Excessive salts, metallic cations

(e.g., calcium, magnesium, ferrous iron), and limestone formations can naturally elevate water hardness (Sawyer and McCarty, 1978). Dissolved oxygen levels were variable throughout the region, ranging from 4.25 mg/L at Station 13-Los Angeles River to 18.40 mg/L at Station 11-Los Angeles River. Water temperatures were also quite variable throughout the region, ranging from 15.9°C (60.6°F) at Station 17-Cold Creek to 35.7 degrees C (96.3°F) at Station 5-Walnut Channel. Turbidity, a measure of water clarity (clear waters have low ntu values), was low at most sites, but was elevated at Station 11-Los Angeles River and Station 13-Los Angeles River with values of 55.8 and 44.0 ntu, respectively.

4.4 Index of Biotic Integrity

In 2004, a Southern California Index of Biotic Integrity was developed to cover the region extending from southern Monterey County to the Mexican border (Ode et al., 2005). The IBI gives a single quantified score to a site based on a multi-metric evaluation technique, and the scores may be compared across seasons and years of a monitoring program to give an indication of trends over time. The CDFG developed the IBI based on a multi-year comprehensive assessment of reference and non-reference conditions in southern California to establish an expected range of benthic invertebrate community structure in the region.

Seven metrics were selected to calculate the IBI that showed a strong and predictable response to ecological impacts and stressors (Table 4). The seven metrics include Number Coleoptera Taxa, Number EPT Taxa, Number Predator Taxa, Percent Collector-Filterers plus Collector-Gatherers, Percent Intolerant Individuals, Percent Non-insect Taxa, and Percent Tolerant Taxa. Each metric value is given a score from 0 to 10, and the scores added to give a final IBI score; the highest possible total score is 70. Each final score is then classified into rating categories ranging from Very Poor to Very Good. Table 4 shows the metric scoring ranges and rating categories for the Southern California IBI.

Table 4: Index of Biotic Integrity Scoring Ranges.

Metric Score	Number Coleoptera Taxa	Number EPT Taxa	Number Predator Taxa	Percent CF+CG Individuals	Percent Intolerant Individuals	Percent Non-Insect Taxa	Percent Tolerant Taxa
10	>5	>17	>12	0-59	25-100	0-8	0-4
9		16-17	12	60-63	23-24	9-12	5-8
8	5	15	11	64-67	21-22	13-17	9-12
7	4	13-14	10	68-71	19-20	18-21	13-16
6		11-12	9	72-75	16-18	22-25	17-19
5	3	9-10	8	76-80	13-15	26-29	20-22
4	2	7-8	7	81-84	10-12	30-34	23-25
3		5-6	6	85-88	7-9	35-38	26-29
2	1	4	5	89-92	4-6	39-42	30-33
1		2-3	4	93-96	1-3	43-46	34-37
0	0	0-1	0-3	97-100	0	47-100	38-100
Cumulative Ratings: Very Poor: 0-13 Poor: 14-26 Fair: 27-40 Good: 41-55 Very Good: 56-70							

Source: Ode et al., 2005

The IBI is quite effective for broadly identifying impairment, and the boundary between Fair and Poor (IBI score of 26, 0-70 scale) is considered to be the threshold for impairment. It must be noted that small differences in IBI scores are not significant and may be due to natural biological variability within a stream reach. Ode et al. determined that the "minimum detectable difference" between IBI scores is about 9 points, thus two site scores must be at least 9 points apart from one another to determine one is of significantly higher quality than the other.

The total IBI scores for each monitoring reach are shown in Figure 2. A complete list of the mean metric values, individual IBI scores, and the total IBI scores, are presented in Appendix B.7.

The 17 monitoring reaches in Los Angeles County had IBI ratings ranging from Good to Very Poor. Three of the sites were rated Good, including Station 2 (SGUT-504)-San Gabriel River, Station 6-Arroyo Seco, and Station 17-Cold Creek. Stations 2 and 17 were designated reference sites. Station 13-Los Angeles River was also a designated reference site, and the IBI score for this monitoring reach was 1, with a rating of Very Poor. The reference monitoring reach of Station 13-Los Angeles River was located within a concrete lined channel upstream of the Sepulveda Dam and did not represent true reference conditions (Ode et al., 2005). Station 11-Los Angeles River was the lowest rated site with a total IBI score of 0.

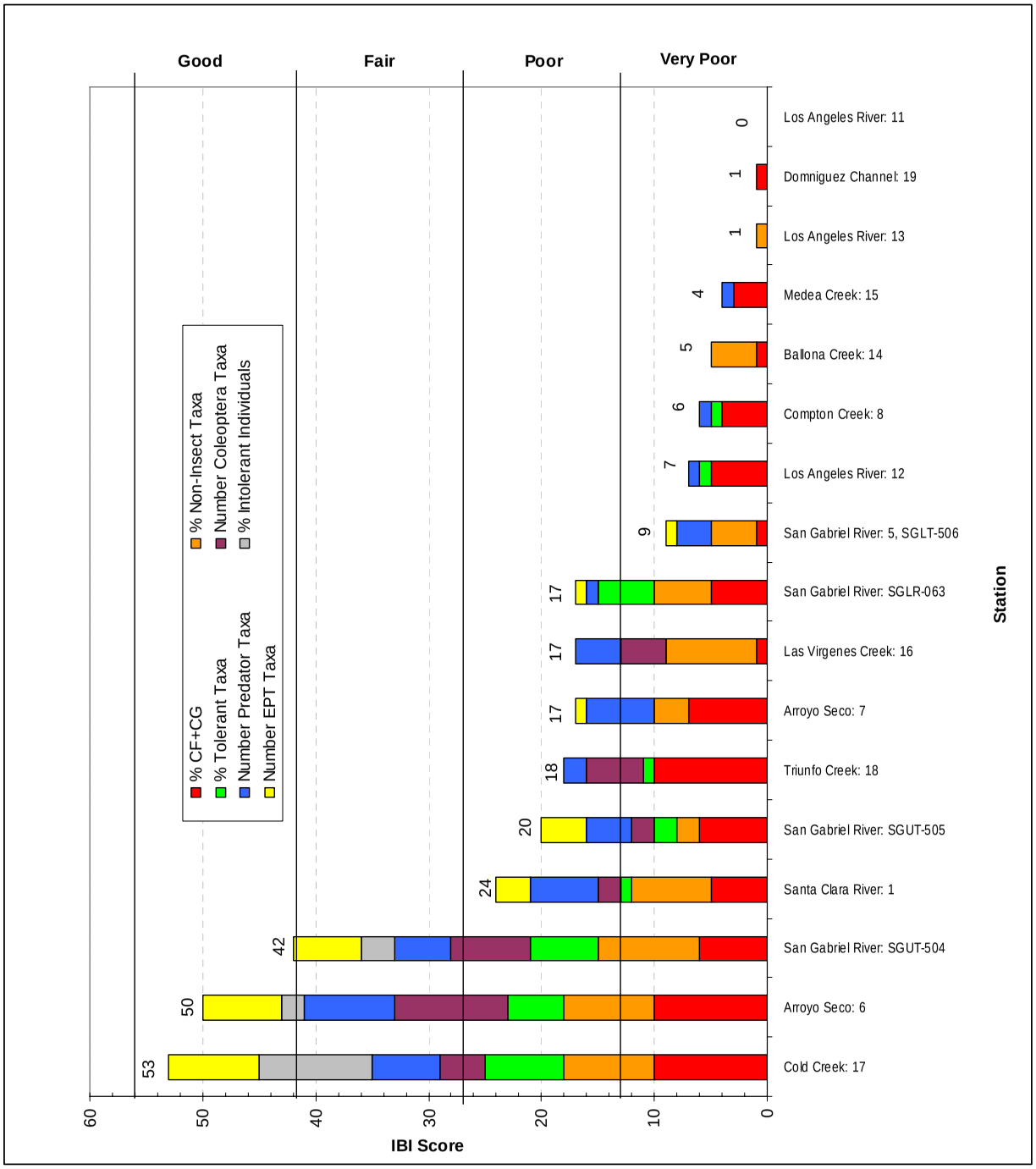


Figure 2: Index Biotic Integrity Scores for LADPW Bioassessment Sites, 2006 (0-70 scale).

4.5 Concrete Lined Channels versus Unlined Channels

Since the beginning of the program, eight of the monitoring reaches have been sampled in concrete lined channels (Stations SGLR-043, SGLR-047, SGLR-063, 2/2A, 12, 13, 14, and 19), and one (Station 11) was partially lined with concrete. This type of substrate is considered to be inferior to a more complex natural substrate (e.g., layered cobblestone, plant stems, or wood) for macroinvertebrate colonization. The lined channels were mostly devoid of coarse organic food sources and riparian canopy, and had uniform water flow characteristics consisting of flat "runs" rather than true riffles. Physical habitat scores for these sites are somewhat elevated due to very stable bank conditions and they typically have ample flow volume due to persistent urban runoff (see Appendix D, Physical Habitat Quality data sheets). It may be noted that regression analysis of the relationship between physical habitat quality and IBI scores in urban runoff dominated streams has shown almost no correlation between the two (MEC, 2003).

All of the lined channel sites had mean IBI scores that were rated Poor and Very Poor (Figure 3). The lined sites in the lower San Gabriel River (Stations SGLR-043, SGLR-047, and SGLR-063) received ratings of Poor, except for Station 2 which was Very Poor. The lined sites in Los Angeles River, Ballona Creek, and Dominguez Channel (Stations 12, 13, 14, and 19, respectively) had IBI scores in the Very Poor range. The IBI scores of the lined channel sites were quite evenly distributed among the other lower-watershed urban sites. An analysis of variance (ANOVA) of IBI scores for lined versus unlined sites indicated no significant difference ($p=0.23$) of IBI scores between the two types of habitat. Thus, it is not apparent that the poorer quality physical habitats of the lined channel sites had a significant effect on overall IBI scores in the lower watershed stream reaches that were dominated by urban runoff. In other words, water quality was likely the primary driver of macroinvertebrate community structure in the lower watershed areas.

The Mann-Whitney test was used to determine if the IBI scores for unlined sites are statistically different from IBI scores at concrete lined sites. This test is a non-parametric alternative to the two-sample t-test. Instead of using the actual values of the dataset, ranks of the data are used. More detailed methods may be found in Zar, 1999. Sites SGLR-063, SGLR-047, SGLR-043, 11, 12, 13, 14, and 19 were used for the concrete lined channel dataset. All other sites were included as unlined. There was no differentiation between how many samples were collected at each site. All results for the two groups were pooled together, and the two groups compared.

The hypothesis was tested at an alpha of 0.05:

H_0: Unlined =Lined
H_a: Unlined $\neq$ Lined

The test was run using two scenarios, both with and without the reference sites.

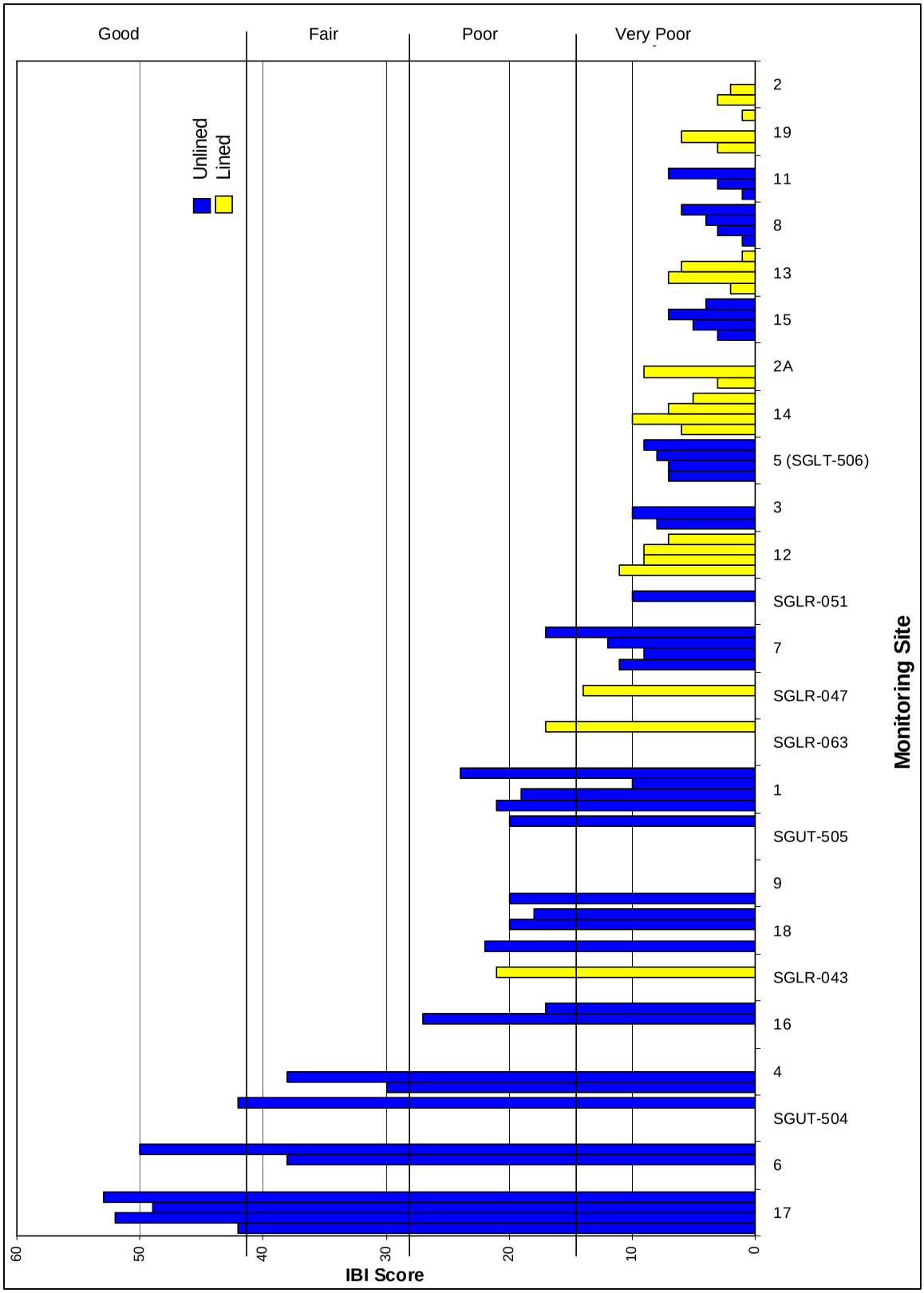


Figure 3: Comparison of IBI Scores of Concrete Lined and Unlined Channels (0-70 scale)

The results of the analysis indicate that in both scenarios the null hypothesis is rejected and the alternate accepted. This means that the IBI scores at unlined sites are statistically different, overall, than the IBI scores at lined sites. In Figure 4, below, a visual comparison of the two groups is presented. One version does not include reference sites in the unlined group, while the other does include reference sites in the unlined group. Without considering reference sites, the mean IBI scores of the unlined sites are slightly higher than the 75th percentile of the lined sites. When reference sites are considered, this difference is increased and the unlined sites are clearly statistically superior to the lined sites. This result is different than previous years' analyses, when there was not a significant difference between lined and unlined lower watershed sites (Weston, 2006). This is due to the 2006 survey having lower IBI scores for the lined sites than in the past, and many of the unlined sites having higher scores in 2006, thus increasing the overall disparity between lined and unlined sites.

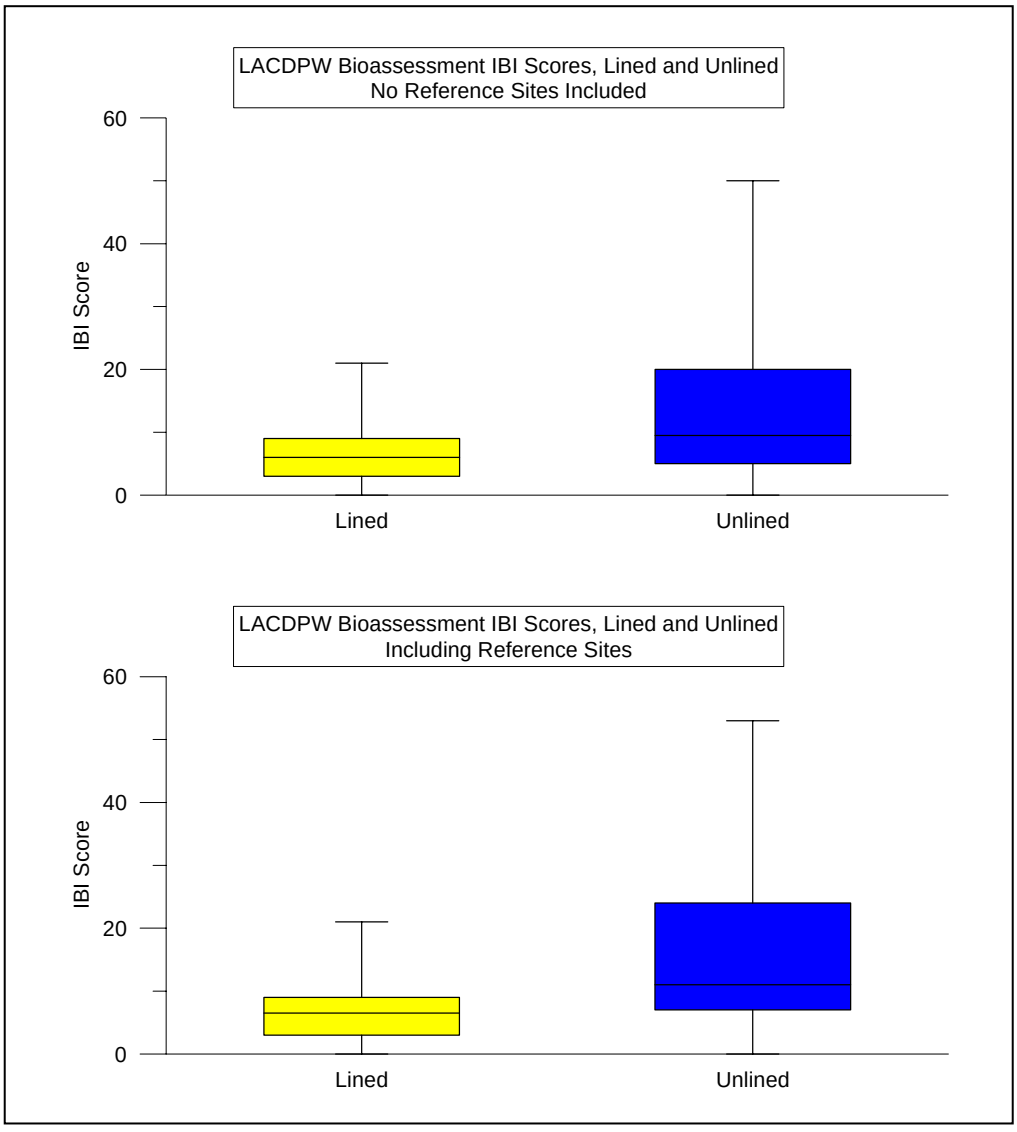


Figure 4: Comparison of lined and unlined channel sites, 2003-2006 (0-70 scale).

Table 5 below shows the mean biological metric values of four individual metrics that are considered strong indicators of ecological health. Lined channel sites are shaded in gray and the top three metrics are highlighted in green. Note that a low value for Percent Collector Filterers plus Collector Gatherers is an indication of good habitat conditions.

Table 5: Selected Metric Values, Mean of 2003-2006 Surveys.
(concrete lined channels are highlighted in gray, top three metric values are highlighted in green)

Monitoring Reach/Station Number		Taxa Richness	EPT Taxa	Percent Intolerant Taxa	Percent Collector Filterers plus Collector Gatherers
Santa Clara River	1	20.2	4.5	0%	83.7%
Coyote Creek**	2	11.5	1.5	0%	89.5%
Coyote Creek*	2A	10.0	4.0	0%	99.0%
San Jose Creek**	3	10.5	2.0	0%	84.0%
San Gabriel River**	4	24.0	12.0	3.1%	85.0%
Walnut Channel (SGLT-506)	5	13.0	1.3	0%	88.0%
Arroyo Seco**	6	35.0	11.5	2.6%	61.3%
Arroyo Seco	7	17.5	2.8	0%	82.8%
Compton Creek	8	13.0	1.5	0%	91.5%
Zone 1 Ditch*	9	21.0	5.0	0%	74.0%
Eaton Wash	10	--	--	--	--
Los Angeles River	11	9.3	1.0	0%	98.5%
Los Angeles River	12	9.3	2.0	0%	93.0%
Los Angeles River	13	11.3	1.7	0%	95.0%
Ballona Creek	14	12.0	2.0	0%	95.3%
Medea Creek	15	11.2	0.8	0%	82.3%
Las Virgenes**	16	21.5	3.5	2.6%	81.7%
Cold Creek	17	27.0	11.3	37.5%	26.2%
Triunfo Creek***	18	26.3	2.3	0.3%	52.6%
Dominguez Channel	19	9.7	0	0%	93.5%
Bouquet Canyon	20	--	--	--	--
SGUT-504*	NA	27.0	12.0	7.6%	79.0%
SGUT-505*	NA	20.0	8.0	0%	74.6%
SGLR-043*	NA	13.0	0.0	0%	74.0%
SGLR-047*	NA	11.0	0.0	0%	90.0%
SGLR-051*	NA	15.0	3.0	0%	72.0%
SGLR-063*	NA	14.0	3.0	0%	79.4%
*Sampled one year **Sampled two years ***Sampled three years					

Overall, most of the concrete lined channels had lower Taxa richness, EPT taxa diversity, no intolerant taxa present, and higher percentages of Collector-Filterers plus Collector Gatherers than the unlined sites.

Mean taxa richness ranged from 35.0 taxa at Station 6-Arroyo Seco to 9.3 taxa at Station 11-Los Angeles River and Station 12-Los Angeles River (Table 5). Most of the lower watershed sites had mean taxa richness values in the range of 9 to 13 taxa per survey. The mid-watershed sites had mean taxa richness in the range of 17-26 taxa with the exception of Station 15-Medea Creek, which had a mean of 11.2 taxa per survey. The number of EPT taxa was quite variable, and four sites had considerably greater EPT diversity than all of the other sites. Station 4-San Gabriel River, Station SGUT-504-San Gabriel River, Station 6-Arroyo Seco, and Station 17-Cold Creek had eleven or more EPT taxa, while all but one of the other sites averaged five or less EPT taxa. The lower watershed sites typically had three or fewer EPT taxa, most frequently consisting of the mayflies, *Baetis* and *Fallceon quilleri*, and the caddisfly *Hydroptila*.

The metric Percent Intolerant Taxa is perhaps the strongest indicator of good water quality conditions, but the metric lacks gradation for moderately to highly impaired water bodies as these intolerant taxa are typically absent. Station 17-Cold Creek had an average of 37.5 percent Intolerant Taxa per survey, and the next highest site, Station SGUT-504 had 7.6 percent. Nineteen of the twenty-five sites had no intolerant taxa collected over the four years of surveys, and all but two of these (Station SGUT-505-San Gabriel River and Station 15-Medea Creek) were located in the lower reaches of the watersheds.

Mean Percent Collector Filterers plus Collector Gatherers (CF+CG) ranged from 26.2 percent at Station 17-Cold Creek to 99.0 percent at Station 2A-Coyote Creek. Most of the lower watershed sites had greater than 80 percent of the benthic community utilizing these feeding strategies. This metric must be interpreted with care, for in some situations a high abundance of an impairment tolerant organism can occur that is not in these two feeding groups, thus reducing the Percent CF+CG. A notable example of this occurred at Station 18-Triunfo Creek, where a high abundance of snails (Scrapers) were present; this site also had one of the highest percent tolerant taxa in the region. Conversely, a high number of organisms in the CF+CG feeding group may be present, while the overall community may have many low tolerance organisms.

To determine if the lined channel sites supported unique benthic communities, a cluster analysis was performed to look for similarities between location and community structure (Figure 5). The analysis is based on a Bray-Curtis similarity index calculated on relative abundances of taxa by location. Locations with similar communities of taxa will cluster together; likewise taxa that occur at the same locations will cluster together. The results are portrayed in a two-way table that shows the relative abundance of each taxon by location.

Results of the cluster analysis show four major species clusters and four station clusters, labeled one through four and A through D, respectively (Figure 5). The shaded blocks highlight the major clusters. In the 2006 survey, the concrete lined channels did not cluster together as much as in previous surveys, and were spread over Station clusters A, C, and D. Overall, the species clusters were not very strong, as many taxa are either ubiquitous or were collected at only one site and thus are dropped from this analysis.

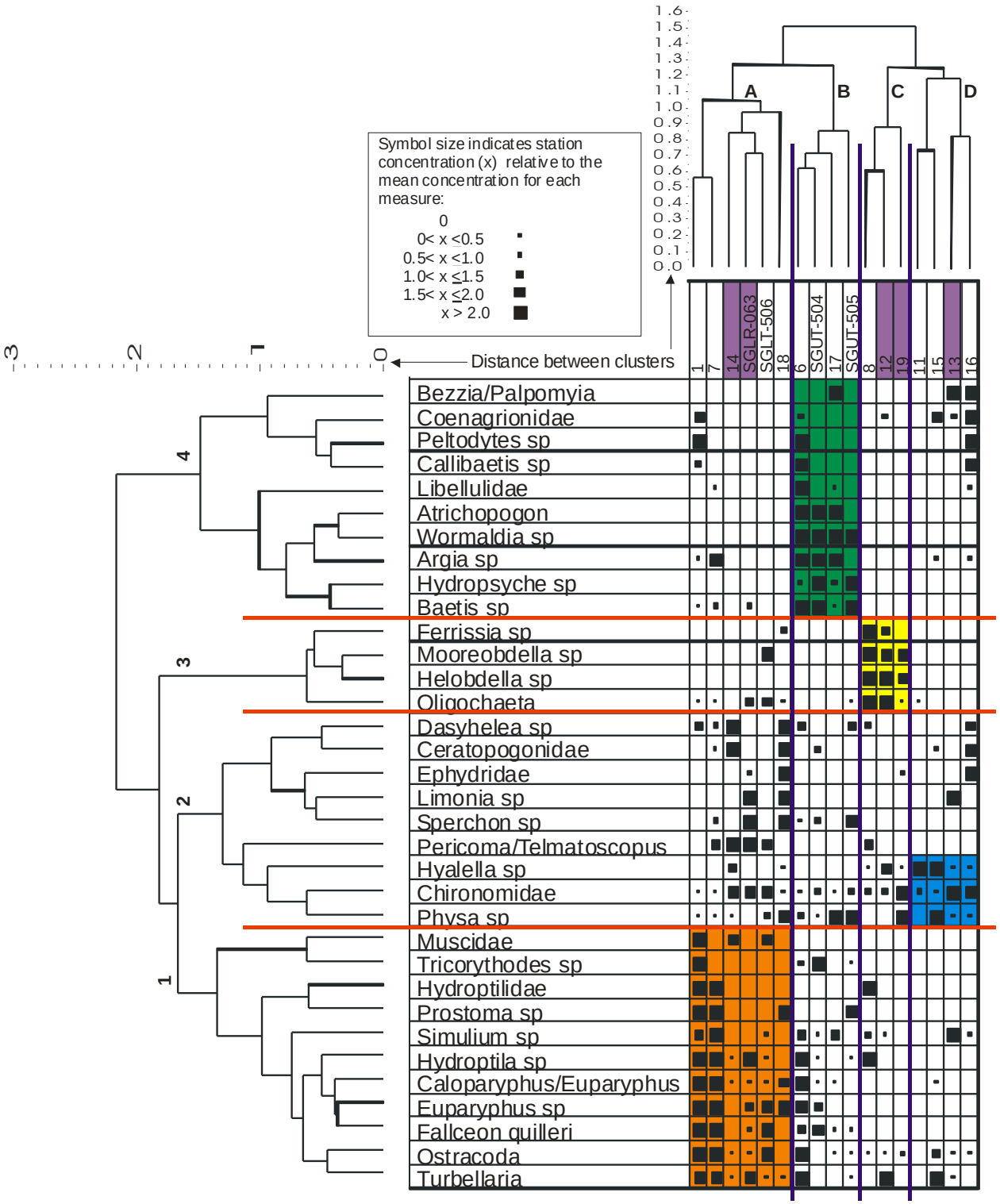


Figure 5: Cluster Analysis of Stations and Taxa For LACDPW Bioassessment Monitoring Sites, 2006. Concrete lined sites are highlighted in purple.

Station cluster A included several of the mid-watershed stations and the lined sites Station 14-Ballona Creek and Station SGLR-063-San Gabriel River. Organisms best representing this cluster included the caddisfly, *Hydroptila*, Soldier flies (*Caloparyphus/Euparyphus*), Ostracods, and Turbellarian flatworms. Cluster A also had a strong sub-cluster comprised of Station 1-Santa Clara River plus Station 7-Arroyo Seco.

Station cluster B included the higher IBI, upper-watershed sites and did not include any of the lined sites. Organisms representative of this cluster included the caddisflies, *Hydropsyche* and *Wormaldia*, the mayfly, *Baetis*, and the damselfly, *Argia*.

Station cluster C included two lined sites, Station 12-Los Angeles River and Station 19-Dominguez Channel. Organisms representative of this cluster included the leeches, *Helobdella* and *Mooreobdella* and Oligochaetes (earthworms).

Station cluster D included one lined site and one partially lined site, Station 13-Los Angeles River and Station 11-Los Angeles River. Organisms representative of this cluster included the amphipod, *Hyalella*, Chironomid midges, and the non-native snail, *Physa*. These three organisms were also quite ubiquitous throughout the region, and are more likely an indication of the opportunistic nature of these taxa than any unique characteristics of the stations within cluster D.

4.6 Comparison of 2003 through 2006 Survey Results

Information from the 2003, 2004, and 2005 studies (Bonterra, 2004; Weston, 2005; Weston, 2006) was compared to the 2006 data to assess the year-to-year variance and trends in biotic integrity of the streams. Monitoring reaches were re-located in very close proximity to previous years' surveys and were sampled at the same time of year (mid fall) except for the San Gabriel River sites, which were offset as a contribution to the San Gabriel River Watershed Monitoring Project and were sampled in July. One other site, Station 19-Dominguez Channel was moved approximately ½ mile upstream in 2006 due to high salinity detected at the previous site. The laboratory and data reduction procedures remained unchanged for the first three survey years. The 2006 survey differed in the level of laboratory processing of benthic samples, with a total of 500 organisms processed vs. 900 for previous surveys. This did not appear to effect the IBI scores since the 900 count samples of the old method were randomly reduced to 500 organisms for IBI calculation. Also note that the 2006 survey with the reduced level of effort had the greatest cumulative diversity of taxa across the region.

Station 1-Santa Clara River
November 2004

Station 1-Santa Clara River
November 2005

Station 1-Santa Clara River
October 2006

Regional macroinvertebrate community structure was relatively similar in all four survey years. The ten most abundant taxa at all sites combined were nearly the same for all four surveys. The 2006 survey collected the greatest number of unique taxa, 96, compared to 88 in 2003, 73 in 2004 and 81 in 2005.

Overall IBI ratings at most of the sites in the study were fairly consistent from 2003 thru 2006 and none of the sites showed any significant trends toward improvement or degradation (Table 6). Most sites have varied by about four to eight IBI points over the four surveys, and all but four sites received the same quality rating for every survey. Three of these sites (Station 1-Santa Clara River, Station 6-Arroyo Seco, and Station 7-Arroyo Seco) had increased IBI scores for 2006, while Station 16-Las Virgenes Creek decreased significantly. Station 1-Santa Clara River had the greatest variability in IBI scores, with a 14 point range between the high and low score. This result was likely due to the substrate conditions at the site, which were severely eroded by the heavy storm flows over the winter of 2004/2005 (see photos this page). By the 2006 survey the site had recovered significantly and the highest IBI score to date was obtained.

Station 17-Cold Creek was the highest rated site for all four surveys. The highest rated non-reference sites were Station 18-Triunfo Creek (2003), Station 1-Santa Clara River (2004) and Station 6-Arroyo Seco (2005 and 2006).

Table 6: Comparison of IBI scores 2003-2006.

Monitoring Reach/Station Number		IBI Score 2003	IBI Score 2004	IBI Score 2005	IBI Score 2006	Mean IBI Score
Cold Creek	17	**42**	**52**	**49**	**53**	**49.0**
Arroyo Seco	6	Dry	Dry	**38**	**50**	**44.0**
San Gabriel River	4	**30**	**38**	Not Sampled	Not Sampled	**34.0**
Las Virgenes	16	Dry	Dry	**27**	**17**	**22.0**
Triunfo Creek	18	**22**	Dry	**20**	**18**	**20.0**
Santa Clara River	1	**21**	**19**	**10**	**24**	**18.5**
Arroyo Seco	7	**11**	**9**	**12**	**17**	**12.3**
Los Angeles River	12	**11**	**9**	**9**	**7**	**9.0**
San Jose Creek	3	**8**	**10**	Not Sampled	Not Sampled	**9.0**
Ballona Creek	14	**6**	**10**	**7**	**5**	**7.0**
Walnut Channel (SGLT-506)	5	**7**	**7**	**8**	**9**	**7.8**
Coyote Creek	2A	**3**	**9**	Not Sampled	Not Sampled	**6.0**
Medea Creek	15	**3**	**5**	**7**	**4**	**4.8**
Los Angeles River	13	**2**	**7**	**6**	**1**	**4.0**
Compton Creek	8	**1**	**3**	**4**	**6**	**3.5**
Dominguez Channel	19	**3**	**6**	**0**	**1**	**3.3**
Los Angeles River	11	**1**	**3**	**7**	**0**	**2.8**
Coyote Creek	2	**3**	**2**	Not Sampled	Not Sampled	**2.5**
Sites Sampled One or Fewer Times						
San Gabriel River (SGUT-504)	2	Not Sampled	Not Sampled	Not Sampled	**42**	**42.0**
San Gabriel River SGLR-043	2	Not Sampled	Not Sampled	**21**	Not Sampled	**21.0**
San Gabriel River (SGUT-505)	3	Not Sampled	Not Sampled	Not Sampled	**20**	**20.0**
Zone 1 Ditch	9	**20**	Dry	Dry	Dry	**20.0**
San Gabriel River (SGLR-063)	4	Not Sampled	Not Sampled	Not Sampled	**17**	**17.0**
San Gabriel River (SGLR-047)	3	Not Sampled	Not Sampled	**14**	Not Sampled	**14**
Carbon Creek SGLR-051	4	Not Sampled	Not Sampled	**10**	Not Sampled	**10**
Eaton Wash	10	Dry	Dry	Dry	Dry	**--**
Bouquet Canyon	20	Dry	Dry	Dry	Dry	**--**

5.0 SUMMARY

Seventeen receiving water monitoring reaches representing six watersheds in Los Angeles County were sampled for benthic macroinvertebrates and assessed for physical habitat quality on July 19 and 26, and from October 3 to 10, 2006. The monitoring reaches were located to provide an assessment of possible impacts associated with urban runoff and to evaluate the biological conditions for trend analysis of the benthic macroinvertebrate communities of the region.

Taxonomic evaluation of the samples yielded 96 different taxa from 8,445 individual organisms. The most abundant organisms collected throughout the region were midges of the family Chironomidae. The majority of organisms collected from the monitoring reaches were moderately or highly tolerant to stream impairments, and all of the sites except Station 17-Cold Creek (a reference site) were dominated by organisms in the collector-gatherer feeding guild.

The Index of Biotic Integrity scores of the monitoring reaches ranged from 0 to 53 out of a possible 70 points, and the benthic macroinvertebrate communities were rated from Very Poor to Good. Station 17-Cold Creek was the highest rated site and Station 6-Arroyo Seco was the second highest rated site with IBI scores of 53 and 50, respectively. Six of the monitoring reaches were located in highly modified, concrete-lined urban water courses, and these sites all had IBI ratings of Poor or Very Poor. Analysis of individual metrics, as well as total IBI scores showed that monitoring sites located in the lower watershed areas had lower quality benthic communities than sites located in the mid to upper reaches of the watersheds.

Comparison of the IBI scores for the four survey years to date did not indicate any substantial trend towards degradation at any of the sites, although most of the lower watershed sites had lower IBI scores in the 2006 survey than in 2005. Most of the mid and upper watershed sites had increased IBI scores from 2005 to 2006 except for Station 16 Las Virgenes Creek, which may not have fully recovered from wildfire impacts that occurred in 2005. Station 1-Santa Clara River showed the greatest improvement in IBI score, likely due to recovery from severe scouring that occurred in the winter of 2004/2005.

An analysis of the difference between concrete lined versus unlined sites indicated that there was a slight but statistically significant difference in IBI scores at sites located in the lower watershed areas. When reference sites were added to the analysis, the difference in IBI scores between lined and unlined sites was of much greater significance. Cluster analysis of the taxa present at the lower watershed sites indicated only minor differences in species composition between lined and unlined sites, as all of the lower watershed sites were populated primarily with ubiquitous, opportunistic organisms.

6.0 REFERENCES

Arnett, R.H. 1993. American insects. The Sandhill Crane Press, Gainesville, Florida.

Barbour, M.T., J. Gerritsen, B.D. Snyder and J.B. Stribling. 1999. Revision to rapid bioassessment protocols for use in streams and rivers: periphyton, BMIs, and fish. EPA 841-D-97-002. U.S. Environmental Protection Agency. Washington D.C.

BonTerra Consulting. 2004. Bioassessment Monitoring Program in Los Angeles County. Prepared for Los Angeles County Department of Public Works. July, 2004.

California Aquatic Macroinvertebrate Laboratories Network (CAMLNet) List of Californian Macroinvertebrate Taxa and Standard Taxonomic Effort. Revision date: 27 January, 2003. Available at http://www.dfg.ca.gov/cabw/camlnetste.pdf

County of San Diego. 2003. San Diego County Municipal Co-permittees 2001-2001 urban runoff monitoring. Prepared by MEC Analytical Systems, Inc. January, 2003.

Harrington, J.M. 1999. California stream bioassessment procedures. California Department of Fish and Game, Water Pollution Control Laboratory. Rancho Cordova, CA.

Harrington, J.M. 2003. California stream bioassessment procedures. California Department of Fish and Game, Water Pollution Control Laboratory. Rancho Cordova, CA.

Larson, D.J., Y. Alarie, and R.E. Roughly. 2000. Predaceous diving beetles (Coleoptera: Dytiscidae) of the nearctic region. NRC Research Press, Ottowa.

Mackay, R.J. 1978. Larval identification and instar association in some species of *Hydropsyche* and *Cheumatopsyche* (Trichoptera: Hydropsychidae). Entomological Society of America 71(4):499-509.

MEC Analytical Systems, Inc (MEC). 2003. San Diego County Municipal Copermittees 2001-2001 urban runoff monitoring. Prepared for the County of San Diego. January, 2003.

Merritt, R.W. and K.W. Cummins. 1996. An introduction to the aquatic insects of North America. Third Edition. Kendall Hunt Publishing Company, Dubuque, Iowa.

Norris, R.H. and A. Georges. 1993. Analysis and interpretation of benthic macroinvertebrate surveys. In: D.M. Rosenberg and V.H. Resh, eds, Chapman and Hall, New York, New York.

Ode P.R., A.C. Rehn, and J.T. May. 2005. A quantitative tool for assessing the integrity of southern coastal California streams. Environmental management, 35 (1): 1-13.

Pennak, R.W. 1989. Freshwater invertebrates of the United States, Protozoa to Mollusca, Third Edition. John Wiley and Sons, Inc., New York, New York.

Physical Habitat Form for the CSBP. Revision date May 1999. Available at http://www.dfg.ca.gov/cabw/Field/rbp_physical_habitat_table.PDF

Resh, V.H. and J.K. Jackson. 1993. Rapid assessment approaches to biomonitoring and benthic macroinvertebrates. In: D.M. Rosenberg and V.H. Resh, eds, Chapman and Hall, New York, New York.

Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT). 2006. List of macroinvertebrate taxa from California and adjacent states and ecoregions; and standard taxonomic effort. Available at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. Edited by A.B. Richards and D.C. Rogers. November 2006.

San Diego Regional Water Quality Control Board (SDRWQCB). 1999 Biological Assessment Annual Report. Prepared by California Department of Fish and Game, Office of Spill Prevention and Response, Water Pollution Control Laboratory. Rancho Cordova, California.

SDRWQCB. 2001 Biological Assessment Annual Report. Prepared by California Department of Fish and Game, Office of Spill Prevention and Response, Water Pollution Control Laboratory. Rancho Cordova, California.

Sawyer, C.N. and P.L. McCarty. 1978. Chemistry for Environmental Engineering. Third Edition. McGraw-Hill Series in Water Resources and Environmental Engineering. McGraw-Hill Book Company, New York.

SLSI, Sustainable Lands Stewardship Institute, Sacramento California. 2003. Biological and physical/habitat assessment of selected sites within the San Gabriel River Watershed.

Smith, D.G. 2001. Pennaks Freshwater Invertebrates of the United States. John Wiley & Sons, Inc. New York.

Stewart, K. W. and Bill P. Stark. Nymphs of North American Stonefly Genera (Plecoptera). Second Edition. The Caddis Press, Columbus, Ohio. 2002.

Thorp, H.T. and A.P. Covich. 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, Inc., San Diego, California

Thorp, H.T. and A.P. Covich. 2001. Ecology and classification of North American freshwater invertebrates, Second Edition. Academic Press, Inc., San Diego, California

Usinger, R.L. 1956. Aquatic insects of California. University of California Press, Berkeley, California.

Welch, E.C. and T. Lindell. 2000. Ecological Effects of Wastewater. E and FN Spoon, London, England.

Weston Solutions. 2005. October 2004 Bioassessment Monitoring Program in Los Angeles County. Final Report. Prepared for Prepared for Los Angeles County Department of Public Works. April 2005.

Weston Solutions. 2006. 2005 Bioassessment Monitoring Program in Los Angeles County. Final Report. Prepared for Prepared for Los Angeles County Department of Public Works. April 2006.

Wiggins, G.B. 1998. Larvae of the North American caddisfly genera (Trichoptera), second edition. University of Toronto Press, Toronto.

Yoder, C.O. and E.T. Rankin. 1998. The role of biological indicators in a state water quality management process. Environmental Monitoring and Assessment 51: 61-68.

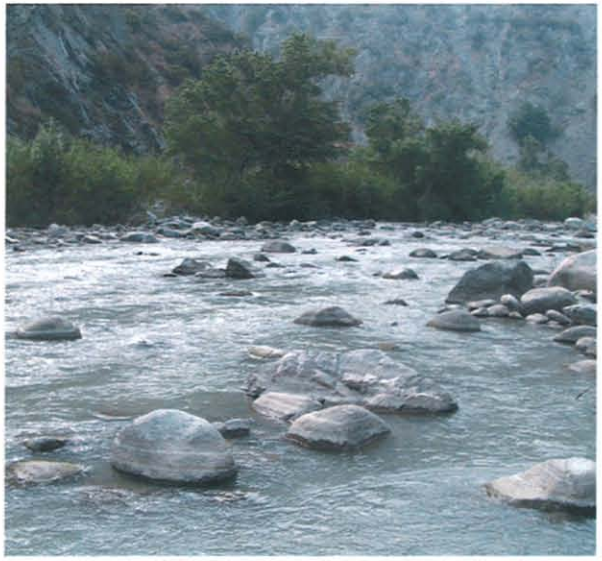
Zar, J.H. 1999. Biostatistical Analysis, 4th ed. Prentice Hall, Upper Saddle River, New Jersey.

APPENDIX A

Photos of Monitoring Reaches

Appendix A photos

SGLR-063-San Gabriel River Tributary

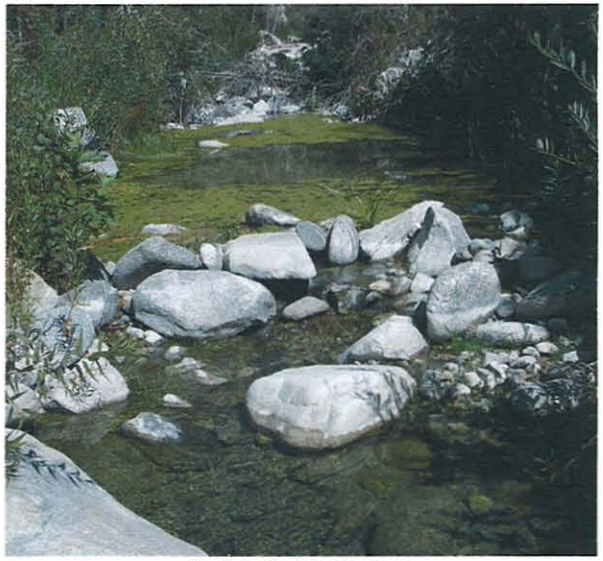


SGUT-504-San Gabriel River

SGUT-505-San Gabriel River

Station 01-Santa Clara River

Station 05 (SGLT-506)



Station 06-Arroyo Seco

Appendix A photos

Station 07-Arroyo Seco

Station 08-Compton Creek

Station 10-Eaton Wash (dry)

Station 11-Los Angeles River

Station 12-Los Angeles River

Station 13-Los Angeles River

Appendix A photos

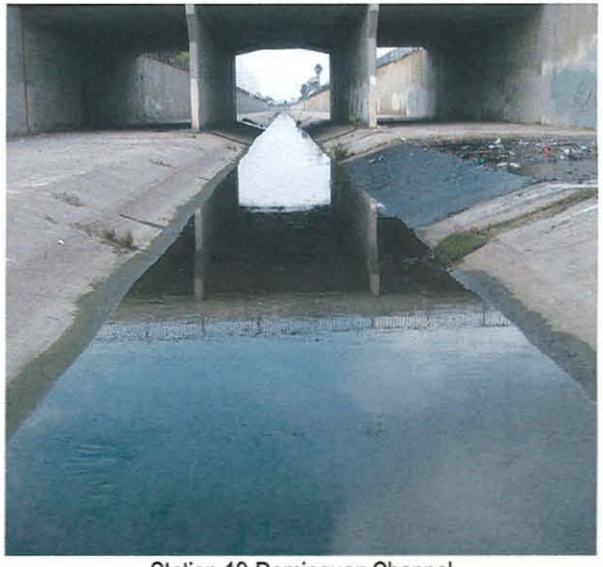
Station 14-Ballona Creek

Station 15-Medea Creek

Station 16-Las Virgenes Creek

Station 17-Cold Creek

Station 18-Triunfo Creek



Station 19-Dominguez Channel

Appendix A photos

Station 20-Bouquet Canyon (dry)

APPENDIX B

Survey Results Data

Appendix B.1: Taxonomic Listing of Benthic Macroinvertebrates Collected from LACDPW Monitoring Sites, 2006.

TV=Tolerance Value: range is 0-10; 0 is intolerant to impairment. FFG=Functional Feeding Group; cg=collector gatherer, cf=collector filterer, sc=scraper, p=predator, pa=parasite, mh=macrophyte herbivore, ph=piercer herbivore, om=omnivore (Source: CAML Net January 2003)

	TV	FFG	1	SGUT-504	SGUT-505	SGLR-63	5 SGLT-506	6	7	8	9*	10*	11	12	13	14	15	16	17	18	19	20*
PHYLUM ARTHROPODA																						
Insecta																						
Ephemeroptera (mayflies)																						
Baetidae																						
Baetis sp	5	cg	1	97	120	10		50	15										8			
Callibaetis sp	9	cg	1					2										19				
Centroptilum/Procleon sp	3	cg		6																		
Fallceon quilleri	4	cg	40	14	1	4	26	10	59										1			
Ephemerellidae																						
Serratella sp	2	cg		22																		
Heptageniidae																						
Epeorus sp	0	sc		10																		
Leptohyphidae																						
Tricorythodes sp	4	cg	134	42	2			6														
Leptophlebidae																						
Paraleptophlebia sp	4	cg																	10			
Odonata (dragonflies)																						
Aeshindae																						
Anax sp	8	p																1				
Calopterygidae	5	p																				
Hetaerina americana	6	p	2																			
Coenagrionidae	9	p	2					1						1	1		2	11				
Argia sp	7	p	2	24				34	27								2	4	56			
Ischnura sp	9	p	1																			
Cordulegastridae	3	p																				
Cordulegaster dorsalis	3	p		2															2			
Gomphidae	4	p																				
Progomphus borealis	4	p	2																			
Libellulidae	9	p						45	1									1	1			
Brechmorhoga mendax	9	p	2						1													
Libellula sp	9	p							1													
Paltothemis lineatipes	9	p						33	9													
Plecoptera (stoneflies)																						
Chloroperlidae	1	p																				
Sweltsa	1	p																	4			
Nemouridae	2	sh																	2			
Malenka sp	2	sh																	35			
Hemiptera (true bugs)																						
Belostomatidae	8	p		2	1																	
Corixidae	8	p					3															
Corisella sp	8	p					3						1									
Trichocorixa sp	8	p					1															
Trichoptera (caddisflies)																						
Brachycentridae	1																					
Micrasema sp	1	mh						14											1			
Glossosomatidae	0	sc																				
Agapetus sp	0	sc																	1			
Helicopsychidae	3	sc																				
Helicopsyche sp	3	sc		31																		
Hydropsychidae	4	cf																				
Cheumatopsyche sp	5	cf						15														
Hydropsyche sp	4	cf		33	161			2											7			
Hydroptilidae	4	ph	2						3	6												
Hydroptila sp	6	ph	36	2	4	43	3	37	63	31						3						
Neotrichia sp	4	sc		3															1			
Ochrotrichia sp	4	ph			18			1														
Lepidostomatidae	1	sh																				
Lepidostoma sp	1	sh																	171			
Leptoceridae	4	om																				
Oecetis disjuncta	8	p																	1			
Philopotamidae	3	cf																				

Appendix B.1: Taxonomic Listing of Benthic Macroinvertebrates Collected from LACDPW Monitoring Sites, 2006.

	TV	FFG	1	SGUT-504	SGUT-505	SGLR-63	5 SGLT-506	6	7	8	9*	10*	11	12	13	14	15	16	17	18	19	20*
Wormaldia sp	3	cf		3	1			3											1			
Polycentropodidae	6	p																				
Polycentropus sp	6	p			4			2														
Psychomyiidae	2	sc																				
Tinodes sp	2	sc		5				8														
Rhyacophilidae	0	p																				
Rhyacophila sp	0	p																	2			
Sericostomatidae	3	sh																				
Gumaga sp	3	sh						1											2			
Lepidoptera (moths)																						
Nepticulidae		s	3																			
Coleoptera (beetles)																						
Dryopidae	5	sh																				
Helichus sp	5	sh						7														
Postelichus	5	sh		17				3														
Dytiscidae	5	p																				
Hydroporinae (immature)	5	p			1																	
Stictotarsus sp	5	p																1				
Elmidae	4	cg																				
Optioservus sp	4	sc						2														
Zaitzevia sp	4	sc						7											26			
Haliplidae	5	mh																				
Peltodytes sp	5	mh	1					4										2				
Hydraenidae	5	p																				
Hydraena sp	5	p		1															7			
Hydrochidae																						
Hydrochus sp																				10		
Hydrophilidae	5	p																				
Berosus sp	5	p						2												1		
Cymbiodyta sp	5	p						1														
Enochrus sp	5	cg																		1		
Laccobius sp	5	mh		3																		
Tropisternus sp	5	p		1																		
Psephenidae	4	sc																				
Psephenus falli	4	sc						28														
Diptera (ture flies)																						
Ceratopogonidae	6	p		2					1							17	1	6		34		
Atrichopogon	6	cg		1				2											4			
Bezzia/Palpomyia	6	p													1			1	1			
Culicoides sp	6	p																1				
Dasyhelea sp	6	cg	2		2			2	1	1						8		2		14		
Chironomidae	6	cg	98	141	105	358	351	41	54	169			176	106	443	368	9	395	77	8	468	
Culicidae	8	cg																				
Anopheles sp	8	cg																11				
Culex sp	8	cg																12				
Dixidae	2	cg																				
Meringodixa chalonensis	2	cg																	4			
Dolichopodidae	4	p				1				3												
Empididae	6	p																				
Hemerodromia sp	6	p				11		2														
Ephydridae	6					1												6		10	1	
Muscidae	6	p	7				1									1						
Psychodidae		cg														3						
Maruina lanceolata	2	sc						1											2			
Pericoma/Telmatoscopus	4	cg				2	1		1	1						8						
Psychoda sp	10	cg														1		2				
Simuliidae	6	cf																				
Simulium sp	6	cf	16	2			1	16	111	11				1	34			3	13			
Stratiomyidae	8	cg																				
Caloparyphus/Euparyphus	8	cg	45	5		2	2	61	58							1	1		1	17		
Euparyphus sp	8	cg	5	2		2	3	3	5											10		
Stratiomys sp	8	cg																		1		
Tipulidae	3																					

Appendix B.1: Taxonomic Listing of Benthic Macroinvertebrates Collected from LACDPW Monitoring Sites, 2006.

	TV	FFG	1	SGUT-504	SGUT-505	SGLR-63	5 SGLT-506	6	7	8	9*	10*	11	12	13	14	15	16	17	18	19	20*
Limonia sp	6	sh				1									1					3		
Molophilus sp	4	sh	1																			
PHYLUM CHELICERATA																						
Arachnida																						
Acari (mites)																						
Lebertiidae	8	p																				
Lebertia sp	8	p		10	11																	
Limnesiidae	5	p																				
Limnesia sp	5	p						3														
Neotyrrellia/Tyrrellia sp	5	p							1											13		
Sperchontidae	8	p																				
Sperchon sp	8	p		5	10	17		1	3											56		
Torrenticolidae	5	p																				
Torrenticola sp	5	p																	4			
PHYLUM ARTHROPODA																						
Malacostraca																						
Amphipoda (scuds)																						
Hyalellidae	8	cg																				
Hyalella sp	8	cg								3			326	103	19	81	420	2		11	5	
Decapoda (crayfish)	8	sh																				
Cambaridae	8	sh								10												
Procambarus clarki	8	sh								3										4		
Ostracoda (seed shrimp)	8	cg	53		2	4	61	27	29	1				1	1	2	12	2	1		6	
PHYLUM PLATYHELMINTHES																						
Turbelleria (flatworms)	4	p	39		5	33	7	53	37					110	5	5	42			1		
PHYLUM CNIDARIA																						
Hydrozoa																						
Hydroida																						
Hydridae																						
Hydra sp	5	p								1				1								
PHYLUM NEMERTEA (tongueworms)																						
Enopla																						
Hoplonemertea																						
Tetrastemmatidae																						
Prostoma sp	8	p	5		3				12											6		
PHYLUM ANNELIDA																						
Hirudinida (leeches)																						
Arynchobdellida																						
Erpobdellidae	8	p								1												
Mooreobdella sp	8	p					2			5				1							1	
Rhyncobdellida																						
Glossiphoniidae	8	pa																				
Helobdella sp	6	pa								6				4							1	
Oligochaeta (earthworms)	5	cg	3		1	31	30		11	226			8	185						10	3	
PHYLUM MOLLUSCA																						
Gastropoda (snails)																						
Hypsogastropoda																						
Hydrobiidae	8	sc																		1		
Potamopyrgus antipodarum		sc															2					
Pyrgulopsis sp																			19	2		
Pulmonata																						
Ancylidae	6	sc																				
Ferrissia sp	6	sc								22				2						1		
Lymnaeidae	6	sc																				
Fossaria sp	8	sc			13															10		
Radix auricularia	6	sc																		2		
Physidae	8	sc																				
Physa sp	8	sc	1	3	64		9	7	4						5	3	27	2	24	19	34	
Planorbidae	6	sc																				
Gyraulus sp	8	sc																		2		
Menetus sp	6	sc								3										42		
Planorbella sp	6	sc						2												14		

*Not sampled due to dry conditions

Appendix B.2: Ranked Total Abundance of Benthic Macroinvertebrates Collected from LACDPW Monitorning Sites, 2006.

Taxon	Station																				
	1	SGUT-504	SGUT-505	SGLR-063	SGLT-506	6	7	8	9*	10*	11	12	13	14	15	16	17	18	19	20*	Total
Chironomidae	98	141	105	358	351	41	54	169			176	106	443	368	9	395	77	8	468		3367
Hyalella sp								3			326	103	19	81	420	2		11	5		970
Oligochaeta	3		1	31	30		11	226			8	185						10	3		508
Turbellaria	39		5	33	7	53	37					110	5	5	42			1			337
Baetis sp	1	97	120	10		50	15										8				301
Hydroptila sp	36	2	4	43	3	37	63	31						3							222
Simulium sp	16	2			1	16	111	11				1	34			3	13				208
Hydropsyche sp		33	161			2											7				203
Ostracoda	53		2	4	61	27	29	1				1	1	2	12	2	1		6		202
Physa sp	1	3	64		9	7	4						5	3	27	2	24	19	34		202
Caloparyphus/Euparyphus	45	5		2	2	61	58							1	1		1	17			193
Tricorythodes sp	134	42	2			6															184
Lepidostoma sp																	171				171
Fallceon quilleri	40	14	1	4	26	10	59										1				155
Argia sp	2	24				34	27								2	4	56				149
Sperchon sp		5	10	17		1	3											56			92
Ceratopogonidae		2					1							17	1	6		34			61
Libellulidae						45	1									1	1				48
Menetus sp								3										42			45
Paltothemis lineatipes						33	9														42
Malenka sp																	35				35
Zaitzevia sp						7											26				33
Dasyhelea sp	2		2			2	1	1						8		2		14			32
Helicopsyche sp		31																			31
Euparyphus sp	5	2		2	3	3	5											10			30
Psephenus falli						28															28
Prostoma sp	5		3				12											6			26
Ferrissia sp								22				2						1			25
Fossaria sp			13															10			23
Callibaetis sp	1					2										19					22
Serratella sp		22																			22
Lebertia sp		10	11																		21
Pyrgulopsis sp																	19	2			21
Postelichus		17				3															20
Ochrotrichia sp			18			1															19
Coenagrionidae	2					1						1	1		2	11					18
Ephydridae				1												6		10	1		18
Planorbella sp						2												14			16
Cheumatopsyche sp						15															15
Micrasema sp						14											1				15
Neotyrrellia/Tyrrellia sp							1											13			14
Hemerodromia sp				11		2															13
Pericoma/Telmatoscopus				2	1		1	1						8							13
Tinodes sp		5				8															13
Culex sp																12					12
Anopheles sp																11					11
Helobdella sp								6				4							1		11
Hydroptilidae	2						3	6													11
Cambaridae								10													10
Epeorus sp		10																			10
Hydrochus sp																		10			10
Paraleptophlebia sp																	10				10
Mooreobdella sp					2			5				1							1		9
Muscidae	7				1									1							9
Hydraena sp		1															7				8

Appendix B.2: Ranked Total Abundance of Benthic Macroinvertebrates Collected from LACDPW Monitorning Sites, 2006.

Taxon	Station																				
	1	SGUT-504	SGUT-505	SGLR-063	SGLT-506	6	7	8	9*	10*	11	12	13	14	15	16	17	18	19	20*	Total
Wormaldia sp		3	1			3											1				8
Atrichopogon		1				2											4				7
Helichus sp						7															7
Peltodytes sp	1					4										2					7
Procambarus clarki								3										4			7
Centroptilum/Procleon sp		6																			6
Polycentropus sp			4			2															6
Limonia sp				1									1					3			5
Cordulegaster dorsalis		2															2				4
Corisella sp					3						1										4
Dolichopodidae				1				3													4
Meringodixa chalonensis																	4				4
Neotrichia sp		3															1				4
Sweltsa																	4				4
Torrenticola sp																	4				4
Belostomatidae		2	1																		3
Berosus sp						2												1			3
Bezzia/Palpomyia													1			1	1				3
Brechmorhoga mendax	2						1														3
Corixidae					3																3
Gumaga sp						1											2				3
Laccobius sp		3																			3
Limnesia sp						3															3
Maruina lanceolata						1											2				3
Nepticulidae	3																				3
Psychoda sp														1		2					3
Psychodidae														3							3
Gyraulus sp																		2			2
Hetaerina americana	2																				2
Hydra sp								1				1									2
Nemouridae																	2				2
Optioservus sp						2															2
Potamopyrgus antipodarum															2						2
Progomphus borealis	2																				2
Radix auricularia																		2			2
Rhyacophila sp																	2				2
Agapetus sp																	1				1
Anax sp																1					1
Culicoides sp																1					1
Cymbiodyta sp						1															1
Enochrus sp																		1			1
Erpobdellidae								1													1
Hydrobiidae																		1			1
Hydroporinae			1																		1
Ischnura sp	1																				1
Libellula sp							1														1
Molophilus sp	1																				1
Oecetis disjuncta																	1				1
Stictotarsus sp																1					1
Stratiomys sp																		1			1
Trichocorixa sp					1																1
Tropisternus sp		1																			1
Grand Total	504	489	529	520	504	539	507	503			511	515	510	501	518	484	489	303	519		8445

*Not sampled due to dry conditions

Appendix B.3: Metric Values for Benthic Macroinvertebrates Collected from LACDPW Monitoring Sites, 2006.

	1	SGUT-504	SGUT-505	SGLR-063	SGLT-506	6	7	8	9*	10*	11	12	13	14	15	16	17	18	19	20*
Taxa Richness	26	27	20	14	15	38	20	17			4	11	9	12	10	19	31	25	8	
Ephemeropteran Taxa	4	6	3	2	1	4	2	0			0	0	0	0	0	1	3	0	0	
Plecopteran Taxa	0	0	0	0	0	0	0	0			0	0	0	0	0	0	3	0	0	
Trichopteran Taxa	2	6	5	1	1	9	1	1			0	0	0	1	0	0	9	0	0	
EPT Taxa	6	12	8	3	2	13	3	1			0	0	0	1	0	1	15	0	0	
Dipteran Taxa	8	5	2	7	5	7	6	5			1	2	4	7	3	9	7	6	2	
Non Insect Taxa	5	3	8	4	5	6	7	11			2	8	4	4	5	3	4	16	6	
% EPT Taxa	42.5%	54.8%	58.8%	11.0%	5.8%	28.0%	27.0%	6.2%			0.0%	0.0%	0.0%	0.6%	0.0%	3.9%	50.5%	0.0%	0.0%	
% Sensitive EPT Taxa	0.0%	15.7%	0.2%	0.0%	0.0%	4.8%	0.0%	0.0%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	44.8%	0.0%	0.0%	
% Chironomidae	19.4%	28.8%	19.8%	68.8%	69.6%	7.6%	10.7%	33.6%			34.4%	20.6%	86.9%	73.5%	1.7%	81.6%	15.7%	2.6%	90.2%	
Shannon Diversity	2.3	2.4	1.9	1.3	1.2	3.0	2.4	1.5			0.7	1.5	0.6	1.0	0.8	0.9	2.3	2.8	0.4	
Margalef Diversity	4.0	4.4	3.0	2.2	2.4	6.0	3.5	2.7			0.5	1.6	1.3	1.9	1.4	3.1	4.8	4.6	1.1	
Average Tolerance Value	5.6	4.9	5.4	5.9	6.1	6.1	6.1	5.6			7.3	5.6	6.1	6.3	7.6	6.3	3.8	6.7	6.2	
% Dominant Taxon	26.6%	28.8%	30.4%	68.8%	69.6%	11.3%	21.9%	44.9%			63.8%	35.9%	86.9%	73.5%	81.1%	81.6%	35.0%	18.5%	90.2%	
% Intolerant Taxa	0.0%	7.6%	0.0%	0.0%	0.0%	4.3%	0.0%	0.0%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.4%	0.0%	0.0%	
% Tolerant Taxa	22.8%	5.5%	17.2%	4.8%	16.7%	33.4%	24.3%	4.6%			64.0%	20.6%	5.1%	17.6%	89.2%	13.0%	5.7%	41.9%	8.9%	
% Collector Gatherer	75.8%	67.5%	44.0%	79.4%	94.0%	37.8%	46.0%	79.7%			99.8%	76.7%	90.8%	94.2%	85.3%	91.9%	21.7%	23.8%	92.9%	
% Collector Filterer	3.2%	7.8%	30.6%	0.0%	0.2%	6.7%	21.9%	2.2%			0.0%	0.2%	6.7%	0.0%	0.0%	0.6%	4.3%	0.0%	0.0%	
% Predator	12.3%	9.6%	6.6%	11.9%	3.4%	32.8%	18.3%	2.0%			0.2%	21.9%	1.4%	4.6%	9.1%	5.4%	16.0%	36.6%	0.2%	
% Shredder	0.2%	3.5%	0.0%	0.2%	0.0%	2.0%	0.0%	2.6%			0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	42.9%	2.3%	0.0%	
% Scraper	0.2%	10.6%	14.6%	0.0%	1.8%	10.2%	0.8%	5.0%			0.0%	0.4%	1.0%	0.6%	5.6%	0.4%	11.0%	30.0%	6.6%	
% Others	7.7%	1.0%	4.2%	8.3%	0.6%	10.4%	13.0%	8.5%			0.0%	0.8%	0.0%	0.6%	0.0%	0.4%	0.2%	0.0%	0.2%	
Estimated abundance/ft^2	933	163	548	6933	2389	749	640	719			7097	2861	230	445	1381	645	261	34	1153	

*Not sampled due to dry conditions

Appendix B.4: Top Five Most Abundant Taxa Collected from LACDPW Monitoring Sites, 2006.

Highly tolerant taxa are highlighted in red; highly intolerant taxa are highlighted in blue.

Station	1st	2nd	3rd	4th	5th
1	Tricorythodes sp 26.6%	Chironomidae 19.4%	Ostracoda 10.5%	Caloparyphus/Euparyphus 8.9%	Fallceon quilleri 7.9%
SGUT-504	Chironomidae 28.8%	Baetis sp 19.8%	Tricorythodes sp 8.6%	Hydropsyche sp 6.7%	Helicopsyche sp 6.3%
SGUT-505	Hydropsyche sp 30.4%	Baetis sp 22.7%	Chironomidae 19.8%	Physa sp 12.1%	Ochrotrichia sp 3.4%
SGLR-063	Chironomidae 68.8%	Hydroptila sp 8.3%	Turbellaria 6.3%	Oligochaeta 6.0%	Sperchon sp 3.3%
5 SGLT-506	Chironomidae 69.6%	Ostracoda 12.1%	Oligochaeta 6.0%	Fallceon quilleri 5.2%	Physa sp 1.8%
6	Caloparyphus/Euparyphus 11.3%	Turbellaria 9.8%	Baetis sp 9.3%	Libellulidae 8.3%	Chironomidae 7.6%
7	Simulium sp 21.9%	Hydroptila sp 12.4%	Fallceon quilleri 11.6%	Caloparyphus/Euparyphus 11.4%	Chironomidae 10.7%
8	Oligochaeta 44.9%	Chironomidae 33.6%	Hydroptila sp 6.2%	Ferrissia sp 4.4%	Simulium sp 2.2%
9*					
10*					
11	Hyalella sp 63.8%	Chironomidae 34.4%	Oligochaeta 1.6%	Corisella sp 0.2%	
12	Oligochaeta 35.9%	Turbellaria 21.4%	Chironomidae 20.6%	Hyalella sp 20.0%	Helobdella sp 0.8%
13	Chironomidae 86.9%	Simulium sp 6.7%	Hyalella sp 3.7%	Physa sp 1.0%	Turbellaria 1.0%
14	Chironomidae 73.5%	Hyalella sp 16.2%	Ceratopogonidae 3.4%	Dasyhelea sp 1.6%	Pericoma/Telmatoscopus 1.6%
15	Hyalella sp 81.1%	Turbellaria 8.1%	Physa sp 5.2%	Ostracoda 2.3%	Chironomidae 1.7%
16	Chironomidae 81.6%	Callibaetis sp 3.9%	Culex 2.5%	Anopheles sp 2.3%	Coenagrionidae 2.3%
17	Lepidostoma sp 35.0%	Chironomidae 15.7%	Argia sp 11.5%	Malenka sp 7.2%	Zaitzevia sp 5.3%
18	Sperchon sp 18.5%	Menetus sp 13.9%	Ceratopogonidae 11.2%	Physa sp 6.3%	Caloparyphus/Euparyphus 5.6%
19	Chironomidae 90.2%	Physa sp 6.6%	Ostracoda 1.2%	Hyalella sp 1.0%	Oligochaeta 0.6%
20*					

***Not sampled due to dry conditions**

Appendix B.5: Physical Habitat Quality Scores for LACDPW Bioassessment Monitoring Sites, 2006.

	Monitoring Reach									
	1	SGUT-504	SGUT-505	SGLR-063	5 SGLT-506	6	7	8	9*	10*
1. Instream Cover	6	15	17	1	6	19	17	5		
2. Embeddedness	1	14	19	20	4	15	14	7		
3. Velocity / Depth Regimes	6	14	15	2	8	15	15	6		
4. Sediment Deposition	1	14	18	20	5	15	9	7		
5. Channel Flow	10	19	20	16	15	18	16	15		
6. Channel Alteration	16	15	16	0	6	19	11	5		
7. Riffle Frequency	16	19	19	1	10	16	13	4		
8. Bank Stability	5	14	16	20	15	16	12	16		
9. Vegetation Protection	9	15	15	0	11	18	14	4		
10. Riparian Vegetative Zone	11	16	15	2	5	18	16	4		
Total	**81**	**155**	**170**	**82**	**85**	**169**	**137**	**73**		

	Monitoring Reach									
	11	12	13	14	15	16	17	18	19	20*
1. Instream Cover	2	5	4	1	14	12	19	14	1	
2. Embeddedness	16	11	16	20	13	4	16	13	19	
3. Velocity / Depth Regimes	6	11	6	3	11	5	14	14	1	
4. Sediment Deposition	20	20	15	20	14	6	15	13	18	
5. Channel Flow	20	18	20	15	14	5	14	15	16	
6. Channel Alteration	6	3	3	0	8	19	18	15	0	
7. Riffle Frequency	6	10	7	20	10	12	18	14	1	
8. Bank Stability	15	20	14	20	12	9	20	8	20	
9. Vegetation Protection	5	5	7	0	14	17	13	17	0	
10. Riparian Vegetative Zone	4	5	7	0	13	16	17	18	0	
Total	**100**	**108**	**99**	**99**	**123**	**105**	**164**	**141**	**76**	

*Not sampled due to dry conditions

Appendix B.6: Water Quality Data for LACDPW Bioassessment Monitoring Sites, 2006.

Monitoring Reach	pH	Specific Conductance (mS/cm)	Water Tempurature (C)	Dissolved Oxygen (mg/l)	Turbidity (ntu)	Hardness (mg/L $CaCO_3$)	Average Depth (inches)	Average Velocity (ft/sec)
1	8.25	1.532	18.0	7.62	0.8	440	7.0	1.6
SGUT-504	8.03	0.504	27.7	4.29	1.3	150	7.7	2.4
SGUT-505	7.73	0.365	23.6	7.39	15.9	160	11.3	1.8
SGLR-063	8.29	1.214	29.5	7.83	3.3	450	2.0	1.1
5 - SGLT-506	8.37	0.469	35.7	7.38	22.6	190	3.2	1.1
6	8.15	0.642	17.9	8.30	0.1	172	4.7	0.8
7	8.43	1.020	24.2	7.82	0.8	292	6.0	1.6
8	8.02	1.003	19.9	5.33	4.4	184	3.0	1.1
9*								
10*								
11	8.52	1.212	27.6	18.40	55.8	352	11.0	1.5
12	7.78	1.019	21.9	5.64	5.8	368	5.3	1.3
13	7.76	1.335	22.4	4.25	44.0	376	4.3	1.2
14	8.38	1.383	18.5	13.46	1.7	280	4.0	1.9
15	8.29	3.403	24.0	13.62	2.7	1120	4.0	1.5
16	7.88	3.969	17.8	9.02	1.0	64	2.8	0.3
17	8.18	0.820	15.9	9.90	0.0	296	3.3	0.9
18	8.16	1.624	20.9	7.99	-1.0	480	3.0	1.4
19	8.69	1.001	19.6	14.89	1.3	180	7.0	1.1
20*								

*Not sampled due to dry conditions

Appendix B.7: Index of Biotic Integrity Scores for LACDPW Bioassessment Monitoring Sites, 2006.

Monitoring Reach	Total IBI Score	IBI Rating	% CF+CG		% Non-Insect Taxa		% Tolerant Taxa		Number Coleoptera Taxa		Number Predator Taxa		% Intolerant Individuals		Number EPT Taxa	
			Metric Value	IBI score	Metric Value	IBI score	Metric Value	IBI score	Metric Value	IBI score	Metric Value	IBI score	Metric Value	IBI score	Metric Value	IBI score
17	**53**	**Good**	26%	**10**	13%	**8**	16%	**7**	2	**4**	9	**6**	45%	**10**	15	**8**
6	**50**	**Good**	45%	**10**	16%	**8**	21%	**5**	8	**10**	11	**8**	4%	**2**	13	**7**
SGUT-504	**42**	**Good**	75%	**6**	11%	**9**	19%	**6**	4	**7**	8	**5**	8%	**3**	12	**6**
1	**24**	**Poor**	79%	**5**	19%	**7**	35%	**1**	1	**2**	9	**6**	0%	**0**	6	**3**
SGUT-505	**20**	**Poor**	75%	**6**	40%	**2**	30%	**2**	1	**2**	7	**4**	0%	**0**	8	**4**
18	**18**	**Poor**	24%	**10**	64%	**0**	36%	**1**	3	**5**	5	**2**	0%	**0**	0	**0**
7	**17**	**Poor**	68%	**7**	35%	**3**	40%	**0**	0	**0**	9	**6**	0%	**0**	3	**1**
16	**17**	**Poor**	93%	**1**	16%	**8**	53%	**0**	2	**4**	7	**4**	0%	**0**	1	**0**
SGLR-063	**17**	**Poor**	79%	**5**	29%	**5**	21%	**5**	0	**0**	4	**1**	0%	**0**	3	**1**
5, SGLT-506	**9**	**Very Poor**	94%	**1**	33%	**4**	47%	**0**	0	**0**	6	**3**	0%	**0**	2	**1**
12	**7**	**Very Poor**	77%	**5**	73%	**0**	36%	**1**	0	**0**	4	**1**	0%	**0**	0	**0**
8	**6**	**Very Poor**	82%	**4**	65%	**0**	35%	**1**	0	**0**	4	**1**	0%	**0**	1	**0**
14	**5**	**Very Poor**	94%	**1**	33%	**4**	42%	**0**	0	**0**	2	**0**	0%	**0**	1	**0**
15	**4**	**Very Poor**	85%	**3**	50%	**0**	50%	**0**	0	**0**	4	**1**	0%	**0**	0	**0**
13	**1**	**Very Poor**	97%	**0**	44%	**1**	44%	**0**	0	**0**	3	**0**	0%	**0**	0	**0**
19	**1**	**Very Poor**	93%	**1**	75%	**0**	50%	**0**	0	**0**	1	**0**	0%	**0**	0	**0**
11	**0**	**Very Poor**	100%	**0**	50%	**0**	50%	**0**	0	**0**	1	**0**	0%	**0**	0	**0**
9*																
10*																
20*																

APPENDIX C

Quality Assurance

DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY-CHICO
CALIFORNIA STATE UNIVERSITY, CHICO
CHICO, CA 95929-0555
530-898-4792

January 31, 2007

Bill Isham
Weston Solutions
2433 Impala Drive
Carlsbad, CA 92008

Dear Bill,

Attached are the results of my QC analysis of 2 samples submitted from the LADPW 2006 project. The results are presented in five summary tables.

Overall taxonomy was very good and performed in accordance with the California Stream Bioassessment Procedure (CSBP) Level I standards with the following minor exceptions.

The *Dasyhelea* vial in the Station 8 sample contained no organisms.

I welcome any questions or comments you may have concerning this report.

Sincerely,

Brady Richards

Austin Brady Richards
Aquatic Bioassessment Laboratory–Chico
California State University, Chico
Chico, CA 95929-0555
arichards@csuchico.edu
(530) 898-4792

QC Report - Disputed ID's only

Report prepared by Brady Richards, CDFG ABL-Chico, 1/31/2007

Sample #	*Vial*	*Original ID*	*QC ID*	*comments*
none				

Listing of Enumeration Discrepancies

Samples submitted by MEC Analytical for Project: LADPW 2006

Report prepared by Brady Richards, CDFG ABL-Chico, 1/31/2007

	Sample #	Vial #	Original ID	# Counted Original	# Counted QC	Difference (Original - QC)
Minor Counting Discrepancies						
	Station 15	10	Hyalella	418	414	4
	Station 8	3	Chironomidae	169	170	-1
		10	Oligochaeta	226	225	1

Listing of Taxonomic Discrepancies

Samples submitted by MEC Analytical for Project: LADPW 2006

Report prepared by Brady Richards, CDFG ABL-Chico, 1/31/2007

Sample #	Vial #	Final ID Original ID	QC Final ID	Taxonomic level of dispute	# Organisms	Comments
Station 8						
No organisms found in vial						
	4	Dasyhelea	no specimen found		1	

Summary of Taxonomic and Enumeration Discrepancies

Samples submitted by MEC Analytical for Project: LADPW 2006

Report prepared by Brady Richards, CDFG ABL-Chico, 1/31/2007

		Taxonomic Discrepancies						**Counting Discrepancies**			
				Taxonomic Precision Relative to QC							
Sample #	**Total Taxa**	**Disputed ID**		**More precise**		**Less**		Major		Minor	
		*f**	*n***	*f*	*n*	*f*	*n*	*f*	*d****	*f*	*d*
Station 15	11	-	-	-	-	-	-	-	-	1	4
Station 8	18	-	-	-	-	-	-	-	-	2	2

* = the frequency of occurrence of the discrepancy, in number of samples *f*

** = the number of organisms affected (by QC Lab counts) *n*

*** = the sum total of (absolute value of) differences in counts *d*

Comparative Taxonomic Listing of all Submitted Samples

Samples submitted by MEC Analytical for Project: LADPW 2006

Report prepared by Brady Richards, CDFG ABL-Chico, 1/31/2007

Taxonomist	Sample no.	Vial no.	Original ID	Original Count	Stage	ABL Count	ABL ID
	Station 15						
		1	Argia	2		2	Argia
		2	Coenagrionidae	2		2	Coenagrionidae
		3	Caloparyphus/Euparyphus	1	L	1	Caloparyphus/Euparyphus
		4	Chironomidae	9	L	9	Chironomidae
		5	Ceratopogonidae	1	P	1	Ceratopogonidae
		6	Turbellaria	42		42	Turbellaria
		7	Helobdella	3		3	Helobdella
		8	Physa	27		27	Physa
		9	Potamopyrgus antipodarum	2		2	Potamopyrgus antipodarum
		10	Hyalella	418		414	Hyalella
		11	Ostracoda	11		11	Ostracoda

Taxonomist	Sample no.	Vial no.	Original ID	Original Count	Stage	ABL Count	ABL ID
	Station 8						
		1	Hydroptila	31	L	31	Hydroptila
		2	Hydroptilidae	6	P	6	Hydroptilidae
		3	Chironomidae	169	L	170	Chironomidae
		4	Dasyhelea	1	L	1	no specimen found
		5	Dolichopodidae	3	L	3	Dolichopodidae
		6	Pericoma/Telmatoscopus	2	L	2	Pericoma/Telmatoscopus
		7	Erpobdellidae	1		1	Erpobdellidae
		8	Helobdella	6		6	Helobdella
		9	Mooreobdella	5		5	Mooreobdella
		10	Oligochaeta	226		225	Oligochaeta
		11	Hydra	1		1	Hydra
		12	Ferrissia	22		22	Ferrissia
		13	Menetus	3		3	Menetus
		14	Procambarus clarkii	3		3	Procambarus clarkii
		15	Cambaridae	10		10	Cambaridae
		16	Ostracoda	1		1	Ostracoda
		17	Hyalella	2		2	Hyalella
		18	Simulium	11	L	11	Simulium

DATA QA CHECK LIST

Name of Project LACDPW 06/07 Bioassessment

Level of QA
General = 10%
Intensive = 20%
Total = 100%

Type of QA	Level of QA	Performed by/Date	Corrections made?
Taxonomic sheets vs. QA printout	total	BI/14Feb07	Yes
Data tables vs. taxonomic sheets	intensive	BI/2Mar07	No
Hand calculate metrics from ~~taxonomic sheets~~ Data Tables	intensive	BI/2Mar07	No
Final report text values vs. data tables	total	NW/20MAR07	Yes

Notes:

Signature of Project Manager / Date

B Isham /21 Mar 07

Project: LADPW Bioassessment

STREAM BIOASSESSMENT LAB SAMPLE TRACKING SHEET

Survey	Station	Rep	# Jars	Vol.	Sorter		QA/QC		Taxonomy							Curation Box #
					Out	In	Out	In	E	T	D	OI	C	M	OP	
2006	1	1	3QT		TG	✓			BI	→			TG	SH	BI	
	2 (SGUT-504)	1	3 Qt	1000	CB	✓			BI	→			TG		BI	
	3 (SGUT-505)	1	3 Qt	1000	JH	✓	Sy	✓	BI	→				SH		
	4 (SGLR-063)	1	3 Qt	1400	JH	✓			BI	→			TG	SH	BI	
	5 (SGLT-506)	1	3 QL	1700	NW	✓	Sy	✓	BI	→			TG	SH	BI	
	6	1	3QT		TG	✓			BI	→			TG	SH	BI	
	7	1	3QT		TG	✓			BI	→			TG	SH	BI	
	8	1	3QT		TG	✓	Sy	✓		BI	→		TG	SH	BI	
	11	1	3QT		TG	✓					BI	BI	TG	SH	BI	
	12	1	3QT		TG	✓					BI	BI	TG	SH	BI	
	13	1	3Qt.	600	CB	✓	Sy	✓			BI	BI	TG	SH	BI	
	14	1	3Qt	1100	CB	✓				BI	BI		TG	SH	BI	
	15	1	3Qt	1300	CB	✓					BI	BI	TG	SH	BI	
	16	1	3Qt.	1000	CB	✓			BI		BI	BI	TG	SH		
	17	1	3Qt	900	CB	✓			BI	→			TG	SH	BI	
	18	1	3QT		TG	✓					BI	BI	TG	SH	BI	
	19	1	3 Qt	~~300~~/1000	CB	✓					BI		TG	SH	BI	

4f

Approved by:_____
Date:_____

Stream Bioassessment Sorting Sheet

I. Sample Identification

Project Title **LADPW SGRRMP site** Survey **July 2006**
Station SGUT-505 Replicate all
Date Collected 26 July 06
Sample Sed. Vol. (mL) 1000 mL No./Type Contr. **1 Qt** Sampler **Kick Net**

II. Sorting

Sort Fraction 0.9/8 squares Sorted By JH Date(s) Sorted 7/28 - 7/31 2006
Total Sort Time 3.2 hrs # Animals Sorted 502 Animals Remaining _____
Animals/Grid 502 in 0.9 squares
Comments 529

Distribution of Sorted Material Est. total abundance 4933.9 = 548/ft²

	# of Vials	# of Jars	Contents of Jars
Ephemeroptera	1		
Trichoptera	1		
Diptera	1		
Other Insects	1		
Mollusca	1		
Crustacea	1		
Other phyla	1		
Extra Animals	0		

III. Sorting QA/QC

Sort Criteria 100 %
QA/QC By g.yonemasu Pass/Fail Pass Date 02Mar07
QA/QC Time 4/2 Re-Sort Time _____ Re-Sort Date _____
No. of Animals QA/QC 26 Removal rate 95.1%
No. of Animals Re-Sort _____

IV. Sample Qualification Comments (Circle One)

1. Preservation: (GOOD) FAIR POOR
2. Single Major Component:
   Shellhash Tubes Wood (Algae) Seeds Animals
   Fibers Coarse Sand Fine Sand Pea Gravel (Organic Material)
   Sewage Debris Macrodetritus Other:_____

Approved by:_____
Date:_____

Stream Bioassessment Sorting Sheet

I. Sample Identification

Project Title **LADPW SGRRMP site** Survey **July 2006**
Station SGLT-506 Replicate 1-3 combined
Date Collected 7/19/06
Sample Sed. Vol. (mL) 1700 mL No./Type Contr. **1 Qt** Sampler **Kick Net**

II. Sorting

Sort Fraction .05/2.1 squares Sorted By MJM Date(s) Sorted 7/20 & 7/24
Total Sort Time 4.1 hrs # Animals Sorted 508 Animals Remaining
Animals/Grid
Comments 504

Distribution of Sorted Material Est. total abundance 21,504 ÷ 9 = 2389

	# of Vials	# of Jars	Contents of Jars
Ephemeroptera	1		
Trichoptera	1		
Diptera	1		
Other Insects	1		
Mollusca	1		
Crustacea	1		
Other phyla	1		
Extra Animals	0		

III. Sorting QA/QC

Sort Criteria 100 %
QA/QC By S. Gonemasu Pass/Fail Pass Date 6 Mar 07
QA/QC Time ½ HR Re-Sort Time Re-Sort Date
No. of Animals QA/QC 8 Removal rate 98.4%
No. of Animals Re-Sort

IV. Sample Qualification Comments (Circle One)

1. Preservation: GOOD FAIR POOR

2. Single Major Component:
Shellhash Tubes Wood ~~Algae~~ Seeds Animals
Fibers Coarse Sand Fine Sand Pea Gravel (Organic Material)
Sewage Debris Macrodetritus Other:_____

Approved by:_____
Date:_____

Stream Bioassessment Sorting Sheet

I. Sample Identification

Project Title **LADPW** Survey **Oct 2006**
Station 8 Replicate 1-3 combined
Date Collected 10 Oct 06
Sample Sed. Vol. (mL) 500 ml No./Type Contr. **3 Qt** Sampler **Kick Net**

II. Sorting

Sort Fraction 2.1/25 Sorted By NF Date(s) Sorted 11-16/17-06
Total Sort Time 4.5 # Animals Sorted 510 Animals Remaining _____
Animals/Grid _____
Comments Fresh water Dorosoma 563

Distribution of Sorted Material Est. total abundance 6476 ÷ 9 = 719

	# of Vials	# of Jars	Contents of Jars
Ephemeroptera			
Trichoptera	1		
Diptera	1		
Other Insects			
Mollusca	1		
Crustacea	1	1	
Other phyla	1		
Extra Animals			

III. Sorting QA/QC

Sort Criteria 100 %
QA/QC By S. Geronimo Pass/Fail Pass Date 6 Nov 06
QA/QC Time 45 min Re-Sort Time _____ Re-Sort Date _____
No. of Animals QA/QC 41 Removal rate 91.8%
No. of Animals Re-Sort _____

IV. Sample Qualification Comments (Circle One)

1. Preservation: (GOOD) FAIR POOR

2. Single Major Component:
Shellhash Tubes Wood Algae Seeds Animals
Fibers Coarse Sand ~~Fine Sand~~ Pea Gravel (Organic Material)
Sewage Debris Macrodetritus Other:_____

Approved by:_____
Date:_____

Stream Bioassessment Sorting Sheet

I. Sample Identification

Project Title **LADPW** Survey **Oct 2006**
Station 13 Replicate 1-3
Date Collected 3 Oct. 06
Sample Sed. Vol. (mL) 6000 No./Type Contr. **3 Qt** Sampler **Kick Net**

II. Sorting

Sort Fraction 2/8 Sorted By CB Date(s) Sorted 11/15
Total Sort Time 5.9hrs # Animals Sorted 520 Animals Remaining _____
Animals/Grid _____
Comments 518

Distribution of Sorted Material Est. total abundance 2072 ÷ 9 = 230

	# of Vials	# of Jars	Contents of Jars
Ephemeroptera	0		
Trichoptera	0		
Diptera	1		
Other Insects	1		
Mollusca	1		
Crustacea	1		
Other phyla	1		
Extra Animals	0		

III. Sorting QA/QC

Sort Criteria 100 %
QA/QC By S. Yonemasu Pass/Fail Pass Date 02Mar07
QA/QC Time ½ HR Re-Sort Time _____ Re-Sort Date _____
No. of Animals QA/QC 8 Removal rate 98.4%
No. of Animals Re-Sort _____

IV. Sample Qualification Comments (Circle One)

1. Preservation: (GOOD) FAIR POOR

2. Single Major Component:
Shellhash Tubes Wood (Algae) Seeds Animals
Fibers Coarse Sand (Fine Sand) Pea Gravel Organic Material
Sewage Debris Macrodetritus Other:_____

APPENDIX D

Chain of Custody and Field Data Sheets

☒ 2433 Impala Drive • Carlsbad, CA 92008 • (760) 931-8081, FAX 931-1580
☐ 98 Main St., Ste. #428 • Tiburon, CA 94920 • (415) 435-1847, FAX 435-0479
☐ 1440 Broadway, Ste. 908 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710
☐ 152 Sunset View Lane • Sequim, WA 98382 • (360) 582-1758, FAX 582-1679
☐ 4729 NE View Drive • Port Gamble, WA 98364 • (360) 297-6903, FAX 297-6905

CHAIN OF CUSTODY

13207

DATE 22Jan07 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: LADPW 06 Survey
PROJECT MANAGER: Bill Tsukamoto
COMPANY: Weston
ADDRESS:
PHONE/FAX:

SAMPLE I.D.	DATE	TIME	MATRIX	INITIALS	NUMBER & TYPE OF CONTAINERS	ANALYSIS/TEST REQUESTED: Taxonomic identification					PRESERVED HOW/ COMMENTS	FOR WESTON USE ONLY: SAMPLE TEMP. UPON RECEIPT	FOR WESTON USE ONLY: WESTON LAB ID
8	Oct 06	~	BMI	~~RT~~	1 8 V	X					70% ETOH	NA	
15	"	~	"	"	1 1 V	"					"	"	
UTC	"		Snails	"	1 V	"					"	"	
UTC	"		Mite	"	1 V	"					"	"	

SPECIAL INSTRUCTIONS/COMMENTS:

SHIPPING:
Shipping VIA: Airbill No:

SAMPLE CONDITION UPON RECEIPT (FOR WESTON USE ONLY):

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: BTsukamoto	Signature: Aquatic Bioassessment Lab	Signature: Aquatic Bioassessment Lab	Signature: BTsukamoto	Signature:	Signature:
Firm: Weston	Firm:	Firm:	Firm: Weston	Firm:	Firm:
Date/Time: 22Jan07/1300	Date/Time: 23Jan2007/1200	Date/Time: 31 Jan 2007 1600	Date/Time: 5Feb07/0730	Date/Time:	Date/Time:

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

☒ 2433 Impala Drive • Carlsbad, CA 92008 • (760) 931-8081, FAX 931-1580
☐ 98 Main St., Ste. #428 • Tiburon, CA 94920 • (415) 435-1847, FAX 435-0479
☐ 1440 Broadway, Ste. 908 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710
☐ 152 Sunset View Lane • Sequim, WA 98382 • (360) 582-1758, FAX 582-1679
☐ 4729 NE View Drive • Port Gamble, WA 98364 • (360) 297-6903, FAX 297-6905

CHAIN OF CUSTODY

13317

DATE 5 Oct 2006 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: LADPW Oct 2006 Bioassessment

PROJECT MANAGER: Bill Isham

COMPANY: Weston

ADDRESS: See Above

PHONE/FAX: "

SAMPLE I.D.	DATE	TIME	MATRIX	INITIALS	NUMBER & TYPE OF CONTAINERS	Hardness	Sort + ID				PRESERVED HOW/ COMMENTS	SAMPLE TEMP. UPON RECEIPT	WESTON LAB ID
13	3 Oct 06	0855	H_2O	DO	1 amber Pol.	X	X				ice/etOH		
17	↓	1045	↓	↓	+3 QE	↓	↓						
16	↓	1207	↓	↓	↓	↓	↓						
15	↓	1406	↓	↓	↓	↓	↓						
18	↓	1510	↓	↓	↓	↓	↓						
1	4 Oct 06	0915	↓	↓	↓	↓	↓						
6	↓	1137	↓	↓	↓	↓	↓						
7	↓	1420	↓	↓	↓	↓	↓						
11	↓	1550	↓	↓	↓	↓	↓						
12	↓	1707	↓	↓	↓	↓	↓						

SPECIAL INSTRUCTIONS/COMMENTS: sampled by D. Owen

SHIPPING:

Shipping VIA: Airbill No:

SAMPLE CONDITION UPON RECEIPT (FOR WESTON USE ONLY):

	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	[signature]	[signature]				
Firm	Weston	Weston				
Date/Time	5 Oct 2006/1045	10/5/06 1045				

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

☒ 2433 Impala Drive • Carlsbad, CA 92008 • (760) 931-8081, FAX 931-1580
☐ 98 Main St., Ste. #428 • Tiburon, CA 94920 • (415) 435-1847, FAX 435-0479
☐ 1440 Broadway, Ste. 908 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710
☐ 152 Sunset View Lane • Sequim, WA 98382 • (360) 582-1758, FAX 582-1679
☐ 4729 NE View Drive • Port Gamble, WA 98364 • (360) 297-6903, FAX 297-6905

CHAIN OF CUSTODY

13079

DATE 11 Oct 2006 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: LADRM Oct 2006 Bioassessment
PROJECT MANAGER: Brian Isham
COMPANY: Weston
ADDRESS: See Above
PHONE/FAX:

SAMPLE I.D.	DATE	TIME	MATRIX	INITIALS	NUMBER & TYPE OF CONTAINERS	ANALYSIS/TEST REQUESTED: HARDNESS	ANALYSIS/TEST REQUESTED: SVOA + TPH				PRESERVED HOW/ COMMENTS	FOR WESTON USE ONLY: SAMPLE TEMP UPON RECEIPT	FOR WESTON USE ONLY: WESTON LAB ID
14	10/10/06	0820	Aq	DO	1 plastic	X	X				10% EtOH		
19	↓	0950	↓	↓	3	X	X				↓		
8	↓	1045	↓	↓	↓	X	X				↓		
		1045 (QC)											

SPECIAL INSTRUCTIONS/COMMENTS:
Sampled by DCuar

SHIPPING:
Shipping VIA:
Airbill No:

SAMPLE CONDITION UPON RECEIPT (FOR WESTON USE ONLY):

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Jessie Hau	Signature	Signature	Signature	Signature
Firm: Weston	Firm: Weston	Firm	Firm	Firm	Firm
Date/Time: 11 Oct 06 0700	Date/Time: 10/11/06 / 1005	Date/Time	Date/Time	Date/Time	Date/Time

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Santa Clara / Santa Clara River DATE/TIME 4 Oct 2006, 0915

PROJECT **LACDPW** SAMPLE ID 1

SITE DESCRIPTION Santa Clara River off old River Road

SAMPLING CREW
FB/DO

SITE INFORMATION	
Latitude	34.43150
Longitude	-118.59329
Elevation	
COMMENTS:	
sand bars with some	
vegetation herbaceous cover	
laterally on stream margins	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	17.97 °C
CONDUCTANCE	1532 µs/cm
pH	8.25
DISS. OXYGEN	7.62 mg/L
CHLOROPHYLL	1.7 µg/L
TURBIDITY	0.8 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3	
Riffle Length	10 ft	10 ft	15 ft	Avg 7.0
Riffle Depth	8 in	9 in	4 in	
Avg. Riffle Width	15 ft	9 ft	15 ft	
Riffle Velocity	45/60 1.5	45/60 1.5	35/60 1.7 ft/s	1.6 ft/s
% Canopy Cover	10%	0	5%	
Substrate Complex	4-5	4	5	
Embeddedness	95%	100 - 90%	95%	
Substrate Composition				
Silt (<0.1")	-	-	-	
Sand (0.1 -0.2")	80%	85%	85%	
Gravel (0.2 -2")	+ 10%	5%	10%	
Cobble (2-10")	10%	10%	-	
Boulder (>10")	-	-	-	
Bedrock/Solid	-	-	-	
Roots			5%	
Substrate consolidation	0	1	1	
Percent Gradient	2.5% / 60 ft	2.5% / 60 ft	2.5% / 60 ft	

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Santa Clara/Santa Clara River
DATE/ TIME: 4 + 2000 / 0915
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 1
SITE DESCRIPTION: Santa Clara River off Ox a River Road

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0

LACDPW
4 Oct 2006 Sta 1 Santa Clara River

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 7 (6)	(5) 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 (3)	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM San Gabriel / San Gabriel River East Fork

DATE/TIME May,2006/ 25 July 06 0910

PROJECT **LACDPW**

SAMPLE ID SGUT-504

SITE DESCRIPTION San Gabriel upper Tributary - Off East Fork Rd 1/4 mi east of fire station

SAMPLING CREW
DO
JM

SITE INFORMATION	
Latitude	34.23714
Longitude	117.81881
Elevation	
COMMENTS:	decaying filamentous algae
	some dead fish found

WATER QUALITY MEASUREMENTS	
WATER TEMP.	27.69°C
CONDUCTANCE	504 µS/cm
pH	8.03
DISS. OXYGEN	4.29 mg/L
CHLOROPHYLL	566.3 µg/L
TURBIDITY	1.3 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 150M

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	25'	15'	25'
Riffle Depth	4"	9"	10"
Avg. Riffle Width	16'	30'	45'
Riffle Velocity	1.2'/s	3.7'/s	2.2'/s
% Canopy Cover	65%	0	0
Substrate Complex	14	16	17
Embeddedness	45%	20%	25%
Substrate Composition			
Silt (<0.1")	25%	-	20%
Sand (0.1 -0.2")	5%	10%	5%
Gravel (0.2 -2")	15%	10%	25%
Cobble (2-10")	40%	60%	30%
Boulder (>10")	15%	20%	20%
Bedrock/Solid	-	-	-
Substrate consolidation	13	15	14
Percent Gradient	2'/6'	5'/6'	3'/6'

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: E. Fork San Gabriel River
COMPANY/ AGENCY: Weston
SITE DESCRIPTION: SGUT off E. Fork, 1/4 mi. East of Fire Station

DATE/ TIME: 25 July 06 / 0915
SAMPLE ID NUMBER: SGUT - 504

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	**15** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

LACDPW - E. Fork San Gabriel River
SGUT-504 25 July 06

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM San Gabriel / San Gabriel River DATE/TIME May,2006/ 26 July 06 0940

PROJECT **LACDPW** SAMPLE ID SGUT-365

SITE DESCRIPTION SGUT - 20 yds upstream of USGS gauge trailer off old San Gabriel Rd.

SAMPLING CREW
DO
JH

SITE INFORMATION	
Latitude	34.1694
Longitude	117.88931
Elevation	
COMMENTS:	
Sampled left side riffles;	
access diagonals	
Riffle 3 - right side riffle sampled	
Riffle 1 - total river width	
actual sample area - 10'	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	23.61°C
CONDUCTANCE	365 uS/cm
pH	7.73
DISS. OXYGEN	7.39 mg/L
CHLOROPHYLL	5606.2 ug/L
TURBIDITY	15.9 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 150m

3 pieces

	Riffle 1	Riffle 2	Riffle 3	
Transect	A	C	G	
Riffle Length	25'	15'	25'	
Riffle Depth	16"	6"	12"	11.3
Avg. Riffle Width	50'	15'	15'	
Riffle Velocity	1.8 f/s	1.3 f/s	2.2 f/s	1.8
% Canopy Cover	0	0	35%	
Substrate Complex	15	17	19	
Embeddedness	5%	5%	10%	
Substrate Composition				
Silt (<0.1")	-	-	-	
Sand (0.1 -0.2")	5%	5%	10%	
Gravel (0.2 -2")	5%	10%	-	
Cobble (2-10")	10%	20%	25%	
Boulder (>10")	80%	60%	50%	
Bedrock/Solid	-	-	-	
Roots		5%	15%	
Substrate consolidation	19	18	16	
Percent Gradient	3%/6'	3%/6'	3%/6'	

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: San Gabriel / San Gabriel River
DATE/ TIME: 26 July, 06 / 0940
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: SGUT - 505
SITE DESCRIPTION: San Gabriel Dr. old San Gabriel Rd./near USGS gauge pulley

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 **(17)** 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 **(19)** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	**(15)** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 **(18)** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

San Gabriel Upper Tributary SGUT-505 0940/ 26 July 06

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 **19** 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Left Bank	10 **9**	8 **7** 6	5 4 3	2 1 0
Right Bank	10 **9**	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Left Bank	10 9	8 **7** 6	5 4 3	2 1 0
Right Bank	10 9	**8** 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Left Bank	10 9	8 **7** 6	5 4 3	2 1 0
Right Bank	10 9	**8** 7 6	5 4 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM San Gabriel River DATE/TIME May,2006/ 7:19pm 1000

PROJECT **LACDPW** SAMPLE ID SGR-ae3

SITE DESCRIPTION corner of Avenue and Fullerton

SAMPLING CREW
Damon Owen
Michelle Evans

SITE INFORMATION
Latitude 34.02261
Longitude 117.98804
Elevation
COMMENTS:
moderate current
used manual
modified protocol
0% Zoo, 75%
algae - diverse, 0% of algae

WATER QUALITY MEASUREMENTS	
WATER TEMP.	20.52 °C
CONDUCTANCE	12.14 ms/cm²
pH	8.29
DISS. OXYGEN	7.82 mg/L
CHLOROPHYLL	Sum 3 mg/L
TURBIDITY	33 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 150m

	Riffle 1	Riffle 2	Riffle 3	
Riffle Length	2'	2'	2'	Avg 2'
Riffle Depth	2"	2"	2"	
Avg. Riffle Width	105'	105'	105'	
Riffle Velocity	1.1'/s	1.1'/s	1.1'/s	1.1'/s
% Canopy Cover	0%	0%	0%	
Substrate Complex	1	1	1	
Embeddedness	0	0	0	
Substrate Composition				
Silt (<0.1")	-	-	-	
Sand (0.1 -0.2")	-	-	-	
Gravel (0.2 -2")	-	-	1%	
Cobble (2-10")	-	-	2%	
Boulder (>10")	-	-	-	
Bedrock/Solid	-	-	-	
concrete	100%	100%	97%	
Substrate consolidation	100%	100%	100%	
Percent Gradient	2'/10'	2'/10'	2'/10'	

7/19/06 1000

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: San Gabriel River
COMPANY/ AGENCY: Dudek Solutions
SITE DESCRIPTION: Corner of Autumn and Fullerton

DATE/ TIME: 7/19/06 1000
SAMPLE ID NUMBER: SGR-003

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 **1** 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 **2** 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

SGR-093 Pg 2 of 2 7/19/06
San Gabriel Lower 1000

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Left Bank	(10) 9	8 7 6	5 4 3	2 1 0
Right Bank	(10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Left Bank	10 9	8 7 6	5 4 3	2 1 0
Right Bank	10 9	8 7 6	5 4 3	2 1 (0)
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Left Bank	10 9	8 7 6	5 4 3	2 (1) 0
Right Bank	10 9	8 7 6	5 4 3	2 (1) 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Walnut Creek DATE/TIME May,2006/ 7/19/06 1330

PROJECT **LACDPW** SAMPLE ID SGUT-S20

SITE DESCRIPTION Walnut Creek west of N. Baldwin Park Blvd

SAMPLING CREW
Donna Ware
Michelle Evans

SITE INFORMATION	
Latitude	34.002237
Longitude	117.99345
Elevation	
COMMENTS:	
- Small [illegible]	
- Upstream [illegible]	
- extensive [illegible]	
- leaches	
- Riffle 3 - large amt trash in stream bed	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	35.72°C
CONDUCTANCE	4609 us/cm
pH	8.37
DISS. OXYGEN	7.38 mg/L
CHLOROPHYLL	246.7 ug/L
TURBIDITY	22.6 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 150m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	15'	15'	15'
Riffle Depth	4"	4"	1.5"
Avg. Riffle Width	(03)	18'	35'
Riffle Velocity	1.3 f/s	0.8 f/s	1.1 f/s
% Canopy Cover	0%	65%	0%
Substrate Complex	8	10	11
Embeddedness	35%	95%	85%
Substrate Composition			
Silt (<0.1")	—	10%	10%
Sand (0.1 -0.2")	40%	20%	55%
Gravel (0.2 -2")	35%	65%	25%
Cobble (2-10")	25%	5%	10%
Boulder (>10")	—	—	—
Bedrock/Solid	—	—	—
Substrate consolidation	8	4	5
Percent Gradient	2"/6'	< 1"/6'	2"/6'

3.2

1.1

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: San Gabriel/ Walnut Creek wash
DATE/ TIME: 1645 26 July, 06
COMPANY/ AGENCY: WESTON
SAMPLE ID NUMBER: SGLT-506
SITE DESCRIPTION: Walnut Creek wash off Valley Blvd/ off 605 Fwy.

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **(6)**	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 **(4)** 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 **(8)** 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	**(5)** 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	**(15)** 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

San Gabriel / Walnut Creek Wash SGLT-506

26 July, 06
1645

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 **6**	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	**10** 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 **7** 6	5 4 3	2 1 0
	Right Bank 10 9	**8** 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 **6**	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	**5** 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 **3**	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	**2** 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Los Angeles River / Arroyo Seco DATE/TIME 4 0 + 2006 / 1137

PROJECT **LACDPW** SAMPLE ID 6

SITE DESCRIPTION Arroyo Seco just upstream of JPL parking lot

SAMPLING CREW
DO, EG

SITE INFORMATION	
Latitude	34.20314
Longitude	-118.16661
Elevation	
COMMENTS:	A lot of filamentous algae

WATER QUALITY MEASUREMENTS	
WATER TEMP.	17.94 °C
CONDUCTANCE	692 µS/cm
pH	8.15
DISS. OXYGEN	8.30 mg/L
CHLOROPHYLL	1.3 +.8 ug/L
TURBIDITY	0.1 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3	
Riffle Length	12 ft	20 ft	25 ft	Avg 4.7
Riffle Depth	4 in	4 in	6 in	
Avg. Riffle Width	7 ft	8 ft	8 ft	
Riffle Velocity	0.75'/sec	0.8'/sec	0.75'/sec	0.8'/s
% Canopy Cover	10%	15%	35%	
Substrate Complex	18	18	17	
Embeddedness	5%	35%	10%	
Substrate Composition				
Silt (<0.1")	-	-	-	
Sand (0.1 -0.2")	10%	20%	10%	
Gravel (0.2 -2")	25%	20%	30%	
Cobble (2-10")	35%	15%	30%	
Boulder (>10")	25%	25%	25%	
Bedrock/Solid	-	-	-	
rock		20%	5%	
Substrate consolidation	15	19	16	
Percent Gradient	9in/6ft	6in/6ft	5in/6ft	

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Los Angeles River / Arroyo Seco
DATE/ TIME: 4 Oct 2006 / 1137
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 6
SITE DESCRIPTION: Arroyo Seco upstream of JPL parking lot

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4 0 1 2006 Sta. 6 LACDPW

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

LA River / Arroyo Seco

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Los Angeles River / Arroyo Seco DATE/TIME 4 Oct 2006 / 1420

PROJECT **LACDPW** SAMPLE ID 7

SITE DESCRIPTION Arroyo Seco just downstream of 134 bridge

SAMPLING CREW
DO / EG

SITE INFORMATION
Latitude 34.14558
Longitude -118.1699
Elevation
COMMENTS:

WATER QUALITY MEASUREMENTS	
WATER TEMP.	24.18°C
CONDUCTANCE	1020 uS/cm
pH	8.43
DISS. OXYGEN	7.82 mg/l
CHLOROPHYLL	26.5 ug/l
TURBIDITY	0.8 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	12 ft	10 ft	12 ft
Riffle Depth	7 in	6 in	5 in
Avg. Riffle Width	11 ft	13 ft	12 ft
Riffle Velocity	1.5'/s	1.5'/s	1.7'/s
% Canopy Cover	100%	60%	80%
Substrate Complex	17	16	17
Embeddedness	40%	50%	45%
Substrate Composition			
Silt (<0.1")	—	—	—
Sand (0.1 -0.2")	15%	35%	~~25%~~ 20%
Gravel (0.2 -2")	15%	10%	20%
Cobble (2-10")	60% ~~25%~~	~~45%~~ 45%	~~45%~~ 50%
Boulder (>10")	10%	5%	10%
Bedrock/Solid	—	—	—
Substrate consolidation	19	18	17
Percent Gradient	3.5 ft / 64 ft	2.5 ft / 64 ft	6 in / 64 ft

avg 6.0"

1.6'/s

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Los Angeles River / Arroyo Seco
DATE/ TIME: 4-6-2006 / 1420
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 7
SITE DESCRIPTION: Arroyo Seco just downstream of 134 bridge

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Mar 2000 LADPW Sta. 7 Arroyo Seco

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
	Right Bank 10 9	8 (7) 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM LA River / Compton Ck. DATE/TIME 10 Oct 2006/1045

PROJECT **LACDPW** SAMPLE ID 8

SITE DESCRIPTION Compton Ck, just downstream of Del Amo Bridge

SAMPLING CREW
D. Owen
D. Simon

SITE INFORMATION	
Latitude	33° 50.785' N
Longitude	118° 12.531' W
Elevation	
COMMENTS:	Riffle 2&3 under Bridge

WATER QUALITY MEASUREMENTS	
WATER TEMP.	19.93°C
CONDUCTANCE	1003 µS/cm
pH	8.02
DISS. OXYGEN	5.33 mg/L
CHLOROPHYLL	9.9 µg/L
TURBIDITY	11.4 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3	
Riffle Length	10 ft	15 ft	12 ft	Avg
Riffle Depth	3 in	2.5 in	3 in	3.0"
Avg. Riffle Width	7 ft	9 ft	14 ft	
Riffle Velocity	1.1 ft/s	1.0 ft/s	1.1 ft/s	1.1 ft/s
% Canopy Cover	0%	under Bridge	under Bridge	
Substrate Complex	12	10	10	
Embeddedness	50%	50%	50%	
Substrate Composition				
Silt (<0.1")	—	5%	—	
Sand (0.1 -0.2")	25%	45%	25%	
Gravel (0.2 -2")	15%	25%	30%	
Cobble (2-10")	45%	20%	25%	
Boulder (>10")	15%	5%	20%	
Bedrock/Solid	—	—	—	
Substrate consolidation	14	6	6	
Percent Gradient	4 in / 6 ft	2.5 in / 6 ft	3 in / 6 ft	

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: LA River/ Compton Ck
COMPANY/ AGENCY: Weston
SITE DESCRIPTION: Compton Ck, just downstream of Del Amo Bridge

DATE/ TIME: 16 Oct 2006 1045
SAMPLE ID NUMBER: 8

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	5 4 3	(2) 1 0
	Right Bank 10 9	8 7 6	5 4 3	(2) 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 3	2 (1) 0
	Right Bank 10 9	8 7 6	5 4 3	2 (1) 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Los Angeles River | Los Angeles River DATE/TIME 4 Oct 2016 | 15 50

PROJECT **LACDPW** SAMPLE ID 11

SITE DESCRIPTION LA River just upstream of Vicking

SAMPLING CREW
DO / EC

SITE INFORMATION	
Latitude	34.15609
Longitude	-118.29473
Elevation	
COMMENTS:	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	21.62 °C
CONDUCTANCE	1212 uS/cm
pH	8.52
DISS. OXYGEN	18.41 mg/L
CHLOROPHYLL	19.4 ug/L
TURBIDITY	55.8 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	6 ft	6 ft	6 ft
Riffle Depth	11 in	11 in	11 in
Avg. Riffle Width	30 ft	25 ft	30 ft
Riffle Velocity	1.5'/sec	1.5'/sec	1.5'/sec
% Canopy Cover	5%	0%	0%
Substrate Complex	1	1	1
Embeddedness	0%	0%	0% [illegible] 100% macro.
Substrate Composition		Periphyton mats	
Silt (<0.1")	—	25%	5%
Sand (0.1 -0.2")	—	—	—
Gravel (0.2 -2")	—	—	—
Cobble (2-10")	—	—	—
Boulder (>10")	10%	—	5%
Bedrock/Solid	—	—	—
concrete	90%	75%	90%
Substrate consolidation	20	20	20 mac | 0 mic
Percent Gradient	11% / 6 ft	11% / 6 ft	11% / 6 ft

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Los Angeles River / Los Angeles River
DATE/ TIME: 4 Oct 2006 / 1550
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 11
SITE DESCRIPTION: LA River just upstream of Vicinity

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 (2) 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

mostly river rock

4 Oct 2006 St. 11 LADPW

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

Los Angeles River

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 7 6	(5) 4 3	2 1 0
	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	(5) 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 (4) 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM LA River / LA River DATE/TIME 4 Oct 2006 / 1707

PROJECT **LACDPW** SAMPLE ID 12

SITE DESCRIPTION LA River just upstream of the 110

SAMPLING CREW
DO / EG

SITE INFORMATION	
Latitude	34.08434
Longitude	-118.22829
Elevation	
COMMENTS:	
riffle 1 & 2 concrete	
with dirt & natural	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	21.9 °C
CONDUCTANCE	1019 µS/cm
pH	7.78
DISS. OXYGEN	5.64 mg/L
CHLOROPHYLL	13.9 mg/L
TURBIDITY	5.9 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3	
Riffle Length	2 @ 6 ft	6 ft	10 ft	Avg
Riffle Depth	6 ft 2 in	2 in	1 ft	5.3"
Avg. Riffle Width	2 @ 3 ft	2 @ 3 ft	15 ft	
Riffle Velocity	1.5'/sec	1.5'/sec	1.0'/sec	1.3'/s
% Canopy Cover	0%	0%	25%	
Substrate Complex	1	1	1-4	
Embeddedness	0	0	60%	
Substrate Composition				
Silt (<0.1")	-	-	-	
Sand (0.1 -0.2")	-	-	20%	
Gravel (0.2 -2")	-	-	5%	
Cobble (2-10")	-	-	30%	
Boulder (>10")	-	-	50-75%	
Bedrock/Solid	-	-	-	
concrete	100%	100%		
Substrate consolidation	20	20	14	
Percent Gradient	4 in / 6 ft	4 in / 6 ft	4 in / 6 ft	

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: LA River / LA River
DATE/ TIME: 4 Oct 2006 / 1507
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 12
SITE DESCRIPTION: LA River just upstream of 110 fwy

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

4 Oct 2006 Sk-12 LADPW

California Department of Fish and Game
Aquatic Bioassessment Laboratory

LA River

Water Pollution Control Laboratory
Revision Date-- May 1999

Parameters to be evaluated in an area longer than the sampling reach

Habitat Parameter	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Left Bank	(10) 9	8 7 6	5 4 3	2 1 0
Right Bank	(10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Left Bank	10 9	8 7 6	5 4 (3)	2 1 0
Right Bank	10 9	8 7 6	5 4 3	(2) 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Left Bank	10 9	8 7 6	5 4 (3)	(2) 1 0
Right Bank	10 9	8 7 6	5 4 (3)	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Los Angeles/Los Angeles River DATE/TIME 30 Oct 2006/0855

PROJECT **LACDPW** SAMPLE ID 13

SITE DESCRIPTION LAR 150 yds downstream of Burbank Blvd

SAMPLING CREW
DO/EG

SITE INFORMATION
Latitude 34.16974
Longitude -118.47655
Elevation
COMMENTS:
Sour chemical/moss.
filter algae. Poor Habitat 4.3

WATER QUALITY MEASUREMENTS	
WATER TEMP.	22.4°C
CONDUCTANCE	1335 µS/cm
pH	7.76
DISS. OXYGEN	4.25 mg/L
CHLOROPHYLL	34.0 µg/L
TURBIDITY	44 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	25 ft	25 ft	30 ft
Riffle Depth	5 in	3 in	5 in
Avg. Riffle Width	20 ft	20 ft	15 ft
Riffle Velocity	1.2'/sec	1.3'/sec	1.2'/sec
% Canopy Cover	0	0	0
Substrate Complex	2	4	4
Embeddedness	0	30%	10%
Substrate Composition			
Silt (<0.1")	—	5%	5%
Sand (0.1 -0.2")	5%	25%	10%
Gravel (0.2 -2")	—	5%	5%
Cobble (2-10")	5%	—	—
Boulder (>10")	5%	—	—
Bedrock/Solid concrete	85%	~~70%~~ 65%	80%
Substrate consolidation	18	15	16
Percent Gradient	2.5%/ft	1%/ft	1.5%/ft

1.2'/sec

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Los Angeles / Los Angeles River
DATE/ TIME: 3 Oct 2006 / 0855
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 13
SITE DESCRIPTION: LAR 150 yards downstream of Burbank Blvd

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

LACDPW St. 13 30d 2006

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

LA River

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	5 4 (3)	2 1 0
	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 (3)	2 1 0
	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Ballona / Ballona Creek DATE/TIME 10 Oct 2006 / 09 15

PROJECT **LACDPW** SAMPLE ID L4

SITE DESCRIPTION Ballona Ck. 50 yds upstream of Sepulveda Blvd Bridge

SAMPLING CREW
D. Owen
D. Simon

SITE INFORMATION	
Latitude	34° 00.016' N
Longitude	118° 24.005' W
Elevation	
COMMENTS:	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	18.54°C
CONDUCTANCE	1363 µS/cm
pH	8.38
DISS. OXYGEN	12.46 mg/L
CHLOROPHYLL	4.6 mg/L
TURBIDITY	1.7 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 150m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	6 ft	6 ft	6 ft
Riffle Depth	4 in	4 in	4 in
Avg. Riffle Width	32 ft	32 ft	32 ft
Riffle Velocity	2 ft/s	1.9 ft/s	1.7 ft/s
% Canopy Cover	0 %	0 %	0 %
Substrate Complex	1	1	1
Embeddedness	0 %	0 %	0 %
Substrate Composition			
Silt (<0.1")	—	—	—
Sand (0.1 -0.2")	1 %	1 %	1 %
Gravel (0.2 -2")	1 %	1 %	—
Cobble (2-10")	—	—	1 %
Boulder (>10")	—	—	—
Bedrock/Solid	—	—	—
Concrete	98 %	98 %	98 %
Substrate consolidation	20	20	20
Percent Gradient	0.5 in/6 ft	0.5 in/6 ft	2.5 in/6 ft

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Ballona/Ballona Ck
COMPANY/ AGENCY: Weston
SITE DESCRIPTION: Ballona Ck / 50 yds upstream of Sepulveda Blvd Bridge

DATE/ TIME: 10/4/2006 / 0815
SAMPLE ID NUMBER: 14

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	5 4 3	2 1 (0)
	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 3	2 1 (0)
	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Malibu / Imedea Creek DATE/TIME 3 Oct 2006 / 1406

PROJECT **LACDPW** SAMPLE ID 15

SITE DESCRIPTION WC downstream of Kanan Rd

SAMPLING CREW
Richie

SITE INFORMATION	
Latitude	34.14943
Longitude	-118.75773
Elevation	
COMMENTS:	
P-hab is better than	
years past. Dense	
kelp shaded creek	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	23.97°C
CONDUCTANCE	3403 mS/cm
pH	8.29
DISS. OXYGEN	13.62 mg/L
CHLOROPHYLL	4.8
TURBIDITY	2.1

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3	
Riffle Length	6 ft	10 ft	12 ft	
Riffle Depth	3 in	9 in	5 in	
Avg. Riffle Width	3 ft	5 ft	5 ft	
Riffle Velocity	1.5'/sec	1.7'/sec	1.3'/sec	1.5'/s
% Canopy Cover	40%	80%	90%	
Substrate Complex	14	15	12	
Embeddedness	20%	25%	40%	
Substrate Composition				
Silt (<0.1")	—	—	5%	
Sand (0.1 -0.2")	30%	20%	60%	
Gravel (0.2 -2")	30%+40%	40%	10%	
Cobble (2-10")	50%	25%	10%	
Boulder (>10")	—	5%+5%	—	
Bedrock/Solid	—	—	—	
Roots	<5%	5%	15%	
Substrate consolidation	15	13	6	
Percent Gradient	5%/6ft	4%/6ft	4%/6ft	

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Malibu / Medea Creek
DATE/ TIME: 30 Oct 2006 / 1405
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 15
SITE DESCRIPTION: MC Downstream of Kanan Rd

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 (13) 12 (11)	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0

LACDPW 3 Oct 2006 Sta-15 Medea Creek

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
Left Bank	10 9	8 (7) 6	5 4 3	2 1 0
Right Bank	10 9	8 7 6	(5) 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Left Bank	10 9	8 (7) 6	5 4 3	2 1 0
Right Bank	10 9	8 (7) 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
Left Bank	10 9	8 7 (6)	5 4 3	2 1 0
Right Bank	10 9	8 (7) 6	5 4 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Malibu / Las Virgenes Creek DATE/TIME 30 Oct 2006 / 1207

PROJECT **LACDPW** SAMPLE ID 16

SITE DESCRIPTION LVC at LA County Line

SAMPLING CREW
DD/BC

SITE INFORMATION
Latitude 34.16953
Longitude -118.70363
Elevation
COMMENTS:
site recovering from
fire summer of 06
Thousands of Hydras

WATER QUALITY MEASUREMENTS	
WATER TEMP.	17.76
CONDUCTANCE	3969 mS/cm
pH	7.88
DISS. OXYGEN	9.02 mg/L
CHLOROPHYLL	3.7
TURBIDITY	1.0 ntu

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	15 ft	20 ft	25 ft
Riffle Depth	1.5 in	5 in	4 in
Avg. Riffle Width	12 ft	7 ft	7 ft
Riffle Velocity	.8 ft/sec	0.1 ft/sec	0.3 ft/s
% Canopy Cover	20%	20%	15%
Substrate Complex	6	5	6
Embeddedness	100%	100%	75%
Substrate Composition			
Silt (<0.1")	15%	30%	20%
Sand (0.1 -0.2")	60%	65%	60%
Gravel (0.2 -2")	20%	5%	—
Cobble (2-10")	5%	—	20%
Boulder (>10")	—	—	—
Bedrock/Solid	—	—	—
Substrate consolidation	4	1	3
Percent Gradient	4in/65ft	4in/63ft	4in/64ft

AVG 2.8"

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Malibu / Las Virgenes Creek
DATE/ TIME: 3 Oct 2006 / 1207
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 16
SITE DESCRIPTION: LVC at LA County line

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 (13) (12) 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0

3 Oct 2006 Sta. 16 1207
CWDW Las Virgenes Creek

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 (3)	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Malibu / Cold Creek ~~Los Angeles River~~ DATE/TIME 3 Oct 2006 / 1045

PROJECT **LACDPW** SAMPLE ID 17

SITE DESCRIPTION Cold Creek 75 yrds down strm at High Trail

SAMPLING CREW
EG/DO

SITE INFORMATION	
Latitude	34.09408
Longitude	-118.64811
Elevation	
COMMENTS:	
more sand than previous years. Not much, but an increase	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	15.86 °C
CONDUCTANCE	0820 µS/cm
pH	8.16
DISS. OXYGEN	9.90 mg/L
CHLOROPHYLL	0.7 mg/L
TURBIDITY	0.0 ntu

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	12 ft	15 ft	15 ft
Riffle Depth	3 in	2 in	2 in
Avg. Riffle Width	3 ft	4 ft	8 ft
Riffle Velocity	0.95'/sec	0.6'/sec	1.4'/sec
% Canopy Cover	10	35%	25%
Substrate Complex	18 - 19	19	20
Embeddedness	30%	40%	10%
Substrate Composition			
Silt (<0.1")	—	—	—
Sand (0.1 -0.2")	25%	35%	10%
Gravel (0.2 -2")	15%	20%	20%
Cobble (2-10")	40%	25%	50%
Boulder (>10")	5%	10%	10%
Bedrock/Solid	—	—	—
roots	5%		10%
Substrate consolidation	15%	15	3
Percent Gradient	5 in / 6 ft	4 in / 6 ft	3.3 in / 6 ft

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Malibu / Cold Creek
DATE/ TIME: 3 Oct 2006 / 1045
COMPANY/ AGENCY: NCRWQCB
SAMPLE ID NUMBER: 17
SITE DESCRIPTION: Cold Creek 75 yards down Stokes Trail

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 (16)	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0

LADPW St. 17 3 Oct 2006 Cold Creek

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	SUBOPTIMAL	MARGINAL	POOR
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 (9)	(8) 7 6	5 4 3	2 1 0
	Right Bank 10 9	(8) 7 6	5 4 3	2 1 0

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Malibu / Triunfo Creek DATE/TIME 3 Oct 2006 / 1510

PROJECT **LACDPW** SAMPLE ID 18

SITE DESCRIPTION TC at Peter Strauss Ranch/Park

SAMPLING CREW
EG/DO

SITE INFORMATION	
Latitude	34.11360
Longitude	-118.77896
Elevation	
COMMENTS:	
Many large rocks embedded	

WATER QUALITY MEASUREMENTS	
WATER TEMP.	20.94 °C
CONDUCTANCE	1624 mS/cm
pH	8.16
DISS. OXYGEN	7.99 mg/L
CHLOROPHYLL	0.6 mg/L
TURBIDITY	<1.0 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 100 m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	15 ft	15 ft	15 ft
Riffle Depth	3 in	3 in	3 in
Avg. Riffle Width	8 ft	6 ft	12 ft
Riffle Velocity	1.5'/sec	1.7'/sec	1.1'/sec
% Canopy Cover	5%	5%	15%
Substrate Complex	17	15	14
Embeddedness	35%	25%	35%
Substrate Composition			
Silt (<0.1")	—	—	—
Sand (0.1 -0.2")	10%	15%	20%
Gravel (0.2 -2")	35%	30%	35%
Cobble (2-10")	40%	55%	45%
Boulder (>10")	15%	—	—
Bedrock/Solid	—	—	—
Substrate consolidation	15	15	14
Percent Gradient	6in/5ft	4in/6ft	3in/6ft

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Malibu / Trancas Creek
DATE/ TIME: 3 Oct 2006 / 1510
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 18
SITE DESCRIPTION: TC at Peter Strauss Ranch

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

30 Oct 2006 Sta. 18 LADPW
Trunfo Creek

CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE-- MAY 1999

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 7 6	5 4 (3)	2 1 0
	Right Bank 10 9	8 7 6	(5) 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	(8) 7 6	5 4 3	2 1 0
	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0

WESTON SOLUTIONS

STREAM BIOASSESSMENT FIELD DATA SHEET

WATERSHED/STREAM Dominguez/Dominguez Channel DATE/TIME 10 Oct 2006

PROJECT **LACDPW** SAMPLE ID 19

SITE DESCRIPTION Dominguez Channel, 25 yds downstream of Normandie Bridge

SAMPLING CREW
D. Ona
D. Simon

SITE INFORMATION	
Latitude	33° 52.276' N
Longitude	118° 17.909' W
Elevation	
COMMENTS:	Site moved 1/2 mi upstream due to tidal influence (cond ~26,000)

WATER QUALITY MEASUREMENTS	
WATER TEMP.	19.64 °C
CONDUCTANCE	1001 µS/cm*
pH	8.69
DISS. OXYGEN	14.89 mg/L
CHLOROPHYLL	6.2 µg/L
TURBIDITY	1.3 NTU

Additional observations (water odor, color, siltation, algae growth, etc.):

PHYSICAL HABITAT CHARACTERISTICS

REACH LENGTH 150 m

	Riffle 1	Riffle 2	Riffle 3
Riffle Length	6 ft	6 ft	6 ft
Riffle Depth	7 in	7 in	7 in
Avg. Riffle Width	9 ft	9 ft	9 ft
Riffle Velocity	1.1 ft/s	1.1 ft/s	1.1 ft/s
% Canopy Cover	0%	0%	0%
Substrate Complex	1	1	1
Embeddedness	5%	5%	5%
Substrate Composition			
Silt (<0.1")	—	-	—
Sand (0.1 -0.2")	3%	8%	—
Gravel (0.2 -2")	2%	2%	3%
Cobble (2-10")	—	—	2%
Boulder (>10")	—	—	—
Bedrock/Solid	—	—	—
Concrete	95%	90%	95%
Substrate consolidation	19	19	19
Percent Gradient	1 in/6 ft	1 in/6 ft	1 in/6 ft

*cond measured 3X

O:\BLANK FORMS\Benthic\Bioassessment\bioassessment field data.xls

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: Pamingue/ Dominguez Channel
DATE/ TIME: 10 06 2005 / 0940
COMPANY/ AGENCY: Weston
SAMPLE ID NUMBER: 19
SITE DESCRIPTION: Dominguez Channel / 25 yds Downstream of Normandie Bridge

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 (19) 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 (0)
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	5 4 3	2 1 (0)
	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 3	2 1 (0)
	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)